

Canadian Mathematical Society
Société mathématique du Canada

CMS
SUMMER MEETING
PROGRAMME
RÉUNION D'ÉTÉ
DE LA SMC

2026



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CMS Summer Meeting 2026 | Réunion d'été 2026 de la SMC
University of New Brunswick
Saint John, NB

Friday Vendredi June 5 juin	Saturday Samedi June 6 juin	Sunday Dimanche June 7 juin	Monday Lundi June 8 juin
8:00 - 19:30 Registration Inscription	7:30 - 17:00 - Registration Inscription 8:30 - 16:30 - Poster Session d'affiches 10:00 - 16:30 - Exhibits Expositions	7:30 - 18:00 - Registration Inscription 8:30 - 16:30 - Poster Session d'affiches 10:00 - 16:30 - Exhibits Expositions	7:30 - 18:00 Registration Inscription
9:00 - 12:00 CMS Mini-Courses Mini-cours de la SMC	8:00 - 10:30 Scientific Sessions Sessions Scientifiques	8:00 - 10:30 Scientific Sessions Sessions Scientifiques	8:00 - 10:30 Scientific Sessions Sessions Scientifiques
	10:30 - 11:00 Break Pause	10:30 - 11:00 Break Pause	10:30 - 11:00 Break Pause
12:30 - 16:30 CMS Board of Directors Meeting Réunion du Conseil d'administration SMC	11:00 - 12:00 Dr. Jhonel Morvan Education Plenary Lecture Conférence sur l'éducation	11:00 - 12:00 Dr. Niky Kamran Plenary Lecture Conférence plénière	11:00 - 12:00 Dr. Julia Gordon Plenary Lecture Conférence plénière
	12:00 - 13:30 Break Pause 12:00 - 13:30 CMS AGM AGA de la SMC	12:00 - 13:30 Break Pause	12:00 - 13:30 Break Pause
	13:30 - 14:30 Dr. Wesley Burr Excellence in Teaching Lecture Conférence du Prix d'excellence en enseignement	13:30 - 14:30 Dr. Yu-Ru Liu Krieger-Nelson Prize Lecture Conférence de prix Krieger- Nelson	13:30 - 16:30 Scientific Sessions Sessions Scientifiques
	14:30 - 15:00 Break Pause	14:30 - 15:00 Break Pause	
17:00 - 18:15 Dr. Anthony Bonato Opening Remarks and Public Lecture Mot d'ouverture et conférence publique	15:00 - 18:00 Scientific Sessions Sessions Scientifiques	15:00 - 18:00 Scientific Sessions Sessions Scientifiques	
18:00 - 19:00 Welcome Reception & BBQ Réception & BBQ	19:00 - 22:00 Reception and Awards Banquet Réception et banquet de prix		
19:30 - 21:00 Student Social Soirée étudiante			





Saturday | Samedi

#	ROOM SALLE	SATURDAY SAMEDI AM	SATURDAY SAMEDI PM
1	Hans W. Klohn Commons	Education Expo <i>Expo d'éducation</i>	
2	GH 115	Problems in Graph Searching <i>Problèmes de recherche dans les graphes</i>	
3	GH 215	Combinatorial Design Theory <i>Théorie des plans combinatoires</i>	
4	GH 313	Geometric Group Theory <i>Théorie géométrique des groupes</i>	
5	HH 125	Teaching and learning of university mathematics: how have things evolved (or not)? <i>Enseignement et apprentissage des mathématiques universitaires : comment les choses ont-elles évolué (ou non) ?</i>	
6	HH 126	Homotopy Theory <i>Théorie de l'homotopie</i>	
7	HH 225	Applied Dynamical Systems and Mathematical Biology <i>Systèmes dynamiques appliqués et biologie mathématique</i>	
8	HH 232	Combinatorial Game Theory <i>Théorie combinatoire des jeux</i>	
9	IH 107		Geometry and Quantization <i>Géométrie et quantification</i>
10	OH 104	Mathematical Physics <i>Physique mathématique</i>	



Sunday | Dimanche

#	ROOM SALLE	SUNDAY DIMANCHE AM	SUNDAY DIMANCHE PM
1	GH 115	Problems in Graph Searching <i>Problèmes de recherche dans les graphes</i>	
2	GH 215	Combinatorial Design Theory <i>Théorie des plans combinatoires</i>	
3	GH 313	Structural and Algorithmic Graph Theory <i>Théorie structurelle et algorithmique des graphes</i>	
4	HH 125	Noncommutative Geometry and Applications <i>Géométrie non commutative et applications</i>	
5	HH 126	Homotopy Theory <i>Théorie de l'homotopie</i>	Student Research Sessions <i>Sessions de recherche des étudiants</i>
6	HH 225	Applied Dynamical Systems and Mathematical Biology <i>Systèmes dynamiques appliqués et biologie mathématique</i>	
7	HH 232	Combinatorial Game Theory <i>Théorie combinatoire des jeux</i>	
8	IH 107	Geometry and Quantization <i>Géométrie et quantification</i>	
9	OH 104	Automorphic forms and representations <i>Formes automorphes et représentations</i>	
10	OH 105	Category Theory <i>Théorie des catégories</i>	
11	OH 208	Mathematical Modelling of Fisheries Dynamics and Management <i>Modélisation mathématique de la dynamique et de la gestion des pêches</i>	Theory and applications of scientific machine learning <i>Théorie et applications de l'apprentissage automatique scientifique</i>



Monday | Lundi

#	ROOM SALLE	MONDAY LUNDI AM	MONDAY LUNDI PM
1	GH 313	Structural and Algorithmic Graph Theory <i>Théorie structurelle et algorithmique des graphes</i>	
2	IH 107		Geometry and Quantization <i>Géométrie et quantification</i>
3	OH 104	Automorphic forms and representations <i>Formes automorphes et représentations</i>	
4	OH 105	Category Theory <i>Théorie des catégories</i>	



President's Welcome Letter



On behalf of the Canadian Mathematical Society, it is my great pleasure to welcome you to Saint John, New Brunswick, for the 2026 CMS Summer Meeting. Hosted by the University of New Brunswick Saint John, this year's meeting brings together mathematicians, students, and educators from across Canada and beyond for several days of collaboration, discovery, and engaging mathematical exchange.

Under the leadership of the Scientific Directors, Dr. Tim Alderson and Dr. Andrea Burgess (both from UNB Saint John), and with the support of a dedicated organizing committee, the program features a diverse selection of scientific and educational sessions. I am confident that participants will find many opportunities to explore new ideas, share their work, and connect with colleagues across a wide range of mathematical disciplines.

The meeting will open with a Public Lecture by Dr. Anthony Bonato (Toronto Metropolitan University), followed by plenary and prize lectures from distinguished speakers, including Dr. Julia Gordon (UBC), Dr. Niky Kamran (McGill), Dr. Jhonel Morvan (Université de l'Ontario français), Dr. Wesley Burr (Trent University), and Dr. Yu-Ru Liu (Waterloo). Highlights of the program include the student poster session, the CMS Annual General Meeting, and the Spectra lunch social.

At the banquet on Saturday June 6, we will celebrate the achievements of this year's prize winners, including Dr. Wesley Burr (Excellence in Teaching Award) and Dr. Yu-Ru Liu (Krieger-Nelson Prize). The banquet will take place at Lily Lake Pavilion, offering a memorable opportunity to gather and celebrate together.

Events of this scale are made possible through the commitment and generosity of many individuals and organizations. I would like to thank the scientific directors, organizing committee members, session organizers, speakers, volunteers, staff, and our host institution for their hard work. I also extend our gratitude to our sponsors, whose support is essential to the success of the meeting: the Tutte Institute, the Atlantic Association for Research in the Mathematical Sciences (AARMS), the Centre de recherches mathématiques (CRM), the Fields Institute, and the Pacific Institute for the Mathematical Sciences (PIMS).

To all participants, I hope you find this meeting both stimulating and rewarding. May it inspire new ideas, foster meaningful collaborations, and strengthen our mathematical community. If you are not yet a CMS member, I encourage you to visit the registration desk to learn more about the Society's programs and initiatives.

Wishing you an enjoyable and productive conference,

Dr. Ilia Binder (University of Toronto)
President, Canadian Mathematical Society



Lettre de bienvenue du Président



Au nom de la Société mathématique du Canada, j'ai le grand plaisir de vous souhaiter la bienvenue à Saint John, au Nouveau-Brunswick, pour la Réunion d'été 2026 de la SMC. Accueilli par l'Université du Nouveau-Brunswick à Saint John, cette conférence réunit cette année des mathématicien(ne)s, des étudiant(e)s et des éducateur(trice)s de partout au Canada et d'ailleurs pour plusieurs jours de collaboration, de découvertes et d'échanges mathématiques enrichissants.

Sous la direction des directeurs scientifiques, le Dr Tim Alderson et la Dre Andrea Burgess (tous deux de l'UNB Saint John), et avec le soutien d'un comité organisateur dévoué, le programme propose une sélection variée de sessions scientifiques et d'éducation. Je suis convaincu que les participant(e)s y trouveront de nombreuses occasions d'explorer de nouvelles idées, de présenter leurs travaux et d'échanger avec des collègues issus d'un large éventail de disciplines mathématiques.

La réunion débutera par une conférence publique du Dr Anthony Bonato (Toronto Metropolitan University), suivie de conférences plénières et de conférences de prix données par d'éminent(e)s conférencier(ère)s, dont la Dre Julia Gordon (UBC), le Dr Niky Kamran (McGill), le Dr Jhonel Morvan (Université de l'Ontario français), le Dr Wesley Burr (Université Trent) et la Dre Yu-Ru Liu (Waterloo). Parmi les moments forts du programme figurent la session d'affiches étudiantes, l'assemblée générale annuelle de la SMC et le dîner social Spectra.

Lors du banquet du samedi 6 juin, nous célébrerons les réalisations des lauréat(e)s de cette année, notamment le Dr Wesley Burr (Prix d'excellence en enseignement) et la Dre Yu-Ru Liu (Prix Krieger-Nelson). Le banquet aura lieu au pavillon du lac Lily, offrant une occasion mémorable de se réunir et de célébrer ensemble.

Des événements de cette envergure sont rendus possibles grâce à l'engagement et à la générosité de nombreuses personnes et organisations. Je tiens à remercier les directeurs scientifiques, les membres du comité organisateur, les organisateur(trice)s de sessions, les orateur(trice)s bénévoles, le personnel ainsi que notre établissement hôte pour leur travail acharné. J'exprime également notre reconnaissance à nos commanditaires, dont le soutien est essentiel au succès du congrès : l'Institut Tutte, l'Atlantic Association for Research in the Mathematical Sciences (AARMS), le Centre de recherches mathématiques (CRM), le Fields Institute et le Pacific Institute for the Mathematical Sciences (PIMS).

À tou(te)s les participant(e)s, je vous souhaite une conférence à la fois stimulante et enrichissante. Puissent ces journées inspirer de nouvelles idées, favoriser des collaborations significatives et renforcer notre communauté mathématique. Si vous n'êtes pas encore membre de la SMC, je vous invite à visiter le bureau d'inscription pour en apprendre davantage sur les programmes et les initiatives de la Société.

Je vous souhaite une réunion agréable et productif,

Dr Ilia Binder (Université de Toronto)
Président, Société mathématique du Canada



Scientific Directors Directeurs scientifiques



Dr. Tim Alderson
University of New Brunswick, Saint John



Dr. Andrea Burgess
University of New Brunswick, Saint John

Scientific Organizing Committee Comité scientifique organisateur



Dr. Andrijana Burazin
University of Toronto, Mississauga



Dr. Tatyana Baron
Western University



Dr. Ailana Fraser
University of British Columbia



Dr. Dorette Pronk
Dalhousie University



Dr. Peter Selinger
Dalhousie University



Dr. Nicholas Touikan
University of New Brunswick



Scientific Director's Welcome Letter



We are delighted to welcome you to the 2026 Canadian Mathematical Society Summer Meeting, taking place at the University of New Brunswick Saint John campus. Overlooking the Saint John River and the Bay of Fundy, this historic port city offers a spectacular setting for our gathering.

Saint John is Canada's oldest incorporated city, shaped by the dramatic rhythm of the world's highest tides and a rich legacy of innovation, industry, and community. We encourage you to

explore Uptown Saint John, stroll along the Harbour Passage waterfront, and discover the natural beauty of the surrounding region during your stay.

This year's scientific program exhibits the depth, breadth, and vitality of the Canadian mathematical community. We are excited to bring together students, postdoctoral fellows, educators, and researchers from across Canada and beyond. The program features outstanding plenary lectures by Julia Gordon, Niky Kamran, and Jhonel Morvan, and a public lecture by Anthony Bonato. A rich variety of thematic sessions will cover both foundational mathematics and exciting emerging areas.

We have also planned strong programming for students, including dedicated sessions and social events. As always, we hope you will take full advantage of the informal moments throughout the meeting, over coffee between sessions, or during evening gatherings, where new ideas spark and future collaborations begin.

We would like to extend our warmest thanks to the members of the Scientific Organizing Committee, the session organizers, our dedicated volunteers, the CMS staff, and our generous sponsors for making this meeting possible.

Thank you for joining us. We wish you a stimulating, productive, and enjoyable meeting in Saint John.

The Scientific Directors
Tim Alderson and Andrea Burgess



Lettre de bienvenue des Directeurs scientifiques



Nous sommes ravis de vous accueillir à la Réunion d'été 2026 de la Société mathématique du Canada, qui se tiendra sur le campus de Saint John de l'Université du Nouveau-Brunswick. Surplombant la rivière Saint-Jean et la baie de Fundy, cette ville portuaire historique offre un cadre spectaculaire pour notre rassemblement.

Saint John est la plus ancienne ville constituée en municipalité du Canada, façonnée par le rythme spectaculaire des marées les plus hautes du monde

et par un riche héritage d'innovation, d'industrie et de vie communautaire. Nous vous encourageons à explorer le quartier Uptown de Saint John, explore Uptown Saint John, à flâner le long du front de mer Harbour Passage et à découvrir la beauté naturelle de la région environnante pendant votre séjour.

Le programme scientifique de cette année témoigne de la richesse, de l'étendue et du dynamisme de la communauté mathématique canadienne. Nous sommes ravis de réunir des étudiant(e)s, des postdoctorant(e)s, des pédagogues et des chercheur(euse)s venu(e)s de tout le Canada et d'ailleurs. Le programme comprend d'excellentes conférences plénières données par Julia Gordon, Niky Kamran et Jhonel Morvan, ainsi qu'une conférence publique d'Anthony Bonato. Une grande variété de sessions thématiques couvrira à la fois les mathématiques fondamentales et des domaines émergents passionnants.

Nous avons également prévu une programmation solide pour les étudiant(e)s, comprenant des sessions qui leur sont dédiées ainsi que des événements sociaux. Comme toujours, nous espérons que vous profiterez pleinement des moments informels tout au long de la conférence, autour d'un café entre les sessions ou lors des rencontres en soirée, où naissent de nouvelles idées et où se nouent de futures collaborations.

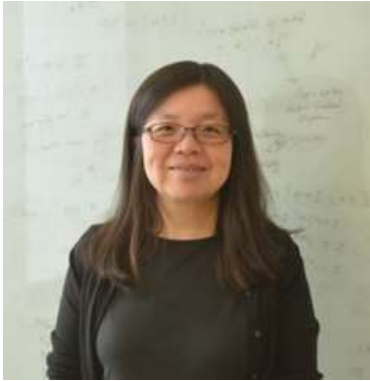
Nous tenons à adresser nos plus vifs remerciements aux membres du comité scientifique d'organisation, aux organisateur(trice)s des sessions, à nos bénévoles dévoués, au personnel de la SMC et à nos généreux commanditaires, qui ont rendu cette réunion possible.

Merci de vous joindre à nous. Nous vous souhaitons une réunion stimulante, productive et agréable à Saint John.

Les Directeurs scientifiques
Tim Alderson et Andrea Burgess



Prix Krieger-Nelson Prize



The CMS has awarded the 2026 Krieger-Nelson Prize to Dr. Yu-Ru Liu (University of Waterloo) in recognition of her outstanding contributions to analytic number theory. Internationally respected, her research focuses on number theory over function fields, advancing understanding of arithmetic distributions and connections with classical problems over the integers.

Dr. Liu earned her Ph.D. from Harvard University and has been a faculty member at Waterloo since 2003, becoming a full professor in 2013. Her work on Waring's problem in function fields introduced new techniques that overcame longstanding limitations, significantly influencing the use of the circle method in positive characteristic. She has also contributed to probabilistic number theory, elliptic curves, and related areas.

In addition to her research, Dr. Liu is a dedicated mentor and leader, supervising numerous students and supporting women in math through leadership roles at CMS and Waterloo.



La SMC a décerné le prix Krieger-Nelson 2026 à la Dre Yu-Ru Liu (Université de Waterloo) en reconnaissance de ses contributions exceptionnelles à la théorie analytique des nombres. Reconnue à l'échelle internationale, ses travaux portent sur la théorie des nombres sur les corps de fonctions, faisant progresser la compréhension de la distribution des objets arithmétiques et des liens avec des problèmes classiques sur les entiers.

La Dre Liu a obtenu son doctorat à l'Université Harvard et est professeure à Waterloo depuis 2003, où elle a été promue professeure titulaire en 2013. Ses travaux sur le problème de Waring dans les corps de fonctions ont introduit de nouvelles méthodes permettant de surmonter des limitations de longue date, influençant de manière significative l'utilisation de la méthode du cercle en caractéristique positive. Elle a également contribué à la théorie probabiliste des nombres, aux courbes elliptiques et à des domaines connexes.

En plus de ses recherches, la Dre Liu est une mentore et une leader engagée, ayant supervisé de nombreux(euses) étudiant(e)s et soutenant les femmes en mathématiques grâce à ses rôles de leadership à la SMC et à Waterloo.



Excellence in Teaching Award Prix d'excellence en enseignement



The CMS has awarded the 2026 Excellence in Teaching Award to Dr. Wesley Burr (Trent University) in recognition of his outstanding contributions to mathematics and statistics education. An Associate Professor and Chair at Trent, Dr. Burr has played a transformative role in undergraduate statistics education since joining the university in 2016.

Dr. Burr is known for his innovative and student-centered teaching practices, including the redevelopment of Trent's mathematics and statistics curriculum. He has designed and revised numerous courses that integrate theoretical understanding with practical computational skills, often using real data and the R programming language. He is also a pioneer of mastery-based grading, an approach that emphasizes learning and improvement while reducing student stress.

Beyond the classroom, Dr. Burr has strengthened teaching infrastructure through initiatives such as implementing WeBWorK and developing cloud-based tools for computational learning. He is also a dedicated mentor and an active leader in statistics education at the national and international levels.



La SMC a décerné le Prix d'excellence en enseignement 2026 au Dr Wesley Burr (Université Trent) en reconnaissance de ses contributions exceptionnelles à l'enseignement des mathématiques et de la statistique. Professeur agrégé et directeur du département à Trent, le Dr Burr a joué un rôle transformateur dans l'enseignement de la statistique au premier cycle depuis son arrivée en 2016.

Le Dr Burr est reconnu pour ses approches pédagogiques innovantes et centrées sur les étudiant(e)s, notamment la refonte du programme de mathématiques et de statistique de Trent. Il a conçu et révisé de nombreux cours intégrant compréhension théorique et compétences pratiques en calcul, souvent à l'aide de données réelles et du langage de programmation R. Il est également un pionnier de l'évaluation par maîtrise, qui met l'accent sur l'apprentissage et l'amélioration continue tout en réduisant le stress des étudiants.

Au-delà de la salle de classe, il a renforcé les infrastructures pédagogiques, notamment par l'implantation de WeBWorK et le développement d'outils infonuagiques. Mentor dévoué et leader actif en éducation statistique, il a également joué un rôle important aux niveaux national et international.

List of Abbreviations Liste des abréviations

ApDySys	Applied Dynamical Systems and Mathematical Biology Systèmes dynamiques appliqués et biologie mathématique
AutoFoR	Automorphic forms and representations Formes automorphes et représentations
CatTheo	Category Theory Théorie des catégories
ComDThe	Combinatorial Design Theory Théorie des plans combinatoires
ComGThe	Combinatorial Game Theory Théorie combinatoire des jeux
ExTea	Excellence in Teaching Award Prix d'excellence en enseignement
GeoQua	Geometry and Quantization Géométrie et quantification
GGTheo	Geometric Group Theory Théorie géométrique des groupes
HomThe	Homotopy Theory Théorie de l'homotopie
KriNel	Krieger-Nelson Prize Prix Krieger-Nelson
MachLea	Theory and applications of scientific machine learning Théorie et applications de l'apprentissage automatique scientifique
MathPhy	Mathematical Physics Physique mathématique
MModFis	Mathematical Modelling of Fisheries Dynamics and Management Modélisation mathématique de la dynamique et de la gestion des pêches
NocommG	Noncommutative Geometry and Applications Géométrie non commutative et applications
PlenL	Plenary Lectures Conférences plénières
Poster	AARMS-CMS Student Poster Session Présentations par affiches des étudiants - AARMS-SMC
ProGraS	Problems in Graph Searching Problèmes de recherche dans les graphes (graph searching)
PubL	Public Lecture Conférence publique
StrAlGT	Structural and Algorithmic Graph Theory Théorie structurelle et algorithmique des graphes
StuRes	Student Research Session Séance de recherche étudiante
Teachor	Teaching and learning of university mathematics: how have things evolved (or not)? Enseignement et apprentissage des mathématiques universitaires : comment les choses ont-elles évolué (ou non) ?

**Schedule for Business Meetings
Horaire pour Séances de travail**

Friday June 5

vendredi 5 juin

12:30 - 16:30 CMS Board of Directors Meeting / Réunion du Conseil d'administration SMC, OH 105

Saturday June 6

samedi 6 juin

12:00 - 13:30 CMS AGM / L'AGA de la SMC, GH 115

Schedule for Related Activities Horaire pour Activités sociales

Friday June 5

vendredi 5 juin

17:00 - 17:15 Opening and Welcome / Ouverture et bienvenue, Ganong Hall Lecture Theatre

19:00 - 21:30 Student Social / Soirée étudiante, Thomas J. Condon Student Centre Whitebone Pizzeria Cafeteria

Saturday June 6

samedi 6 juin

10:30 - 11:00 Break / Pause, Ganong Hall Gallery and Foyer

13:00 - 14:00 AARMS-CMS Student Poster Session, Ganong Hall Gallery and Foyer

14:30 - 15:00 Break / Pause, Ganong Hall Gallery and Foyer

18:15 - 19:15 Welcome Reception / Réception de bienvenue, Ganong Hall Gallery and Foyer

19:00 - 22:00 Awards Banquet / Banquet de prix, Lily Lake Pavilion

Sunday June 7

dimanche 7 juin

10:30 - 11:00 Break / Pause, Ganong Hall Gallery and Foyer

14:30 - 15:00 Break / Pause, Ganong Hall Gallery and Foyer

Monday June 8

lundi 8 juin

10:30 - 11:00 Break / Pause, Ganong Hall Gallery and Foyer

13:00 - 13:30 Break / Pause, Ganong Hall Gallery and Foyer

Schedule Horaire

Friday June 5

vendredi 5 juin

17:00 - 17:15	Opening and Welcome / Ouverture et bienvenue, Social, Ganong Hall Lecture Theatre
17:15 - 18:15	Anthony Bonato (Toronto Metropolitan University), <i>Math Memes for the Math-Inclined and Whoever Else Comes to Public Math Lectures</i> , PubL (p. 21), Ganong Hall Lecture Theatre
19:00 - 21:30	Student Social / Soirée étudiante, Social, Thomas J. Condon Student Centre Whitebone Pizzeria Cafeteria

Saturday June 6

samedi 6 juin

8:00 - 8:30	Adrian Chitan (Western), <i>Stratification and Quantization of Chern-Simons Phase Space: Towards Witten's Asymptotic Conjecture</i> , MathPhy (p. 68), OH 104
8:00 - 8:30	Rebecca McKay (University of New Brunswick, Saint John), <i>University mathematics education is always changing but maybe in the same ways</i> , Teachor (p. 88), HH 125
8:00 - 8:30	Teddy Mishura (Toronto Metropolitan University), <i>Cooling Generalized Hypercubes</i> , ProGraS (p. 78), GH 115
8:30 - 9:00	Daniel Almeida (University of Ottawa), <i>Strictification of models of generalized algebraic theories</i> , HomThe (p. 59), HH 126
8:30 - 9:00	Anthony Bonato (Toronto Metropolitan University), <i>What we know and what we don't know about cooling</i> , ProGraS (p. 76), GH 115
8:30 - 9:00	Peter Danziger (Toronto Metropolitan University), <i>A complete solution to the directed Oberwolfach problem of order 2 mod 4 with cycles of even lengths</i> , ComDThe (p. 45), GH 215
8:30 - 9:00	Connell McCluskey (Wilfrid Laurier University), <i>Global Stability of Epidemic Models with Uniform Susceptibility</i> , ApDySys (p. 28), HH 225
8:30 - 9:00	Todd Mullen (University of Prince Edward Island), <i>Reaction is necessary (but is it sufficient?)</i> , Teachor (p. 88), HH 125
8:30 - 9:00	Wenjun Niu (Perimeter), <i>Line operators and BPS algebras</i> , MathPhy (p. 69), OH 104
9:00 - 9:30	Dandan Hu (Memorial), <i>Dynamical analysis in a nonlocal delayed reaction-diffusion tumor model with therapy</i> , ApDySys (p. 27), HH 225
9:00 - 9:30	Marie Rose Jerade (University of Ottawa), <i>The Honeymoon Oberwolfach Problem: A Recursive Approach</i> , ComDThe (p. 46), GH 215
9:00 - 9:30	Trent Marbach (Acadia University), <i>Between Burning and Cooling: Liminal Burning on Graphs</i> , ProGraS (p. 77), GH 115
9:00 - 9:30	Dorette Pronk (Dalhousie University), <i>Examples of Orthogonal Factorization Systems for Double Categories</i> , HomThe (p. 61), HH 126
9:00 - 9:30	Meghan Allen Rose (Mount Allison University), <i>Breaking out of online echo chambers: is the manosphere influencing classroom behaviour?</i> , Teachor (p. 89), HH 125
9:00 - 9:30	Ruben Sandapen (Acadia), <i>Conformal inversion in the internal light-front dynamics of a pion</i> , MathPhy (p. 69), OH 104
9:00 - 9:30	Nicholas Toukian (University of New Brunswick), GGTheo (p. 53), GH 313
9:30 - 10:00	Masoomeh Akbari (University of Ottawa), <i>On the generalized honeymoon Oberwolfach problem</i> , ComDThe (p. 44), GH 215
9:30 - 10:00	Matthew Alexander (Regina), <i>Hopf-Frobenius Gauge Theories</i> , MathPhy (p. 67), OH 104
9:30 - 10:00	Theofanis Chatzidiamantis-Christoforidis (Western University), <i>Fixed Point Properties in Homotopy Type Theory</i> , HomThe (p. 60), HH 126
9:30 - 10:00	Fatima Islam (University of New Brunswick), <i>Impact of Dispersal on Total Equilibrium Biomass in Patch-Structured Logistic Models.</i> , ApDySys (p. 27), HH 225
9:30 - 10:00	Margaret-Ellen Messinger (Mount Allison University), <i>The Infectious Vaccination Problem, Part 1</i> , ProGraS (p. 78), GH 115
9:30 - 10:00	Alyssa Sankey (University of New Brunswick), <i>Reflections on academic apathy</i> , Teachor (p. 89), HH 125
9:30 - 10:00	Diana Vizcaino (Memorial University), <i>Finiteness of Homological Dehn Functions</i> , GGTheo (p. 53), GH 313
10:00 - 10:30	Shiheng Fan (Memorial), <i>Global dynamics of two-species competition reaction-diffusion systems in a time-varying domain</i> , ApDySys (p. 26), HH 225
10:00 - 10:30	Melissa Huggan (Vancouver Island University), <i>The Infectious Vaccination Problem, Part II</i> , ProGraS (p. 76), GH 115
10:00 - 10:30	Miroslav Lovric (McMaster University), <i>Mathematical habits of mind in the 2020s</i> , Teachor (p. 88), HH 125
10:00 - 10:30	Peter Marzlin (St Francis Xavier), <i>Locality and the phase space representation of quantum fields</i> , MathPhy (p. 68), OH 104
10:00 - 10:30	Jean Pierre Mutanguha (McGill University), <i>Bounded dynamics in various moduli spaces</i> , GGTheo (p. 53), GH 313

Saturday • samedi

10:00 - 10:30	Shahriyar Pourakbar Saffar (Memorial University), <i>On Uniquely Colourable Biclique Designs</i> , ComDThe (p. 47), GH 215
10:00 - 10:30	Deni Salja (Dalhousie University), HomThe (p. 62), HH 126
10:30 - 11:00	Break / Pause, Social, Ganong Hall Gallery and Foyer
11:00 - 12:00	Jhonel Morvan (Université de l'Ontario français), <i>What Mathematics, and for Whom Exactly?</i> , PlenL (p. 22), Ganong Hall Lecture Theatre
13:00 - 14:00	AARMS-CMS Student Poster Session, Social, Ganong Hall Gallery and Foyer
13:00 - 13:30	William Forget (Bishop's University), <i>Understanding Neural Networks Through the Knowledge Matrix</i> , Poster (p. 92), Ganong Hall Gallery and Foyer
13:00 - 13:30	Fatima Islam (University of New Brunswick), <i>Impact of Dispersal on Total Equilibrium Biomass in Patch-Structured Logistic Models.</i> , Poster (p. 92), Ganong Hall Gallery and Foyer
13:00 - 13:30	Hin Lon Lao (York University), <i>TRANSVERSAL MATROIDS AND THEIR PRESENTATIONS</i> , Poster (p. 92), Ganong Hall Gallery and Foyer
13:00 - 13:30	Marzieh Roshani (University of Manitoba), <i>Rate-Dependent Tipping in Human–Ecological Systems</i> , Poster (p. 93), Ganong Hall Gallery and Foyer
13:00 - 13:30	Aiden Taylor (University of Calgary), <i>Wavelet Optimization in Wavelet Convolutional Neural Networks</i> , Poster (p. 93), Ganong Hall Gallery and Foyer
13:00 - 13:30	Luyao Zhao (University of New Brunswick), <i>A Unified Mathematical Study of Four Within-Host Mycobacterium tuberculosis Models</i> , Poster (p. 93), Ganong Hall Gallery and Foyer
13:30 - 14:30	Wesley Burr (Trent University), <i>What and Who are Grading and Assessment For?</i> , ExTea (p. 24), Ganong Hall Lecture Theatre
14:30 - 15:00	Break / Pause, Social, Ganong Hall Gallery and Foyer
15:00 - 15:30	Matthew Alexander (formerly University of Regina), <i>A (Pr)operad of (Pr)operad algebras</i> , HomThe (p. 59), HH 126
15:00 - 15:30	Griffin Bartlett (Memorial University), <i>The Lamplighter Game on Paths with Complete Lamps</i> , ProGraS (p. 76), GH 115
15:00 - 15:30	Connor Behan (Perimeter), <i>Supercharge cohomology in holographic theories</i> , MathPhy (p. 68), OH 104
15:00 - 15:30	Simon Blackburn (Royal Holloway, University of London), <i>Tredoku Patterns</i> , ComDThe (p. 44), GH 215
15:00 - 15:30	Alex Clow (Simon Fraser University), <i>How Expressive is Digraph Placement?</i> , ComGThe (p. 49), HH 232
15:00 - 15:30	Marie MacDonald (Cornell University), <i>Balancing lessons from teaching throughout the early to mid 2020s</i> , Teacher (p. 88), HH 125
15:00 - 15:30	Catherine Pfaff (Queens University), GGTheo (p. 53), GH 313
15:00 - 15:30	Zhisheng Shuai (Central Florida), <i>A Final Size Relation for Heterogeneous Epidemic Models</i> , ApDySys (p. 29), HH 225
15:00 - 16:00	Dmitry Korotkin (Concordia University), GeoQua (p. 56), IH 107
15:30 - 16:00	Julian Christopher (Wilfrid Laurier University), <i>The effect of time delay on the global stability of infectious disease models and other dynamical systems</i> , ApDySys (p. 26), HH 225
15:30 - 16:00	Danielle Cox (Mount Saint Vincent University), <i>Evolving Perspectives</i> , Teacher (p. 88), HH 125
15:30 - 16:00	Haoyang He (Memorial University), <i>The curve complex as a coset intersection complex</i> , GGTheo (p. 52), GH 313
15:30 - 16:00	Meagan Mann (Queen's University), <i>Predicting The Cop Number Using Machine Learning</i> , ProGraS (p. 77), GH 115
15:30 - 16:00	Neil McKay (UNB Saint John), ComGThe (p. 50), HH 232
15:30 - 16:00	Laura Scull (Fort Lewis College), <i>Twisted Bredon Cohomology is a Morita Invariant</i> , HomThe (p. 62), HH 126
15:30 - 16:00	Kianoosh Skokri (University of Ottawa), <i>On the Chromatic Number of Cayley Tables of Dihedral Groups</i> , ComDThe (p. 48), GH 215
15:30 - 16:00	Chris Waddell (Perimeter), <i>On sufficient conditions for holographic scattering</i> , MathPhy (p. 69), OH 104
16:00 - 16:30	Seth Asante (UNB), <i>Deferred Cyclotomic Representations: Exact Algebraic Evaluation of Quantum Group Invariants and q-Hypergeometric Series</i> , MathPhy (p. 67), OH 104
16:00 - 16:30	Richard Cleary (Babson College & Mathematical Association of America), Teacher (p. 88), HH 125
16:00 - 16:30	Joy Cooper (University of Victoria), <i>A Fuzzy Generalization of Latin Squares</i> , ComDThe (p. 44), GH 215

Saturday • samedi

16:00 - 16:30	Peter Crooks (Utah State University), <i>Algebro-geometric symplectic slice theorems and quantization</i> , GeoQua (p. 55), IH 107
16:00 - 16:30	Tyrone Ghaswala (University of Waterloo), <i>Promoting circular orderability to left orderability</i> , GGTheo (p. 52), GH 313
16:00 - 16:30	Tomasz Maciosowski (Memorial University), <i>Exploring Invertible Subgroups of Dead-ending and Blocking Universes</i> , ComGThe (p. 50), HH 232
16:00 - 16:30	Wentao Meng (Memorial), <i>A road-field population model with climate change: forced wave patterns and stability</i> , ApDySys (p. 28), HH 225
16:00 - 16:30	Amanda Porter (University of Victoria), <i>Edge Cops and Robber on Triangle-Free Graphs</i> , ProGraS (p. 79), GH 115
16:00 - 16:30	Daniel Ramras (Indiana University Indianapolis), <i>Homotopy Pullbacks in CAT</i> , HomThe (p. 61), HH 126
16:30 - 17:00	Beth Ann Austin (Memorial University), <i>Calling in reinforcements to limit damage</i> , ProGraS (p. 75), GH 115
16:30 - 17:00	Adam Clay (University of Manitoba), <i>Borel complexity and isomorphism of bi-orderable groups</i> , GGTheo (p. 52), GH 313
16:30 - 17:00	Kaylee Devries (Wilfrid Laurier University), <i>Analysis of a General Vector Transmission Model for Infectious Disease Spread</i> , ApDySys (p. 26), HH 225
16:30 - 17:00	Shashen Gounden (University of Regina), <i>Steenrod's cohomology realization problem for some monomial ideal rings</i> , HomThe (p. 60), HH 126
16:30 - 17:00	Alex Meadows (St. Mary's College of Maryland), <i>Joy and Complexity of Blokus Games</i> , ComGThe (p. 50), HH 232
16:30 - 17:00	David Pike (Memorial University), <i>Edge-connectivity of vertex-transitive hypergraphs</i> , ComDThe (p. 47), GH 215
16:30 - 17:00	Martin Pinsonnault (Western University), GeoQua (p. 56), IH 107
16:30 - 17:00	Adrian Lopez Raven (Perimeter), <i>Categorical 't Hoof Expansion and Chiral Algebras</i> , MathPhy (p. 69), OH 104
16:30 - 17:00	Lee van Brussel (McMaster University), <i>Observations from an Early-Career Mathematics Educator</i> , Teachor (p. 89), HH 125
17:00 - 17:30	Hope Alderson (University of New Brunswick, Saint John), <i>Balancing Technology and First Principles in Engineering Mathematics</i> , Teachor (p. 87), HH 125
17:00 - 17:30	Nancy Clarke (Acadia University), <i>Further results on the Cops and Insightful Robber model</i> , ProGraS (p. 76), GH 115
17:00 - 17:30	Tao Gong (Western University), <i>Toric varieties modulo reflections</i> , HomThe (p. 60), HH 126
17:00 - 17:30	Seraphim Jarov (Toronto), <i>Novel integrable PDEs from twistor theory</i> , MathPhy (p. 68), OH 104
17:00 - 17:30	Yucen Jin (Western), <i>Delay-induced Hopf-zero bifurcation in a Host-parasite model</i> , ApDySys (p. 27), HH 225
17:00 - 17:30	Eduardo Martínez-Pedroza (Memorial University of Newfoundland), GGTheo (p. 53), GH 313
17:00 - 17:30	Ethan Saunders (University of Calgary), ComGThe (p. 51), HH 232
17:00 - 17:30	Alejandro Uribe (University of Michigan), <i>Semi-classical aspects of the quantum Zeno effect</i> , GeoQua (p. 57), IH 107
17:30 - 18:00	Alex Clow (Simon Fraser University), <i>Can Cop Number Equal Independence Number?</i> , ProGraS (p. 76), GH 115
17:30 - 18:00	Robert Cornea (University of Waterloo), <i>Stable Wild Vafa-Witten Bundles on \mathbb{P}^2</i> , GeoQua (p. 55), IH 107
17:30 - 18:00	General Discussion, Teachor (p. 88), HH 125
17:30 - 18:00	Thomas Wilskow Thorbjørnsen (Western University), <i>Finitely Adequate Modules in Synthetic Algebraic Geometry</i> , HomThe (p. 62), HH 126
17:30 - 18:00	Robert van den Hoogen (St Francis Xavier), <i>Using gauge covariant Lie derivatives to impose symmetries</i> , MathPhy (p. 69), OH 104
17:30 - 18:00	Junyuan Yang (Shanxi University), <i>Parameter identification of age-structured epidemic models</i> , ApDySys (p. 29), HH 225
18:15 - 19:15	Welcome Reception / Réception de bienvenue, Social, Ganong Hall Gallery and Foyer
19:00 - 22:00	Awards Banquet / Banquet de prix, Social, Lily Lake Pavilion

Sunday June 7

dimanche 7 juin

8:00 - 8:30	Konrad Aguilar (Pomona College), <i>The Bures metric and the quantum metric on the density space of a C^*-algebra: the non-unital case</i> , NocommG (p. 72), HH 125
8:00 - 8:30	Kristaps Balodis (University of Calgary), <i>Arthur parameters and orbits with singular closure</i> , AutoFoR (p. 31), OH 104
8:00 - 8:30	Ben Cameron (University of Prince Edward Island), <i>An infinite family of k-critical $(2P_3, K_{k-1})$-free graphs for each $k \geq 5$</i> , StrAlGT (p. 81), GH 313
8:00 - 8:30	Yang Hu (University of Regina), <i>Realization of some Stanley-Reisner algebras and graph colorings</i> , HomThe (p. 61), HH 126
8:00 - 8:30	Sokhna Ndiaye (Université de Moncton), <i>On the Adequacy of Simple Continuous-Time Models for Snow Crab Population Dynamics</i> , MModFis (p. 65), OH 208

8:30 - 9:00	Iain Beaton (Acadia University), <i>k-vertex-critical graphs in $(P_4 + \ell P_1)$-free graphs</i> , StrAlGT (p. 81), GH 313
8:30 - 9:00	Joe BurrIDGE (University of Nottingham), <i>Fuzzy Geometries with an Internal Space</i> , NocommG (p. 73), HH 125
8:30 - 9:00	Martin Frankland (Regina), <i>An invitation to n-angulated categories</i> , CatTheo (p. 38), OH 105
8:30 - 9:00	Sophie Léger (Université de Moncton), <i>The Role of Cannibalism in Cyclic Snow Crab Population Dynamics</i> , MModFis (p. 64), OH 208
8:30 - 9:00	Emmanuel Lorin (Carleton), <i>Recent Advances in Neural Network-based Methods for Partial Differential Equations and Eigenvalue Problems</i> , ApDySys (p. 28), HH 225
8:30 - 9:00	Todd Mullen (University of Prince Edward Island), <i>Cops and Robbers and Barricades</i> , ProGraS (p. 78), GH 115
8:30 - 9:00	Monica Nevins (University of Ottawa), <i>On 4-packets of representations of $SL(2, F)$, for F a 2-adic field</i> , AutoFoR (p. 34), OH 104
8:30 - 9:00	Carlos Gabriel Valenzuela Ruiz (University of Regina), <i>About tight moment-angle complexes</i> , HomThe (p. 62), HH 126
8:30 - 9:00	Doug Stinson (University of Waterloo / Carleton University), <i>Optimal Equidistant Codes—A Detective Story</i> , ComDThe (p. 48), GH 215
8:30 - 9:30	Jonathan Weitsman (Northeastern University), <i>Hilbert Polynomials of Calabi Yau Hypersurfaces in Toric Varieties and Lattice Points in Polytope Boundaries</i> , GeoQua (p. 57), IH 107

9:00 - 9:30	Steven Amelotte (Carleton University), <i>Elements of order 4 in the homotopy groups of the 3-sphere</i> , HomThe (p. 60), HH 126
9:00 - 9:30	MacKenzie Carr (Toronto Metropolitan University), <i>Reconstructing C_4-free graphs from their digital convexity</i> , StrAlGT (p. 81), GH 313
9:00 - 9:30	Sita Gakkhar (University of Waterloo), <i>Stochastic quantization and the geometry of open quantum systems</i> , NocommG (p. 73), HH 125
9:00 - 9:30	Didier Lesesvre (Université de Lille), <i>Dimension of spaces of modular forms via the Arthur trace formula</i> , AutoFoR (p. 32), OH 104
9:00 - 9:30	Joy Morris (University of Lethbridge), <i>Eternal domination in Cayley graphs</i> , ProGraS (p. 78), GH 115
9:00 - 9:30	Prangya Parida (University of Ottawa), <i>One Sequence to Rule them All.</i> , ComDThe (p. 46), GH 215
9:00 - 9:30	Wanyue Tang (Western), <i>High-Codimension Bifurcation Analysis of a Predator-Prey System with Fear Effects</i> , ApDySys (p. 29), HH 225
9:00 - 9:30	Daniel Teixeira (Dalhousie), <i>(∞, ∞)-categories with adjoints are a bit like spaces</i> , CatTheo (p. 42), OH 105
9:00 - 9:30	Julien Thibodeau (Université de Moncton), <i>Bifurcation detection in dynamical systems using deep learning</i> , MModFis (p. 65), OH 208

9:30 - 10:00	Tim Alderson (University of New Brunswick), <i>Length-Maximal Nonlinear Codes with Given Singleton Defect—Structure and Bounds</i> , ComDThe (p. 44), GH 215
9:30 - 10:00	Asgar Ghorbanpour (Western University), NocommG (p. 73), HH 125
9:30 - 10:00	Olivier Grimard (University of New Brunswick), <i>Modelling clonal structure of saltmarsh <i>Spartina</i> grasses</i> , ApDySys (p. 27), HH 225
9:30 - 10:00	Cameron Krulewski (Dalhousie), <i>Dagger Categories and Higher Spin Statistics</i> , CatTheo (p. 39), OH 105

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9:30 - 10:00	Eduardo Martinez-Pedroza (Memorial University), <i>Gromov's Approximating Tree and the All-pairs Bottleneck Paths Problem.</i> , StrAIGT (p. 83), GH 313
9:30 - 10:00	Gill Moss (University of Maine), <i>Converse theorems and the local Langlands conjecture in families for $GSp(4)$</i> , AutoFoR (p. 34), OH 104
9:30 - 10:00	Logan Pipes (Memorial University), <i>On The Radius of Location of Trees</i> , ProGraS (p. 79), GH 115
9:30 - 10:00	Ellie Weise (Dalhousie University), <i>Close-Kin Mark-Recapture in Atlantic Halibut</i> , MModFis (p. 66), OH 208
9:30 - 10:30	João Nunes (Instituto Superior Técnico), <i>Quantization and Hamiltonian flows in imaginary time</i> , GeoQua (p. 56), IH 107
10:00 - 10:30	Courtney Allen (University of New Brunswick), <i>Modelling the dynamics of diatoms on New Brunswick's mudflats</i> , ApDySys (p. 25), HH 225
10:00 - 10:30	Darien Dewolf (St Francis Xavier), <i>Crossed Modules of Inverse Semigroups as Internal Categories</i> , CatTheo (p. 37), OH 105
10:00 - 10:30	Aaron Dwyer (Carleton University), <i>Perfect Codes in the Lee Scheme</i> , ComDThe (p. 45), GH 215
10:00 - 10:30	Atul Gothe (University of Warsaw), <i>A quantum CW-complex for quantum real projective spaces</i> , NocommG (p. 73), HH 125
10:00 - 10:30	Gena Hahn (Université de Montréal), <i>Resurrection II - revisiting old problems</i> , StrAIGT (p. 82), GH 313
10:00 - 10:30	Sadie Lipman (University of Michigan), <i>Toral supercuspidal representations and Shintani lifting</i> , AutoFoR (p. 33), OH 104
10:00 - 10:30	John Marcoux (Toronto Metropolitan University), <i>Localization and the Ball Dimension</i> , ProGraS (p. 77), GH 115
10:00 - 10:30	Jérôme Mazerolle (Université de Moncton), <i>Modeling Snow Crab Diffusion Using a Finite Element Method</i> , MModFis (p. 64), OH 208
10:30 - 11:00	Break / Pause, Social, Ganong Hall Gallery and Foyer
11:00 - 12:00	Niky Kamran (McGill University), <i>A survey of the Calderón inverse problem.</i> , PlenL (p. 22), Ganong Hall Lecture Theatre
13:30 - 14:30	Yu-Ru Liu (University of Waterloo), <i>Fermat vs Waring: An Introduction to Number Theory in Function Fields</i> , KriNel (p. 24), Ganong Hall Lecture Theatre
14:30 - 15:00	Break / Pause, Social, Ganong Hall Gallery and Foyer
15:00 - 15:30	Alexander Clow (Simon Fraser University), <i>An Algorithm for the Small Quasi-Kernels Conjecture</i> , StrAIGT (p. 81), GH 313
15:00 - 15:30	Shonda Dueck (University of Winnipeg), <i>The threshold strong dimension of the hypercube</i> , ComDThe (p. 45), GH 215
15:00 - 15:30	Julia Gordon (University of British Columbia), <i>Coefficients of Harish-Chandra's local character expansion are motivic</i> , AutoFoR (p. 32), OH 104
15:00 - 15:30	Cameron Krulewski (Dalhousie University), <i>Twisted Atiyah–Bott–Shapiro Maps and SPTs</i> , NocommG (p. 73), HH 125
15:00 - 15:30	Rory Lucyshyn-Wright (Brandon), <i>Infinitary cartesian theories: A logic of locally presentable categories</i> , CatTheo (p. 40), OH 105
15:00 - 15:30	Joy Morris (Lethbridge), <i>Making your academic job application stand out</i> , StuRes (p. 85), HH 126
15:00 - 15:30	Abani Patra (Tufts), MachLea (p. 91), OH 208
15:00 - 15:30	Peter Selinger (Dalhousie University), <i>On 3-terminal positions in Hex</i> , ComGThe (p. 51), HH 232
15:00 - 16:00	José Mourão (Instituto Superior Técnico), <i>Fourier-Helgason transform as infinite geodesic time limit in quantization</i> , GeoQua (p. 56), IH 107
15:30 - 16:00	Julien Codsì (Princeton University), <i>A Tale of the Tree-Independence Number</i> , StrAIGT (p. 82), GH 313
15:30 - 16:00	Nathan Haydon (Dalhousie), <i>Compositional First-Order Logic</i> , CatTheo (p. 38), OH 105
15:30 - 16:00	Jeremiah Hockaday (Dalhousie University), <i>Evaluating positions in Reverse Hex</i> , ComGThe (p. 49), HH 232
15:30 - 16:00	Mohammed Nyuydini Kiven (Memorial), <i>VARIATIONAL MOVING MESH METHODS FOR DIFFERENTIABLE NUMERICAL SOLVERS</i> , MachLea (p. 90), OH 208
15:30 - 16:00	Andrew Knightly (University of Maine), <i>Counting newforms with prescribed ramified supercuspidal components</i> , AutoFoR (p. 32), OH 104

Sunday • dimanche

15:30 - 16:00	James Mingo (Queen's University), <i>Infinitesimal Freeness</i> , NocommG (p. 73), HH 125
15:30 - 16:00	Sarobidy Razafimahatratra (Carleton University), <i>Using cyclic codes to solve an Erdős-Ko-Rado type problem on permutation groups</i> , ComDThe (p. 47), GH 215
16:00 - 16:30	Alexandre Clément (Dalhousie), <i>Complete Equational Theories for Quantum circuits</i> , CatTheo (p. 37), OH 105
16:00 - 16:30	Mark Hamilton (Mount Allison University), GeoQua (p. 55), IH 107
16:00 - 16:30	Veronika Keras (Dalhousie University), <i>The Combinatorial Game Theory of Rex+</i> , ComGThe (p. 50), HH 232
16:00 - 16:30	Taite LaGrange (Waterloo University), <i>When the twin-width is sub-linear</i> , StrAIGT (p. 83), GH 313
16:00 - 16:30	Emmanuel Lorin (Carleton), <i>Informed Normalized Gradient Flow Method for Point Spectrum in Spectral Gaps: Application to Edge-State Computation</i> , MachLea (p. 91), OH 208
16:00 - 16:30	Siddharth Mahendrakar (Boston College), <i>Regularizing the Geometric RTF for the Galois Period on SL_2</i> , AutoFoR (p. 34), OH 104
16:00 - 16:30	Andrew Nagarajah (Carleton University), <i>A brief tour of completion results for partial designs</i> , ComDThe (p. 46), GH 215
16:00 - 16:30	Nathan Pagliaroli (University of Waterloo), <i>Asymmetric phase transitions in random noncommutative geometries</i> , NocommG (p. 74), HH 125
16:00 - 16:30	Aiden Taylor (University of Calgary), <i>Wavelet Optimization in Wavelet Convolutional Neural Networks</i> , StuRes (p. 86), HH 126
16:30 - 17:00	Mathieu Bazinet (Laval), <i>Introduction to PAC-Bayes theory and its applications</i> , MachLea (p. 90), OH 208
16:30 - 17:00	Katrina De Vera (Acadia University), <i>Clique Cut Sets of Signed Graphs and Zero-Free Chromatic Equivalence</i> , StuRes (p. 85), HH 126
16:30 - 17:00	Office Hours, GeoQua (p. 55), IH 107
16:30 - 17:00	Svenja Huntemann (Mount Saint Vincent University), <i>Partizan ArcKayles has unbounded temperature</i> , ComGThe (p. 50), HH 232
16:30 - 17:00	Spencer Leslie (Boston College), <i>Endoscopic phenomena in relative Langlands</i> , AutoFoR (p. 33), OH 104
16:30 - 17:00	Shuxing Li (University of Delaware), <i>Generalized Additive Bases and Difference Bases For Cartesian Product of Finite Abelian Groups</i> , ComDThe (p. 46), GH 215
16:30 - 17:00	Ilya Shapiro (University of Windsor), <i>Annuli stacking and duoidal categories.</i> , NocommG (p. 74), HH 125
16:30 - 17:00	Ann Trenk (Wellesley College), <i>Degree sequences, split graphs and geometric representations</i> , StrAIGT (p. 84), GH 313
16:30 - 17:00	Jean-Baptiste Vienney (University of Ottawa), <i>Non-uniqueness of differentiation in differential categories</i> , CatTheo (p. 42), OH 105
17:00 - 17:30	Karen Collins (Wesleyan University), <i>Partitioned Split Graphs</i> , StrAIGT (p. 82), GH 313
17:00 - 17:30	Michael Lambert (UMass Boston), <i>Twisted Double Functors</i> , CatTheo (p. 39), OH 105
17:00 - 17:30	Hin Lon Lao (York University), <i>Acyclic Presentation of Transversal Matroid</i> , StuRes (p. 85), HH 126
17:00 - 17:30	Sophie Morin (Polytechnique Montréal), <i>Conditioning and equivariance in a contact detection problem</i> , MachLea (p. 91), OH 208
17:00 - 17:30	Nick Rosenblyum (University of Toronto), <i>Categorical representations and traces</i> , AutoFoR (p. 35), OH 104
17:00 - 17:30	Giorgos Tsimperis (University of Nottingham), NocommG (p. 74), HH 125
17:30 - 18:00	Simran Khunger (University of Michigan), <i>Automorphic multiplicity formulas for inner forms of SL_n</i> , AutoFoR (p. 32), OH 104
17:30 - 18:00	Sean Kim (Simon Fraser University), <i>Lower Bound on Degenerate Induced Subgraphs</i> , StrAIGT (p. 82), GH 313
17:30 - 18:00	Evan Patterson (Topos Institute), <i>Double-categorical logic for unbiased categorical structures</i> , CatTheo (p. 41), OH 105
17:30 - 18:00	Kateryna Tretiakova (University of Ottawa), <i>Beyond the Lecture: Testing Pedagogical Formats in Undergraduate Mathematics Tutorials</i> , StuRes (p. 86), HH 126

Monday June 8

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8:00 - 8:30	Rose Kudzman-Blais (Kyoto), <i>Linear and Cyclic *-Autonomous Proarrow Equipments</i> , CatTheo (p. 39), OH 105
8:00 - 8:30	Atonu Mukherjee (University of British Columbia), <i>Log Canonical Threshold of Vinberg (enveloping) monoid</i> , AutoFoR (p. 34), OH 104
8:30 - 9:00	Ali Hamad (Ottawa), <i>Ultracategories: Past and Future</i> , CatTheo (p. 38), OH 105
8:30 - 9:00	Margaret-Ellen Messinger (Mount Allison University), <i>Domination reconfiguration: a mixed model</i> , StrAIGT (p. 83), GH 313
8:30 - 9:00	Taeuk Nam (Harvard University), <i>Categorical Trace and Geometric Langlands</i> , AutoFoR (p. 34), OH 104
8:30 - 9:30	Jacques Hurtubise (McGill University), <i>Quasi-monopoles</i> , GeoQua (p. 56), IH 107
9:00 - 9:30	Nancy Clarke (Acadia University), <i>Polychromatic Dominating Sets</i> , StrAIGT (p. 81), GH 313
9:00 - 9:30	Thomas Rüd (Massachusetts Institute of Technology), <i>Jacquet–Rallis Transfer for ramified unitary groups and the Arithmetic Transfer Conjecture</i> , AutoFoR (p. 35), OH 104
9:00 - 9:30	Scott Wesley (Dalhousie), <i>Parameterized Quantum Circuit Semantics Through Enriched Categories</i> , CatTheo (p. 42), OH 105
9:30 - 10:00	Amélie Comtois (University of Ottawa), <i>Notions of Smallness and Completeness for V-Graded Categories</i> , CatTheo (p. 37), OH 105
9:30 - 10:00	Callie Liddle (Carleton University), <i>Singularities of K-orbits on the flag variety of G_2</i> , AutoFoR (p. 33), OH 104
9:30 - 10:00	Ood Shabtai (University of Toronto Mississauga), <i>Localization of quantum systems at Liouville tori</i> , GeoQua (p. 57), IH 107
9:30 - 10:00	Agnes Totschnig (Massachusetts Institute of Technology), <i>Almost perfect graph classes</i> , StrAIGT (p. 84), GH 313
10:00 - 10:30	Nicolas Arancibia (CY Cergy Paris Université - site Saint Martin), <i>Proving the Enhanced Shahidi Conjecture for Real Groups.</i> , AutoFoR (p. 31), OH 104
10:00 - 10:30	Robert Morissette (Dalhousie), <i>Oppositizing Cells in Equipments</i> , CatTheo (p. 40), OH 105
10:00 - 10:30	Ben Seamone (Dawson College), <i>Removeable edges in cubic graphs which admit nowhere-zero 4-flows</i> , StrAIGT (p. 83), GH 313
10:00 - 10:30	Jacques Van Wyk (University of Waterloo), <i>Generalised Complex Structures on Products of Lie Groups</i> , GeoQua (p. 57), IH 107
10:30 - 11:00	Break / Pause, Social, Ganong Hall Gallery and Foyer
11:00 - 12:00	Julia Gordon (University of British Columbia), <i>A long story of eliminated quantifiers</i> , PlenL (p. 22), Ganong Hall Lecture Theatre
13:00 - 13:30	Break / Pause, Social, Ganong Hall Gallery and Foyer
13:30 - 14:00	Adele Bourgeois (Carleton University), <i>A lift for semisimple characters and its compatibility with base change functoriality</i> , AutoFoR (p. 31), OH 104
13:30 - 14:00	Jack Jia (Waterloo), <i>Introduction to Deligne Categories</i> , CatTheo (p. 38), OH 105
13:30 - 14:30	Daniel Ramras (Indiana University), <i>Spaces of flat connections</i> , GeoQua (p. 56), IH 107
14:00 - 14:30	Jose Cruz (University of Calgary), <i>On the transcendental nature of the class number formula</i> , AutoFoR (p. 31), OH 104
14:00 - 14:30	Aaron Fairbanks (Dalhousie), <i>Comonads as spaces</i> , CatTheo (p. 38), OH 105
14:30 - 15:00	Thomas Baird (Memorial University of Newfoundland), <i>Moduli spaces of Higgs bundles over a real curve</i> , GeoQua (p. 55), IH 107
14:30 - 15:00	Hayato Nasu (Dalhousie), <i>On the decomposition of a strong epimorphism into regular epimorphisms</i> , CatTheo (p. 40), OH 105
15:00 - 15:30	Abdel Rahman Al-Abdallah (Brandon University), <i>Homogeneous Levi-Flat Hypersurfaces in Complex Projective Spaces</i> , GeoQua (p. 54), IH 107
15:00 - 15:30	Laura Scull (Fort Lewis), <i>(Lack of) Model Structure for Homotopy of Graphs</i> , CatTheo (p. 41), OH 105
15:30 - 16:00	Robert Paré (Dalhousie), <i>A topos for categories</i> , CatTheo (p. 41), OH 105

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A

- Aguilar, Konrad, *The Bures metric and the quantum metric on the density space of a C^* -algebra: the non-unital case*, NocommG (p. 72), Sunday June 7, 8:00 - 8:30, HH 125
- Akbari, Masoomeh, *On the generalized honeymoon Oberwolfach problem*, ComDThe (p. 44), Saturday June 6, 9:30 - 10:00, GH 215
- Al-Abdallah, Abdel Rahman, *Homogeneous Levi-Flat Hypersurfaces in Complex Projective Spaces*, GeoQua (p. 54), Monday June 8, 15:00 - 15:30, IH 107
- Alderson, Hope, *Balancing Technology and First Principles in Engineering Mathematics*, Teachor (p. 87), Saturday June 6, 17:00 - 17:30, HH 125
- Alderson, Tim, *Length-Maximal Nonlinear Codes with Given Singleton Defect-Structure and Bounds*, ComDThe (p. 44), Sunday June 7, 9:30 - 10:00, GH 215
- Alexander, Matthew, *Hopf-Frobenius Gauge Theories*, MathPhy (p. 67), Saturday June 6, 9:30 - 10:00, OH 104
- Alexander, Matthew, *A (Pr)operad of (Pr)operad algebras*, HomThe (p. 59), Saturday June 6, 15:00 - 15:30, HH 126
- Allen, Courtney, *Modelling the dynamics of diatoms on New Brunswick's mudflats*, ApDySys (p. 25), Sunday June 7, 10:00 - 10:30, HH 225
- Almeida, Daniel, *Strictification of models of generalized algebraic theories*, HomThe (p. 59), Saturday June 6, 8:30 - 9:00, HH 126
- Amelotte, Steven, *Elements of order 4 in the homotopy groups of the 3-sphere*, HomThe (p. 60), Sunday June 7, 9:00 - 9:30, HH 126
- Arancibia, Nicolas, *Proving the Enhanced Shahidi Conjecture for Real Groups.*, AutoFoR (p. 31), Monday June 8, 10:00 - 10:30, OH 104
- Asante, Seth, *Deferred Cyclotomic Representations: Exact Algebraic Evaluation of Quantum Group Invariants and q -Hypergeometric Series*, MathPhy (p. 67), Saturday June 6, 16:00 - 16:30, OH 104
- Austin, Beth Ann, *Calling in reinforcements to limit damage*, ProGraS (p. 75), Saturday June 6, 16:30 - 17:00, GH 115

B

- Baird, Thomas, *Moduli spaces of Higgs bundles over a real curve*, GeoQua (p. 55), Monday June 8, 14:30 - 15:00, IH 107
- Balodis, Kristaps, *Arthur parameters and orbits with singular closure*, AutoFoR (p. 31), Sunday June 7, 8:00 - 8:30, OH 104
- Bartlett, Griffin, *The Lamplighter Game on Paths with Complete Lamps*, ProGraS (p. 76), Saturday June 6, 15:00 - 15:30, GH 115
- Bazinet, Mathieu, *Introduction to PAC-Bayes theory and its applications*, MachLea (p. 90), Sunday June 7, 16:30 - 17:00, OH 208
- Beaton, Iain, *k -vertex-critical graphs in $(P_4 + \ell P_1)$ -free graphs*, StrAIGT (p. 81), Sunday June 7, 8:30 - 9:00, GH 313
- Behan, Connor, *Supercharge cohomology in holographic theories*, MathPhy (p. 68), Saturday June 6, 15:00 - 15:30, OH 104
- Blackburn, Simon, *Tredoku Patterns*, ComDThe (p. 44), Saturday June 6, 15:00 - 15:30, GH 215
- Bonato, Anthony, *Math Memes for the Math-Inclined and Whoever Else Comes to Public Math Lectures*, PubL (p. 21), Friday June 5, 17:15 - 18:15, Ganong Hall Lecture Theatre
- Bonato, Anthony, *What we know and what we don't know about cooling*, ProGraS (p. 76), Saturday June 6, 8:30 - 9:00, GH 115
- Bourgeois, Adele, *A lift for semisimple characters and its compatibility with base change functoriality*, AutoFoR (p. 31), Monday June 8, 13:30 - 14:00, OH 104
- Burr, Wesley, *What and Who are Grading and Assessment For?*, ExTea (p. 24), Saturday June 6, 13:30 - 14:30, Ganong Hall Lecture Theatre
- Burridge, Joe, *Fuzzy Geometries with an Internal Space*, NocommG (p. 73), Sunday June 7, 8:30 - 9:00, HH 125

C

- Cameron, Ben, *An infinite family of k -critical $(2P_3, K_{k-1})$ -free graphs for each $k \geq 5$* , StrAIGT (p. 81), Sunday June 7, 8:00 - 8:30, GH 313
- Carr, MacKenzie, *Reconstructing C_4 -free graphs from their digital convexity*, StrAIGT (p. 81), Sunday June 7, 9:00 - 9:30, GH 313

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- Chatzidiamantis-Christoforidis, Theofanis, *Fixed Point Properties in Homotopy Type Theory*, HomThe (p. 60), Saturday June 6, 9:30 - 10:00, HH 126
- Chitan, Adrian, *Stratification and Quantization of Chern-Simons Phase Space: Towards Witten's Asymptotic Conjecture*, MathPhy (p. 68), Saturday June 6, 8:00 - 8:30, OH 104
- Christopher, Julian, *The effect of time delay on the global stability of infectious disease models and other dynamical systems*, ApDySys (p. 26), Saturday June 6, 15:30 - 16:00, HH 225
- Clarke, Nancy, *Further results on the Cops and Insightful Robber model*, ProGraS (p. 76), Saturday June 6, 17:00 - 17:30, GH 115
- Clarke, Nancy, *Polychromatic Dominating Sets*, StrAIGT (p. 81), Monday June 8, 9:00 - 9:30, GH 313
- Clay, Adam, *Borel complexity and isomorphism of bi-orderable groups*, GGTheo (p. 52), Saturday June 6, 16:30 - 17:00, GH 313
- Cleary, Richard, Teachor (p. 88), Saturday June 6, 16:00 - 16:30, HH 125
- Clément, Alexandre, *Complete Equational Theories for Quantum circuits*, CatTheo (p. 37), Sunday June 7, 16:00 - 16:30, OH 105
- Clow, Alex, *How Expressive is Digraph Placement?*, ComGThe (p. 49), Saturday June 6, 15:00 - 15:30, HH 232
- Clow, Alex, *Can Cop Number Equal Independence Number?*, ProGraS (p. 76), Saturday June 6, 17:30 - 18:00, GH 115
- Clow, Alexander, *An Algorithm for the Small Quasi-Kernels Conjecture*, StrAIGT (p. 81), Sunday June 7, 15:00 - 15:30, GH 313
- Codsi, Julien, *A Tale of the Tree-Independence Number*, StrAIGT (p. 82), Sunday June 7, 15:30 - 16:00, GH 313
- Collins, Karen, *Partitioned Split Graphs*, StrAIGT (p. 82), Sunday June 7, 17:00 - 17:30, GH 313
- Comtois, Amélie, *Notions of Smallness and Completeness for V-Graded Categories*, CatTheo (p. 37), Monday June 8, 9:30 - 10:00, OH 105
- Cooper, Joy, *A Fuzzy Generalization of Latin Squares*, ComDThe (p. 44), Saturday June 6, 16:00 - 16:30, GH 215
- Cornea, Robert, *Stable Wild Vafa-Witten Bundles on \mathbb{P}^2* , GeoQua (p. 55), Saturday June 6, 17:30 - 18:00, IH 107
- Cox, Danielle, *Evolving Perspectives*, Teachor (p. 88), Saturday June 6, 15:30 - 16:00, HH 125
- Crooks, Peter, *Algebro-geometric symplectic slice theorems and quantization*, GeoQua (p. 55), Saturday June 6, 16:00 - 16:30, IH 107
- Cruz, Jose, *On the transcendental nature of the class number formula*, AutoFoR (p. 31), Monday June 8, 14:00 - 14:30, OH 104

D

- Danziger, Peter, *A complete solution to the directed Oberwolfach problem of order $2 \bmod 4$ with cycles of even lengths*, ComDThe (p. 45), Saturday June 6, 8:30 - 9:00, GH 215
- De Vera, Katrina, *Clique Cut Sets of Signed Graphs and Zero-Free Chromatic Equivalence*, StuRes (p. 85), Sunday June 7, 16:30 - 17:00, HH 126
- Devries, Kaylee, *Analysis of a General Vector Transmission Model for Infectious Disease Spread*, ApDySys (p. 26), Saturday June 6, 16:30 - 17:00, HH 225
- Dewolf, Darien, *Crossed Modules of Inverse Semigroups as Internal Categories*, CatTheo (p. 37), Sunday June 7, 10:00 - 10:30, OH 105
- Discussion, General, Teachor (p. 88), Saturday June 6, 17:30 - 18:00, HH 125
- Dueck, Shonda, *The threshold strong dimension of the hypercube*, ComDThe (p. 45), Sunday June 7, 15:00 - 15:30, GH 215
- Dwyer, Aaron, *Perfect Codes in the Lee Scheme*, ComDThe (p. 45), Sunday June 7, 10:00 - 10:30, GH 215

F

- Fairbanks, Aaron, *Comonads as spaces*, CatTheo (p. 38), Monday June 8, 14:00 - 14:30, OH 105
- Fan, Shiheng, *Global dynamics of two-species competition reaction-diffusion systems in a time-varying domain*, ApDySys (p. 26), Saturday June 6, 10:00 - 10:30, HH 225
- Forget, William, *Understanding Neural Networks Through the Knowledge Matrix*, Poster (p. 92), Saturday June 6, 13:00 - 13:30, Ganong Hall Gallery and Foyer
- Frankland, Martin, *An invitation to n -angulated categories*, CatTheo (p. 38), Sunday June 7, 8:30 - 9:00, OH 105

G

Talk List

- Gakkhar, Sita, *Stochastic quantization and the geometry of open quantum systems*, NocommG (p. 73), Sunday June 7, 9:00 - 9:30, HH 125
- Ghaswala, Tyrone, *Promoting circular orderability to left orderability*, GGTheo (p. 52), Saturday June 6, 16:00 - 16:30, GH 313
- Ghorbanpour, Asghar, NocommG (p. 73), Sunday June 7, 9:30 - 10:00, HH 125
- Gong, Tao, *Toric varieties modulo reflections*, HomThe (p. 60), Saturday June 6, 17:00 - 17:30, HH 126
- Gordon, Julia, *Coefficients of Harish-Chandra's local character expansion are motivic*, AutoFoR (p. 32), Sunday June 7, 15:00 - 15:30, OH 104
- Gordon, Julia, *A long story of eliminated quantifiers*, PlenL (p. 22), Monday June 8, 11:00 - 12:00, Ganong Hall Lecture Theatre
- Gothe, Atul, *A quantum CW-complex for quantum real projective spaces*, NocommG (p. 73), Sunday June 7, 10:00 - 10:30, HH 125
- Gounden, Shashen, *Steenrod's cohomology realization problem for some monomial ideal rings*, HomThe (p. 60), Saturday June 6, 16:30 - 17:00, HH 126
- Grimard, Olivier, *Modelling clonal structure of saltmarsh *Spartina* grasses*, ApDySys (p. 27), Sunday June 7, 9:30 - 10:00, HH 225

H

- Hahn, Gena, *Resurrection II - revisiting old problems*, StrAlGT (p. 82), Sunday June 7, 10:00 - 10:30, GH 313
- Hamad, Ali, *Ultracategories: Past and Future*, CatTheo (p. 38), Monday June 8, 8:30 - 9:00, OH 105
- Hamilton, Mark, *GeoQua* (p. 55), Sunday June 7, 16:00 - 16:30, IH 107
- Haydon, Nathan, *Compositional First-Order Logic*, CatTheo (p. 38), Sunday June 7, 15:30 - 16:00, OH 105
- He, Haoyang, *The curve complex as a coset intersection complex*, GGTheo (p. 52), Saturday June 6, 15:30 - 16:00, GH 313
- Hockaday, Jeremiah, *Evaluating positions in Reverse Hex*, ComGThe (p. 49), Sunday June 7, 15:30 - 16:00, HH 232
- Hours, Office, *GeoQua* (p. 55), Sunday June 7, 16:30 - 17:00, IH 107
- Hu, Dandan, *Dynamical analysis in a nonlocal delayed reaction-diffusion tumor model with therapy*, ApDySys (p. 27), Saturday June 6, 9:00 - 9:30, HH 225
- Hu, Yang, *Realization of some Stanley-Reisner algebras and graph colorings*, HomThe (p. 61), Sunday June 7, 8:00 - 8:30, HH 126
- Huggan, Melissa, *The Infectious Vaccination Problem, Part II*, ProGraS (p. 76), Saturday June 6, 10:00 - 10:30, GH 115
- Huntemann, Svenja, *Partizan ArcKayles has unbounded temperature*, ComGThe (p. 50), Sunday June 7, 16:30 - 17:00, HH 232
- Hurtubise, Jacques, *Quasi-monopoles*, GeoQua (p. 56), Monday June 8, 8:30 - 9:30, IH 107

I

- Islam, Fatima, *Impact of Dispersal on Total Equilibrium Biomass in Patch-Structured Logistic Models.*, ApDySys (p. 27), Saturday June 6, 9:30 - 10:00, HH 225
- Islam, Fatima, *Impact of Dispersal on Total Equilibrium Biomass in Patch-Structured Logistic Models.*, Poster (p. 92), Saturday June 6, 13:00 - 13:30, Ganong Hall Gallery and Foyer

J

- Jarov, Seraphim, *Novel integrable PDEs from twistor theory*, MathPhy (p. 68), Saturday June 6, 17:00 - 17:30, OH 104
- Jerade, Marie Rose, *The Honeymoon Oberwolfach Problem: A Recursive Approach*, ComDThe (p. 46), Saturday June 6, 9:00 - 9:30, GH 215
- Jia, Jack, *Introduction to Deligne Categories*, CatTheo (p. 38), Monday June 8, 13:30 - 14:00, OH 105
- Jin, Yucen, *Delay-induced Hopf-zero bifurcation in a Host-parasite model*, ApDySys (p. 27), Saturday June 6, 17:00 - 17:30, HH 225

K

- Kamran, Niky, *A survey of the Calderón inverse problem.*, PlenL (p. 22), Sunday June 7, 11:00 - 12:00, Ganong Hall Lecture Theatre
- Keras, Veronika, *The Combinatorial Game Theory of Rex^+* , ComGThe (p. 50), Sunday June 7, 16:00 - 16:30, HH 232

Talk List

- Khunger, Simran, *Automorphic multiplicity formulas for inner forms of SL_n* , AutoFoR (p. 32), Sunday June 7, 17:30 - 18:00, OH 104
- Kim, Sean, *Lower Bound on Degenerate Induced Subgraphs*, StrAIGT (p. 82), Sunday June 7, 17:30 - 18:00, GH 313
- Kiven, Mohammed Nyuydini, *VARIATIONAL MOVING MESH METHODS FOR DIFFERENTIABLE NUMERICAL SOLVERS*, MachLea (p. 90), Sunday June 7, 15:30 - 16:00, OH 208
- Knightly, Andrew, *Counting newforms with prescribed ramified supercuspidal components*, AutoFoR (p. 32), Sunday June 7, 15:30 - 16:00, OH 104
- Korotkin, Dmitry, *GeoQua* (p. 56), Saturday June 6, 15:00 - 16:00, IH 107
- Krulewski, Cameron, *Dagger Categories and Higher Spin Statistics*, CatTheo (p. 39), Sunday June 7, 9:30 - 10:00, OH 105
- Krulewski, Cameron, *Twisted Atiyah–Bott–Shapiro Maps and SPTs*, NocommG (p. 73), Sunday June 7, 15:00 - 15:30, HH 125
- Kudzman-Blais, Rose, *Linear and Cyclic *-Autonomous Proarrow Equipments*, CatTheo (p. 39), Monday June 8, 8:00 - 8:30, OH 105

L

- LaGrange, Taite, *When the twin-width is sub-linear*, StrAIGT (p. 83), Sunday June 7, 16:00 - 16:30, GH 313
- Lambert, Michael, *Twisted Double Functors*, CatTheo (p. 39), Sunday June 7, 17:00 - 17:30, OH 105
- Lao, Hin Lon, *TRANSVERSAL MATROIDS AND THEIR PRESENTATIONS*, Poster (p. 92), Saturday June 6, 13:00 - 13:30, Ganong Hall Gallery and Foyer
- Lao, Hin Lon, *Acyclic Presentation of Transversal Matroid*, StuRes (p. 85), Sunday June 7, 17:00 - 17:30, HH 126
- Léger, Sophie, *The Role of Cannibalism in Cyclic Snow Crab Population Dynamics*, MModFis (p. 64), Sunday June 7, 8:30 - 9:00, OH 208
- Lesesvre, Didier, *Dimension of spaces of modular forms via the Arthur trace formula*, AutoFoR (p. 32), Sunday June 7, 9:00 - 9:30, OH 104
- Leslie, Spencer, *Endoscopic phenomena in relative Langlands*, AutoFoR (p. 33), Sunday June 7, 16:30 - 17:00, OH 104
- Li, Shuxing, *Generalized Additive Bases and Difference Bases For Cartesian Product of Finite Abelian Groups*, ComDThe (p. 46), Sunday June 7, 16:30 - 17:00, GH 215
- Liddle, Callie, *Singularities of K -orbits on the flag variety of G_2* , AutoFoR (p. 33), Monday June 8, 9:30 - 10:00, OH 104
- Lipman, Sadie, *Toral supercuspidal representations and Shintani lifting*, AutoFoR (p. 33), Sunday June 7, 10:00 - 10:30, OH 104
- Liu, Yu-Ru, *Fermat vs Waring: An Introduction to Number Theory in Function Fields*, KriNel (p. 24), Sunday June 7, 13:30 - 14:30, Ganong Hall Lecture Theatre
- Lorin, Emmanuel, *Recent Advances in Neural Network-based Methods for Partial Differential Equations and Eigenvalue Problems*, ApDySys (p. 28), Sunday June 7, 8:30 - 9:00, HH 225
- Lorin, Emmanuel, *Informed Normalized Gradient Flow Method for Point Spectrum in Spectral Gaps: Application to Edge-State Computation*, MachLea (p. 91), Sunday June 7, 16:00 - 16:30, OH 208
- Lovric, Miroslav, *Mathematical habits of mind in the 2020s*, Teachor (p. 88), Saturday June 6, 10:00 - 10:30, HH 125
- Lucyshyn-Wright, Rory, *Infinitary cartesian theories: A logic of locally presentable categories*, CatTheo (p. 40), Sunday June 7, 15:00 - 15:30, OH 105

M

- MacDonald, Marie, *Balancing lessons from teaching throughout the early to mid 2020s*, Teachor (p. 88), Saturday June 6, 15:00 - 15:30, HH 125
- Maciosowski, Tomasz, *Exploring Invertible Subgroups of Dead-ending and Blocking Universes*, ComGThe (p. 50), Saturday June 6, 16:00 - 16:30, HH 232
- Mahendraker, Siddharth, *Regularizing the Geometric RTF for the Galois Period on SL_2* , AutoFoR (p. 34), Sunday June 7, 16:00 - 16:30, OH 104
- Mann, Meagan, *Predicting The Cop Number Using Machine Learning*, ProGraS (p. 77), Saturday June 6, 15:30 - 16:00, GH 115
- Marbach, Trent, *Between Burning and Cooling: Liminal Burning on Graphs*, ProGraS (p. 77), Saturday June 6, 9:00 - 9:30, GH 115
- Marcoux, John, *Localization and the Ball Dimension*, ProGraS (p. 77), Sunday June 7, 10:00 - 10:30, GH 115
- Martínez-Pedroza, Eduardo, *GGTheo* (p. 53), Saturday June 6, 17:00 - 17:30, GH 313

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- Martinez-Pedroza, Eduardo, *Gromov's Approximating Tree and the All-pairs Bottleneck Paths Problem.*, StrAlGT (p. 83), Sunday June 7, 9:30 - 10:00, GH 313
- Marzlin, Peter, *Locality and the phase space representation of quantum fields*, MathPhy (p. 68), Saturday June 6, 10:00 - 10:30, OH 104
- Mazerolle, Jérôme, *Modeling Snow Crab Diffusion Using a Finite Element Method*, MModFis (p. 64), Sunday June 7, 10:00 - 10:30, OH 208
- McCluskey, Connell, *Global Stability of Epidemic Models with Uniform Susceptibility*, ApDySys (p. 28), Saturday June 6, 8:30 - 9:00, HH 225
- McKay, Neil, ComGThe (p. 50), Saturday June 6, 15:30 - 16:00, HH 232
- McKay, Rebecca, *University mathematics education is always changing but maybe in the same ways*, Teachor (p. 88), Saturday June 6, 8:00 - 8:30, HH 125
- Meadows, Alex, *Joy and Complexity of Blokus Games*, ComGThe (p. 50), Saturday June 6, 16:30 - 17:00, HH 232
- Meng, Wentao, *A road-field population model with climate change: forced wave patterns and stability*, ApDySys (p. 28), Saturday June 6, 16:00 - 16:30, HH 225
- Messinger, Margaret-Ellen, *The Infectious Vaccination Problem, Part 1*, ProGraS (p. 78), Saturday June 6, 9:30 - 10:00, GH 115
- Messinger, Margaret-Ellen, *Domination reconfiguration: a mixed model*, StrAlGT (p. 83), Monday June 8, 8:30 - 9:00, GH 313
- Mingo, James, *Infinitesimal Freeness*, NocommG (p. 73), Sunday June 7, 15:30 - 16:00, HH 125
- Mishura, Teddy, *Cooling Generalized Hypercubes*, ProGraS (p. 78), Saturday June 6, 8:00 - 8:30, GH 115
- Morin, Sophie, *Conditioning and equivariance in a contact detection problem*, MachLea (p. 91), Sunday June 7, 17:00 - 17:30, OH 208
- Morissette, Robert, *Oppositizing Cells in Equipments*, CatTheo (p. 40), Monday June 8, 10:00 - 10:30, OH 105
- Morris, Joy, *Eternal domination in Cayley graphs*, ProGraS (p. 78), Sunday June 7, 9:00 - 9:30, GH 115
- Morris, Joy, *Making your academic job application stand out*, StuRes (p. 85), Sunday June 7, 15:00 - 15:30, HH 126
- Morvan, Jhonel, *What Mathematics, and for Whom Exactly?*, PlenL (p. 22), Saturday June 6, 11:00 - 12:00, Ganong Hall Lecture Theatre
- Moss, Gill, *Converse theorems and the local Langlands conjecture in families for $GSp(4)$* , AutoFoR (p. 34), Sunday June 7, 9:30 - 10:00, OH 104
- Mourão, José, *Fourier-Helgason transform as infinite geodesic time limit in quantization*, GeoQua (p. 56), Sunday June 7, 15:00 - 16:00, IH 107
- Mukherjee, Atonu, *Log Canonical Threshold of Vinberg (enveloping) monoid*, AutoFoR (p. 34), Monday June 8, 8:00 - 8:30, OH 104
- Mullen, Todd, *Reaction is necessary (but is it sufficient?)*, Teachor (p. 88), Saturday June 6, 8:30 - 9:00, HH 125
- Mullen, Todd, *Cops and Robbers and Barricades*, ProGraS (p. 78), Sunday June 7, 8:30 - 9:00, GH 115
- Mutanguha, Jean Pierre, *Bounded dynamics in various moduli spaces*, GGTheo (p. 53), Saturday June 6, 10:00 - 10:30, GH 313

N

- Nagarajah, Andrew, *A brief tour of completion results for partial designs*, ComDThe (p. 46), Sunday June 7, 16:00 - 16:30, GH 215
- Nam, Taeuk, *Categorical Trace and Geometric Langlands*, AutoFoR (p. 34), Monday June 8, 8:30 - 9:00, OH 104
- Nasu, Hayato, *On the decomposition of a strong epimorphism into regular epimorphisms*, CatTheo (p. 40), Monday June 8, 14:30 - 15:00, OH 105
- Ndiaye, Sokhna, *On the Adequacy of Simple Continuous-Time Models for Snow Crab Population Dynamics*, MModFis (p. 65), Sunday June 7, 8:00 - 8:30, OH 208
- Nevins, Monica, *On 4-packets of representations of $SL(2, F)$, for F a 2-adic field*, AutoFoR (p. 34), Sunday June 7, 8:30 - 9:00, OH 104
- Niu, Wenjun, *Line operators and BPS algebras*, MathPhy (p. 69), Saturday June 6, 8:30 - 9:00, OH 104
- Nunes, João, *Quantization and Hamiltonian flows in imaginary time*, GeoQua (p. 56), Sunday June 7, 9:30 - 10:30, IH 107

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- Pagliaroli, Nathan, *Asymmetric phase transitions in random noncommutative geometries*, NocommG (p. 74), Sunday June 7, 16:00 - 16:30, HH 125
- Paré, Robert, *A topos for categories*, CatTheo (p. 41), Monday June 8, 15:30 - 16:00, OH 105
- Parida, Prangya, *One Sequence to Rule them All.*, ComDThe (p. 46), Sunday June 7, 9:00 - 9:30, GH 215
- Patra, Abani, MachLea (p. 91), Sunday June 7, 15:00 - 15:30, OH 208
- Patterson, Evan, *Double-categorical logic for unbiased categorical structures*, CatTheo (p. 41), Sunday June 7, 17:30 - 18:00, OH 105
- Pfaff, Catherine, GGTheo (p. 53), Saturday June 6, 15:00 - 15:30, GH 313
- Pike, David, *Edge-connectivity of vertex-transitive hypergraphs*, ComDThe (p. 47), Saturday June 6, 16:30 - 17:00, GH 215
- Pinsonnault, Martin, GeoQua (p. 56), Saturday June 6, 16:30 - 17:00, IH 107
- Pipes, Logan, *On The Radius of Location of Trees*, ProGraS (p. 79), Sunday June 7, 9:30 - 10:00, GH 115
- Porter, Amanda, *Edge Cops and Robber on Triangle-Free Graphs*, ProGraS (p. 79), Saturday June 6, 16:00 - 16:30, GH 115
- Pronk, Dorette, *Examples of Orthogonal Factorization Systems for Double Categories*, HomThe (p. 61), Saturday June 6, 9:00 - 9:30, HH 126

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- Ramras, Daniel, *Homotopy Pullbacks in CAT*, HomThe (p. 61), Saturday June 6, 16:00 - 16:30, HH 126
- Ramras, Daniel, *Spaces of flat connections*, GeoQua (p. 56), Monday June 8, 13:30 - 14:30, IH 107
- Raven, Adrian Lopez, *Categorical 't Hoof Expansion and Chiral Algebras*, MathPhy (p. 69), Saturday June 6, 16:30 - 17:00, OH 104
- Razafimahatratra, Sarobidy, *Using cyclic codes to solve an Erdős-Ko-Rado type problem on permutation groups*, ComDThe (p. 47), Sunday June 7, 15:30 - 16:00, GH 215
- Rose, Meghan Allen, *Breaking out of online echo chambers: is the manosphere influencing classroom behaviour?*, Teachor (p. 89), Saturday June 6, 9:00 - 9:30, HH 125
- Rosenblyum, Nick, *Categorical representations and traces*, AutoFoR (p. 35), Sunday June 7, 17:00 - 17:30, OH 104
- Roshani, Marzieh, *Rate-Dependent Tipping in Human-Ecological Systems*, Poster (p. 93), Saturday June 6, 13:00 - 13:30, Ganong Hall Gallery and Foyer
- Rüd, Thomas, *Jacquet-Rallis Transfer for ramified unitary groups and the Arithmetic Transfer Conjecture*, AutoFoR (p. 35), Monday June 8, 9:00 - 9:30, OH 104
- Ruiz, Carlos Gabriel Valenzuela, *About tight moment-angle complexes*, HomThe (p. 62), Sunday June 7, 8:30 - 9:00, HH 126

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- Saffar, Shahriyar Pourakbar, *On Uniquely Colourable Biclique Designs*, ComDThe (p. 47), Saturday June 6, 10:00 - 10:30, GH 215
- Salja, Deni, HomThe (p. 62), Saturday June 6, 10:00 - 10:30, HH 126
- Sandapen, Ruben, *Conformal inversion in the internal light-front dynamics of a pion*, MathPhy (p. 69), Saturday June 6, 9:00 - 9:30, OH 104
- Sankey, Alyssa, *Reflections on academic apathy*, Teachor (p. 89), Saturday June 6, 9:30 - 10:00, HH 125
- Saunders, Ethan, ComGThe (p. 51), Saturday June 6, 17:00 - 17:30, HH 232
- Scull, Laura, *Twisted Bredon Cohomology is a Morita Invariant*, HomThe (p. 62), Saturday June 6, 15:30 - 16:00, HH 126
- Scull, Laura, *(Lack of) Model Structure for Homotopy of Graphs*, CatTheo (p. 41), Monday June 8, 15:00 - 15:30, OH 105
- Seamone, Ben, *Removeable edges in cubic graphs which admit nowhere-zero 4-flows*, StrAIGT (p. 83), Monday June 8, 10:00 - 10:30, GH 313
- Selinger, Peter, *On 3-terminal positions in Hex*, ComGThe (p. 51), Sunday June 7, 15:00 - 15:30, HH 232
- Shabtai, Ood, *Localization of quantum systems at Liouville tori*, GeoQua (p. 57), Monday June 8, 9:30 - 10:00, IH 107
- Shapiro, Ilya, *Annuli stacking and duoidal categories.*, NocommG (p. 74), Sunday June 7, 16:30 - 17:00, HH 125
- Shuai, Zhisheng, *A Final Size Relation for Heterogeneous Epidemic Models*, ApDySys (p. 29), Saturday June 6, 15:00 - 15:30, HH 225
- Skokri, Kianoosh, *On the Chromatic Number of Cayley Tables of Dihedral Groups*, ComDThe (p. 48), Saturday June 6, 15:30 - 16:00, GH 215
- Stinson, Doug, *Optimal Equidistant Codes—A Detective Story*, ComDThe (p. 48), Sunday June 7, 8:30 - 9:00, GH 215

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- Tang, Wanyue, *High-Codimension Bifurcation Analysis of a Predator-Prey System with Fear Effects*, ApDySys (p. 29), Sunday June 7, 9:00 - 9:30, HH 225
- Taylor, Aiden, *Wavelet Optimization in Wavelet Convolutional Neural Networks*, Poster (p. 93), Saturday June 6, 13:00 - 13:30, Ganong Hall Gallery and Foyer
- Taylor, Aiden, *Wavelet Optimization in Wavelet Convolutional Neural Networks*, StuRes (p. 86), Sunday June 7, 16:00 - 16:30, HH 126
- Teixeira, Daniel, *(∞, ∞) -categories with adjoints are a bit like spaces*, CatTheo (p. 42), Sunday June 7, 9:00 - 9:30, OH 105
- Thibodeau, Julien, *Bifurcation detection in dynamical systems using deep learning*, MModFis (p. 65), Sunday June 7, 9:00 - 9:30, OH 208
- Thorbjørnsen, Thomas Wilskow, *Finitely Adequate Modules in Synthetic Algebraic Geometry*, HomThe (p. 62), Saturday June 6, 17:30 - 18:00, HH 126
- Totschnig, Agnes, *Almost perfect graph classes*, StrAlGT (p. 84), Monday June 8, 9:30 - 10:00, GH 313
- Toukian, Nicholas, GGTheo (p. 53), Saturday June 6, 9:00 - 9:30, GH 313
- Trenk, Ann, *Degree sequences, split graphs and geometric representations*, StrAlGT (p. 84), Sunday June 7, 16:30 - 17:00, GH 313
- Tretiakova, Kateryna, *Beyond the Lecture: Testing Pedagogical Formats in Undergraduate Mathematics Tutorials*, StuRes (p. 86), Sunday June 7, 17:30 - 18:00, HH 126
- Tsimperis, Giorgos, NocommG (p. 74), Sunday June 7, 17:00 - 17:30, HH 125

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- Uribe, Alejandro, *Semi-classical aspects of the quantum Zeno effect*, GeoQua (p. 57), Saturday June 6, 17:00 - 17:30, IH 107

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- van Brussel, Lee, *Observations from an Early-Career Mathematics Educator*, Teachor (p. 89), Saturday June 6, 16:30 - 17:00, HH 125
- van den Hoogen, Robert, *Using gauge covariant Lie derivatives to impose symmetries*, MathPhy (p. 69), Saturday June 6, 17:30 - 18:00, OH 104
- Van Wyk, Jacques, *Generalised Complex Structures on Products of Lie Groups*, GeoQua (p. 57), Monday June 8, 10:00 - 10:30, IH 107
- Vienney, Jean-Baptiste, *Non-uniqueness of differentiation in differential categories*, CatTheo (p. 42), Sunday June 7, 16:30 - 17:00, OH 105
- Vizcaino, Diana, *Finiteness of Homological Dehn Functions*, GGTheo (p. 53), Saturday June 6, 9:30 - 10:00, GH 313

W

- Waddell, Chris, *On sufficient conditions for holographic scattering*, MathPhy (p. 69), Saturday June 6, 15:30 - 16:00, OH 104
- Weise, Ellie, *Close-Kin Mark-Recapture in Atlantic Halibut*, MModFis (p. 66), Sunday June 7, 9:30 - 10:00, OH 208
- Weitsman, Jonathan, *Hilbert Polynomials of Calabi Yau Hypersurfaces in Toric Varieties and Lattice Points in Polytope Boundaries*, GeoQua (p. 57), Sunday June 7, 8:30 - 9:30, IH 107
- Wesley, Scott, *Parameterized Quantum Circuit Semantics Through Enriched Categories*, CatTheo (p. 42), Monday June 8, 9:00 - 9:30, OH 105

Y

- Yang, Junyuan, *Parameter identification of age-structured epidemic models*, ApDySys (p. 29), Saturday June 6, 17:30 - 18:00, HH 225

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- Zhao, Luyao, *A Unified Mathematical Study of Four Within-Host Mycobacterium tuberculosis Models*, Poster (p. 93), Saturday June 6, 13:00 - 13:30, Ganong Hall Gallery and Foyer

Public Lecture
Conférence publique

Schedule/Horaire

Room/Salle: Ganong Hall Lecture Theatre

Friday June 5

vendredi 5 juin

17:15 - 18:15 ANTHONY BONATO (Toronto Metropolitan University), *Math Memes for the Math-Inclined and Whoever Else Comes to Public Math Lectures* (p. 21)

Abstract/Résumé

ANTHONY BONATO, Toronto Metropolitan University

[Friday June 5 / vendredi 5 juin, 17:15 – Ganong Hall Lecture Theatre]

Math Memes for the Math-Inclined and Whoever Else Comes to Public Math Lectures

From the distracted boyfriend to the grumpy cat to Rickrolls, memes pop up constantly and spread rapidly through our socials.

Memes are cultural units or behaviours passed on through imitation. First coined by the evolutionary biologist Richard Dawkins in *The Selfish Gene*, the word comes from splicing “gene” with mimema, the Greek word for imitation.

Math memes, or memoids as I like to call them, add a dose of mathematical nerdiness to the mix. Memoids poke fun, entertain, and sometimes even educate.

We’ll take a personal guided tour of math memes, with a brief look at how they spread, including a nod to graph burning. No differential equations required.

Plenary Lectures Conférences plénières

Schedule/Horaire

Room/Salle: Ganong Hall Lecture Theatre

Saturday June 6

samedi 6 juin

11:00 - 12:00 JHONEL MORVAN (Université de l'Ontario français), *What Mathematics, and for Whom Exactly?* (p. 22)

Sunday June 7

dimanche 7 juin

11:00 - 12:00 NIKY KAMRAN (McGill University), *A survey of the Calderón inverse problem.* (p. 22)

Monday June 8

lundi 8 juin

11:00 - 12:00 JULIA GORDON (University of British Columbia), *A long story of eliminated quantifiers* (p. 22)

Abstracts/Résumés

JULIA GORDON, University of British Columbia

[Monday June 8 / lundi 8 juin, 11:00 – Ganong Hall Lecture Theatre]

A long story of eliminated quantifiers

This talk is about many recent applications of classical theorems from Model Theory known as ‘quantifier elimination’ results. The first examples of such results go back to the work of Tarski in the 1930s, and Ax-Kochen in the 1960s. In the current century, these ideas found far-reaching applications, including the proof of many cases of the Andre-Oort conjecture in Number Theory. With the development of a theory called Motivic Integration, further applications of these ideas were developed ranging from Algebraic geometry to the theory of Automorphic forms. I will survey the foundational idea of quantifier elimination, and then focus on its application to the study of properties of a certain class of morphisms between algebraic varieties, and then an application of these properties in representation theory (this part is based on the work of I. Glazer and Y. Hendel).

NIKY KAMRAN, McGill University

[Sunday June 7 / dimanche 7 juin, 11:00 – Ganong Hall Lecture Theatre]

A survey of the Calderón inverse problem.

The Calderón inverse problem in geometric analysis asks if the metric of a smooth compact Riemannian manifold with boundary is uniquely determined from the knowledge of the Dirichlet-to-Neumann map, that is the map that assigns to prescribed boundary data the normal derivative of the corresponding solution of the Laplace-Beltrami equation. While the Calderón inverse problem is still open in its full generality, there are a number of interesting and at times surprising results that provide either an affirmative answer or counterexamples, depending on which special assumptions are made about the background geometry. The talk will be an introduction to the Calderón problem and a survey of some of the main uniqueness and non-uniqueness results.

JHONEL MORVAN, Université de l'Ontario français

[Saturday June 6 / samedi 6 juin, 11:00 – Ganong Hall Lecture Theatre]

What Mathematics, and for Whom Exactly?

Who is mathematics for, and what do mathematicians look like? These two questions sit at the heart of a growing equity conversation that the mathematical community can no longer afford to leave at the classroom door. Drawing on doctoral research conducted with the Toronto District School Board, this lecture examines how the overall school experience and emotional well-being of racialized secondary students relate to their mathematics achievement. Additionally, through video

Plenary Lectures Conférences plénières

excerpts of prospective teachers reflecting on their postsecondary mathematics journeys, the talk invites participants to confront some uncomfortable but important questions: Are we teaching for our own pleasure, or so a diverse student population can genuinely understand? Who gets called good at math, who does not, and what messages travel forward into the next generation? The session closes by questioning how emerging technologies may be reshaping the relationship between learners and instructors.

Prize Lectures
Conférence des lauréats

Schedule/Horaire

Room/Salle: Ganong Hall Lecture Theatre

Saturday June 6

samedi 6 juin

13:30 - 14:30 WESLEY BURR (Trent University), *What and Who are Grading and Assessment For?* (p. 24)

Sunday June 7

dimanche 7 juin

13:30 - 14:30 YU-RU LIU (University of Waterloo), *Fermat vs Waring: An Introduction to Number Theory in Function Fields* (p. 24)

Abstract/Résumé

**Excellence in Teaching Award
Prix d'excellence en enseignement**

WESLEY BURR, Trent University

[Saturday June 6 / samedi 6 juin, 13:30 – Ganong Hall Lecture Theatre]

What and Who are Grading and Assessment For?

I, like most in the mathematical sciences community, was trained in a fairly traditional way. The courses I took during my degrees were largely conventional — assignments, quizzes or tests, and exams. This was the world I knew. When I became an instructor, and then a faculty member, and was given varying levels of control over pedagogy for my teaching, this was the framework I followed. But I rapidly became dissatisfied with this framework, and began questioning both the purpose and efficacy of the methods I had been exposed to in my own education. In this talk I will discuss the evolution of my thinking on grading and assessment across the last decade, and the development of an integrated framework of mastery-based grading and assessment which I have established for a full sequence of courses at Trent University, along with some musings of how successful I believe it has been, and (hopefully) some inspiration for things you might consider trying in your own teaching.

**Krieger-Nelson Prize
Prix Krieger-Nelson**

YU-RU LIU, University of Waterloo

[Sunday June 7 / dimanche 7 juin, 13:30 – Ganong Hall Lecture Theatre]

Fermat vs Waring: An Introduction to Number Theory in Function Fields

Let \mathbb{Z} be the ring of integers. For a prime number p , let $\mathbb{F}_p[t]$ be the ring of polynomials in one variable defined over the finite field \mathbb{F}_p of p elements. Since the characteristic of \mathbb{Z} is 0, while that of $\mathbb{F}_p[t]$ is the positive number p , it is a striking theme in arithmetic that these two rings faithfully resemble each other. The study of the similarity and difference between \mathbb{Z} and $\mathbb{F}_p[t]$ lies in the field that relates number fields to function fields. In this talk, we will investigate some Diophantine problems in the settings of \mathbb{Z} and $\mathbb{F}_p[t]$, including Fermat's last theorem and Waring's problem.

Applied Dynamical Systems and Mathematical Biology Systèmes dynamiques appliqués et biologie mathématique

Org: **Lin Wang** (University of New Brunswick) and/et **Yuan Yuan** (Memorial University)

The session is devoted to recent progress in applied dynamical systems involving ordinary, partial, and fractional differential equations, with applications in mathematical biology. The focus will include, but is not limited to, the qualitative behavior of these equations, as well as applied models arising in population dynamics, infectious disease modeling, and ecological systems.

Cette session est consacrée aux avancées récentes en systèmes dynamiques appliqués faisant intervenir des équations différentielles ordinaires, aux dérivées partielles et fractionnaires, avec des applications en biologie mathématique. L'accent sera mis, sans s'y limiter, sur le comportement qualitatif de ces équations, ainsi que sur des modèles appliqués issus de la dynamique des populations, de la modélisation des maladies infectieuses et des systèmes écologiques.

Schedule/Horaire

Room/Salle: HH 225

Saturday June 6

samedi 6 juin

8:30 - 9:00	CONNELL MCCLUSKEY (Wilfrid Laurier University), <i>Global Stability of Epidemic Models with Uniform Susceptibility</i> (p. 28)
9:00 - 9:30	DANDAN HU (Memorial), <i>Dynamical analysis in a nonlocal delayed reaction–diffusion tumor model with therapy</i> (p. 27)
9:30 - 10:00	FATIMA ISLAM (University of New Brunswick), <i>Impact of Dispersal on Total Equilibrium Biomass in Patch-Structured Logistic Models</i> . (p. 27)
10:00 - 10:30	SHIHENG FAN (Memorial), <i>Global dynamics of two-species competition reaction-diffusion systems in a time-varying domain</i> (p. 26)
15:00 - 15:30	ZHISHENG SHUAI (Central Florida), <i>A Final Size Relation for Heterogeneous Epidemic Models</i> (p. 29)
15:30 - 16:00	JULIAN CHRISTOPHER (Wilfrid Laurier University), <i>The effect of time delay on the global stability of infectious disease models and other dynamical systems</i> (p. 26)
16:00 - 16:30	WENTAO MENG (Memorial), <i>A road-field population model with climate change: forced wave patterns and stability</i> (p. 28)
16:30 - 17:00	KAYLEE DEVRIES (Wilfrid Laurier University), <i>Analysis of a General Vector Transmission Model for Infectious Disease Spread</i> (p. 26)
17:00 - 17:30	YUCEN JIN (Western), <i>Delay-induced Hopf-zero bifurcation in a Host-parasite model</i> (p. 27)
17:30 - 18:00	JUNYUAN YANG (Shanxi University), <i>Parameter identification of age-structured epidemic models</i> (p. 29)

Sunday June 7

dimanche 7 juin

8:30 - 9:00	EMMANUEL LORIN (Carleton), <i>Recent Advances in Neural Network-based Methods for Partial Differential Equations and Eigenvalue Problems</i> (p. 28)
9:00 - 9:30	WANYUE TANG (Western), <i>High-Codimension Bifurcation Analysis of a Predator-Prey System with Fear Effects</i> (p. 29)
9:30 - 10:00	OLIVIER GRIMARD (University of New Brunswick), <i>Modelling clonal structure of saltmarsh <i>Spartina</i> grasses</i> (p. 27)
10:00 - 10:30	COURTNEY ALLEN (University of New Brunswick), <i>Modelling the dynamics of diatoms on New Brunswick's mudflats</i> (p. 25)

Abstracts/Résumés

COURTNEY ALLEN, University of New Brunswick

[Sunday June 7 / dimanche 7 juin, 10:00 – HH 225]

Modelling the dynamics of diatoms on New Brunswick's mudflats

Applied Dynamical Systems and Mathematical Biology

Systèmes dynamiques appliqués et biologie mathématique

At low tide in the upper Bay of Fundy, over a kilometre of intertidal mudflats are exposed. The microalgal biofilms that grow on these mudflats are a carbon sink, but their potential for carbon sequestration is still being understood. One hurdle is that the primary component of the microalgal biofilm, diatoms, migrate vertically within the mud. Diatoms rise to the surface when the sun comes out, but recede when the light becomes too intense and when the tide comes in. Therefore, surface measurements of diatom populations made by remote sensing technologies, such as drones and satellites, need to be corrected. To that end, we propose a one-dimensional advection-diffusion-reaction equation to describe how the diatom population changes with depth and time. The model is implemented in Julia, and some sensitivity analyses are presented to show how the surface behaviour is influenced by parameters such as temperature and light intensity.

JULIAN CHRISTOPHER, Wilfrid Laurier University

[Saturday June 6 / samedi 6 juin, 15:30 – HH 225]

The effect of time delay on the global stability of infectious disease models and other dynamical systems

When studying mathematical models of infectious disease, one characteristic of great interest is the long term persistence of the disease: given an initial infection rate, will it become endemic? or die out? Mathematically this is a question about the stability of an endemic equilibrium. Since the initial conditions of an outbreak are not under our control, local stability results are often insufficient: one would like to know whether the conditions present in a specific outbreak would lead the system to the endemic equilibrium, or to disease extinction. For this reason, global stability results play an important role in the analysis of epidemic models.

In this talk we examine the effect of delayed variables on the global stability of systems of ordinary differential equations. This problem arises naturally in mathematical models of infectious disease, where delays may represent vector-borne transmission, incubation periods, temporary immunity, or other biological processes that prevent instantaneous responses in the system. Our approach is based on Lyapunov's Direct Method. Specifically, we construct Lyapunov functionals for the delayed system by modifying the Lyapunov functions used for the corresponding ODE model. This approach allows us to extend stability results from the non-delayed system to the delayed system, and provides a framework for analyzing the effect of delays in a broad class of dynamic models.

KAYLEE DEVRIES, Wilfrid Laurier University

[Saturday June 6 / samedi 6 juin, 16:30 – HH 225]

Analysis of a General Vector Transmission Model for Infectious Disease Spread

As an extension of the framework developed by Earn and McCluskey (PNAS 2025 Vol. 122 No. 49), we consider a very general vector transmission model for the spread of an infectious disease. The human and vector populations each contain a single susceptible class and an arbitrary number of post-infection compartments, allowing for general stage structure (e.g., exposed, infectious, treated or quarantined classes). The main assumptions of the model are as follows: there is no return from infected classes to the susceptible classes in either population; each infected class can be reached from the respective susceptible class; and transmission follows a mass action incidence function with a criss-cross structure, whereby infected vectors infect susceptible humans, and infected humans infect susceptible vectors. For the resulting system of ordinary differential equations, we explicitly determine the disease-free and endemic equilibria and derive a closed-form expression for the basic reproduction number. Using techniques similar to those developed by McCluskey and Earn, we study the global stability of the disease-free equilibrium when $\mathcal{R}_0 \leq 1$ and of the endemic equilibrium when $\mathcal{R}_0 > 1$.

SHIHENG FAN, Memorial University of Newfoundland

[Saturday June 6 / samedi 6 juin, 10:00 – HH 225]

Global dynamics of two-species competition reaction-diffusion systems in a time-varying domain

In this talk, we investigate the global dynamics of a two-species competition reaction-diffusion model in a time-varying domain under the homogeneous Dirichlet and Neumann boundary conditions. Under appropriate conditions, we establish the competitive exclusion principle for asymptotically bounded and periodic domains, respectively. By the method of upper and lower

Applied Dynamical Systems and Mathematical Biology Systèmes dynamiques appliqués et biologie mathématique

solutions and comparison arguments, we prove that one species will exclude the other in an asymptotically unbounded domain. We further apply the analytic results to a Lotka-Volterra competition model for its global dynamics and conduct numerical simulations to illustrate our findings.

OLIVIER GRIMARD, University of New Brunswick

[Sunday June 7 / dimanche 7 juin, 9:30 – HH 225]

*Modelling clonal structure of saltmarsh *Spartina* grasses*

For *Spartina* spp., clonal spread via extension of rhizomes represents a major means of colonization within saltmarsh restoration sites. Both dominant halotolerant grass species *Spartina alterniflora* and *Spartina patens* have remarkably different rhizomal structures, which affect both their rate of spread and their competitive ability. The rhizomal three-dimensional structure of both species is only superficially understood despite its apparent importance. The present work offers a detailed quantification of the rhizomal structure for both plant species and defines a set of growth rules from which this structure could arise. Quantification of rhizomal structure includes internode length, branching angles, short internode numbers and length, and node counts within functional rhizome sections, among other measurements. The rules include branching potential per node, apical bud activity variability between zones, and the sequence of functional sections. Rules hold regardless of the position within the plant while quantities change. To test whether these quantifications and rules are truly able to produce the observed structure, we implement them in a deterministic node-based three-dimensional model using Julia. As of now, the simulations capture the difference in forms characterizing each species quite well, although the details of these forms need further refinements. The results outline the need to understand both plant developmental processes and plant structures' geometric properties to obtain a set of rules that lead to a biologically realistic structure.

DANDAN HU, Memorial University of Newfoundland

[Saturday June 6 / samedi 6 juin, 9:00 – HH 225]

Dynamical analysis in a nonlocal delayed reaction-diffusion tumor model with therapy

In this talk, we study a nonlocal delayed reaction-diffusion model for tumor growth under therapy. The model includes nonlinear tumor-therapy interactions, spatial diffusion, and a nonlocal delayed response. Using the Lyapunov-Schmidt reduction, we establish the existence of a nontrivial steady-state solution bifurcating from the trivial solution and obtain an approximate expression for a spatially inhomogeneous steady state. We then analyze the spectrum of the linearized operator, derive explicit stability criteria, and identify delay-induced Hopf bifurcation regimes. Numerical simulations are presented to support the theoretical results and to illustrate how treatment parameters affect stability and oscillatory behavior.

FATIMA ISLAM, University of New Brunswick

[Saturday June 6 / samedi 6 juin, 9:30 – HH 225]

Impact of Dispersal on Total Equilibrium Biomass in Patch-Structured Logistic Models.

Understanding how dispersal asymmetry influences total equilibrium biomass in spatially structured populations remains a key challenge in mathematical ecology. This study extends classical two-patch logistic models by incorporating a mixed dispersal strategy that combines random and density-dependent movement. The dispersal rate from each patch is governed by a fitness function parameterized by dispersal strength and asymmetry ratio. Using geometric phase-plane analysis, specifically the intersection of an ellipse and a hyperbola derived from the equilibrium conditions, we characterize the unique positive equilibrium and prove its global asymptotic stability via Dulac's criterion and the Poincaré-Bendixson theorem. Our results reveal four distinct dispersal regimes based on the position of a limiting hyperbola relative to three critical points on the ellipse. These regimes determine whether total equilibrium biomass increases, decreases, peaks at an intermediate dispersal strength, or crosses the isolated baseline. The framework resolves the so-called Perfect-Mixing Paradox by showing that asymmetry fundamentally alters the relationship between connectivity and total biomass, offering a more complete picture than previous symmetric or purely nonlinear models.

Applied Dynamical Systems and Mathematical Biology Systèmes dynamiques appliqués et biologie mathématique

YUCEN JIN, Western University

[Saturday June 6 / samedi 6 juin, 17:00 – HH 225]

Delay-induced Hopf-zero bifurcation in a Host-parasite model

Host–parasite interactions play a central role in ecological and evolutionary dynamics, shaping population persistence and ecosystem stability. When these interactions are coupled with interspecific competition, they can generate highly nonlinear and often counterintuitive behaviors. In this study, we develop a delayed differential equation model describing host–competitor–parasite dynamics, incorporating a latency period in parasite reproduction. This delay represents the developmental time of infection and introduces memory effects that can significantly alter system stability. Using bifurcation analysis, we investigate codimension-two phenomena, with particular focus on the Hopf–zero bifurcation as an organizing center for complex oscillatory and mixed-mode dynamics. Our results demonstrate how the interplay between temporal delays and multi-species interactions drives the emergence of rich and intricate dynamical patterns in ecological systems.

EMMANUEL LORIN, Carleton University

[Sunday June 7 / dimanche 7 juin, 8:30 – HH 225]

Recent Advances in Neural Network-based Methods for Partial Differential Equations and Eigenvalue Problems

In this talk, I will provide an overview of recent algorithms and mathematical advances in scientific machine learning, focusing on the computation of eigenvalues and eigenfunctions of operators, as well as on the solution of partial differential equations. I will illustrate these methods with examples and highlight current research challenges in this rapidly evolving field. While the presentation will emphasize general mathematical frameworks, many of the techniques discussed have direct applications to problems arising in mathematical biology.

CONNELL MCCLUSKEY, Wilfrid Laurier University

[Saturday June 6 / samedi 6 juin, 8:30 – HH 225]

Global Stability of Epidemic Models with Uniform Susceptibility

We consider a very general framework for compartmental disease models, allowing a single susceptible class and an arbitrary number of post-infection classes (including, for example, asymptomatic, mildly infectious, highly infectious, treated and quarantined groups).

Key model assumptions: (1) only one susceptible class, (2) no return from the infected classes to the susceptible class, (3) each infected class can (eventually) be reached from the susceptible class, (4) a “reasonable” incidence function.

We are able to fully resolve the global dynamics for the resulting ODE systems, obtaining the common threshold behaviour: If $R_0 < 1$, then the disease-free equilibrium is globally asymptotically stable; if $R_0 > 1$ then the endemic equilibrium is globally asymptotically stable.

Our proof involves using properties of M-matrices to construct a Lyapunov function that is a sum of Volterra functions.

This result subsumes a large number of results published over the last century, strengthens many of them by establishing global rather than local stability, avoids the need for any stability analyses of these systems in the future, and settles the question of whether co-existing stable solutions or non-equilibrium attractors are possible in such models: they are not.

This work was done in collaboration with David Earn (McMaster University).

WENTAO MENG, Memorial

[Saturday June 6 / samedi 6 juin, 16:00 – HH 225]

A road-field population model with climate change: forced wave patterns and stability

Recently, increasing attention is being devoted to spatial invasion and wave propagation phenomena in high-dimensional heterogeneous media (such as road-field interchange networks), due to their significance in applications to population models.

Applied Dynamical Systems and Mathematical Biology

Systèmes dynamiques appliqués et biologie mathématique

The combined effects of road diffusion and climate change in an unbounded high-dimensional domain introduce further complexity and challenges. In this talk, we study the propagation dynamics of a road-field system in a shifting environment. Our results indicated that forced traveling waves exist as long as the shifting speed is less than a critical value. For each of these kind of speeds, the forced wave profile is unique and exponentially stable. While the shifting speed is greater than that critical value, we further established propagation dynamics in connection to extinction and persistence. We found that the propagation of persistence cannot be faster than the critical speed.

ZHISHENG SHUAI, University of Central Florida

[Saturday June 6 / samedi 6 juin, 15:00 – HH 225]

A Final Size Relation for Heterogeneous Epidemic Models

We revisit the final size relation for epidemic models with homogeneous mixing and explore the challenges of extending it to heterogeneous settings. To address these, we develop a new systematic approach to construct first integrals in heterogeneous epidemic models. This approach enables a natural extension of the final size relation and yields new biological insights into reproduction numbers, turning points and peak infection levels.

WANYUE TANG, Western University, Lanzhou University

[Sunday June 7 / dimanche 7 juin, 9:00 – HH 225]

High-Codimension Bifurcation Analysis of a Predator-Prey System with Fear Effects

In this talk, we present a predator-prey model incorporating the fear effect and apply bifurcation theory to investigate higher-codimension Bogdanov-Takens (BT) and Hopf bifurcations. We demonstrate that multiple types of higher-codimension BT bifurcations can arise, including codimension-2, -3, and -4 cusp bifurcations, codimension-3 focus (elliptic) bifurcations, and other codimension-4 bifurcation types. Explicit conditions for the onset of these bifurcations are derived. In addition, we conduct a Hopf bifurcation analysis and employ normal-form theory to compute focus values up to the sixth order. Nevertheless, an exhaustive numerical search reveals that the generalized Hopf bifurcation is of codimension three, indicating that at most three limit cycles can bifurcate from the Hopf critical point associated with an equilibrium point. [This is joint work with Dr. Pei Yu.]

JUNYUAN YANG, University of Victoria

[Saturday June 6 / samedi 6 juin, 17:30 – HH 225]

Parameter identification of age-structured epidemic models

Parameter identifiability analysis aims to determine whether model parameters can be uniquely determined from observable outputs. This is a critical step in epidemiological forecasting and the design of effective control measures. In this talk, we systematically review the theoretical foundations and practical applications of parameter identifiability and propose a framework for analyzing structural model parameter identifiability. By integrating locally and globally identifiable techniques, we systematically construct a hierarchical structure for parameter identifiability in age-structured epidemic models. Using Monte Carlo simulations and approximate Bayesian estimation methods, we identify parameters that are actually unidentifiable in the models. This is a joint work with Ziyi Wu and Maia Martcheva.

Automorphic forms and representations Formes automorphes et représentations

Org: Clifton Cunningham (University of Calgary) and/et **Mishty Ray** (University of British Columbia)

The Langlands program is a deep web of connections that relates automorphic forms from harmonic analysis and Galois groups from algebraic number theory. The local aspects involve the representation theory of groups over local fields, and the global aspects cover automorphic representations. Our session aims to highlight recent works in this area, that use both classical methods as well as geometric or categorical perspectives.

Le programme de Langlands est un réseau profond de liens qui relie les formes automorphes issues de l'analyse harmonique et les groupes de Galois provenant de la théorie algébrique des nombres. Les aspects locaux font intervenir la théorie des représentations des groupes sur des corps locaux, et les aspects globaux portent sur les représentations automorphes. Notre session vise à mettre en valeur des travaux récents dans ce domaine, qui utilisent à la fois des méthodes classiques ainsi que des perspectives géométriques ou catégoriques.

Schedule/Horaire

Room/Salle: OH 104

Sunday June 7

dimanche 7 juin

8:00 - 8:30	KRISTAPS BALODIS (University of Calgary), <i>Arthur parameters and orbits with singular closure</i> (p. 31)
8:30 - 9:00	MONICA NEVINS (University of Ottawa), <i>On 4-packets of representations of $SL(2,F)$, for F a 2-adic field</i> (p. 34)
9:00 - 9:30	DIDIER LESESVRE (Université de Lille), <i>Dimension of spaces of modular forms via the Arthur trace formula</i> (p. 32)
9:30 - 10:00	GILL MOSS (University of Maine), <i>Converse theorems and the local Langlands conjecture in families for $GSp(4)$</i> (p. 34)
10:00 - 10:30	SADIE LIPMAN (University of Michigan), <i>Toral supercuspidal representations and Shintani lifting</i> (p. 33)
15:00 - 15:30	JULIA GORDON (University of British Columbia), <i>Coefficients of Harish-Chandra's local character expansion are motivic</i> (p. 32)
15:30 - 16:00	ANDREW KNIGHTLY (University of Maine), <i>Counting newforms with prescribed ramified supercuspidal components</i> (p. 32)
16:00 - 16:30	SIDDHARTH MAHENDRAKER (Boston College), <i>Regularizing the Geometric RTF for the Galois Period on SL_2</i> (p. 34)
16:30 - 17:00	SPENCER LESLIE (Boston College), <i>Endoscopic phenomena in relative Langlands</i> (p. 33)
17:00 - 17:30	NICK ROSENBLUM (University of Toronto), <i>Categorical representations and traces</i> (p. 35)
17:30 - 18:00	SIMRAN KHUNGER (University of Michigan), <i>Automorphic multiplicity formulas for inner forms of SL_n</i> (p. 32)

Monday June 8

lundi 8 juin

8:00 - 8:30	ATONU MUKHERJEE (University of British Columbia), <i>Log Canonical Threshold of Vinberg (enveloping monoid)</i> (p. 34)
8:30 - 9:00	TAEUK NAM (Harvard University), <i>Categorical Trace and Geometric Langlands</i> (p. 34)
9:00 - 9:30	THOMAS RÜD (Massachusetts Institute of Technology), <i>Jacquet–Rallis Transfer for ramified unitary groups and the Arithmetic Transfer Conjecture</i> (p. 35)
9:30 - 10:00	CALLIE LIDDLE (Carleton University), <i>Singularities of K-orbits on the flag variety of G_2</i> (p. 33)
10:00 - 10:30	NICOLAS ARANCIBIA (CY Cergy Paris Université - site Saint Martin), <i>Proving the Enhanced Shahidi Conjecture for Real Groups</i> . (p. 31)
13:30 - 14:00	ADELE BOURGEOIS (Carleton University), <i>A lift for semisimple characters and its compatibility with base change functoriality</i> (p. 31)
14:00 - 14:30	JOSE CRUZ (University of Calgary), <i>On the transcendental nature of the class number formula</i> (p. 31)

Automorphic forms and representations

Formes automorphes et représentations

Abstracts/Résumés

NICOLAS ARANCIBIA, Cergy Paris Université

[Monday June 8 / lundi 8 juin, 10:00 – OH 104]

Proving the Enhanced Shahidi Conjecture for Real Groups.

For a real group G , it follows from the work of Kostant and Vogan that the L -packet associated with an L -parameter ϕ contains a generic representation if and only if the corresponding \tilde{G} -orbit in the variety of geometric parameters is open.

In this talk, we prove an analogous criterion for Adams–Barbasch–Vogan micro-packets: the micro-packet attached to ϕ contains a generic representation precisely when the associated orbit is open. As an application, we establish the Enhanced Shahidi Conjecture for real groups, showing that the Arthur packet attached to an A -parameter ψ contains a generic representation if and only if the restriction $\psi|_{\mathrm{SL}_2}$ is trivial.

Micro-packets are defined in terms of characteristic cycles of D -modules. To establish our result, we explicitly compute these characteristic cycles in the case of D -modules associated with generic representations. We do this by exploiting the existence of a Weyl group action on both the domain and the codomain of the characteristic cycle map, which makes this map equivariant.

KRISTAPS BALODIS, University of Calgary

[Sunday June 7 / dimanche 7 juin, 8:00 – OH 104]

Arthur parameters and orbits with singular closure

Building on the work of Zelevinsky, and the cases for real and complex groups, David Vogan proposed a p -adic Kazhdan-Lusztig hypothesis: The dimensions of stalks of perverse sheaves on the "Vogan variety" V_λ of Langlands parameters having infinitesimal parameter λ , should coincide with multiplicities of irreducible representations of infinitesimal parameter λ in standard representations. Moreover, Vogan defined what we call ABV-packets in terms of the microlocal geometry of V_λ , and proposed that these coincide with Arthur's A -packets.

In this talk, I will discuss recent work with collaborators that, if G is a p -adic group for which the p -adic Kazhdan-Lusztig hypothesis holds, then the forward direction of the Gross-Prasad conjecture holds: An L -packet $\Pi_\phi(G)$ contains a generic representation if and only if $L(s, \phi, \mathrm{Ad})$ is regular at $s = 1$. I will also discuss an analogous result for ABV-packets, and implications for Shahidi's enhanced genericity. Finally, I will discuss some results towards showing that Arthur parameters of classical groups and $\mathrm{GL}(n)$ are associated to orbits of singular closure in their Vogan variety, and counter-examples for non-classical groups.

ADELE BOURGEOIS, Tutte Institute for Mathematics and Computing / Carleton University

[Monday June 8 / lundi 8 juin, 13:30 – OH 104]

A lift for semisimple characters and its compatibility with base change functoriality

Let G be a connected reductive group over a local nonarchimedean field F of residual characteristic p and set $H = (G^\Gamma)^\circ$, where $\Gamma \subset \mathrm{Aut}(G)$ is a finite group such that $\gcd(p, |\Gamma|) = 1$. We show how one can lift a semisimple character for H , in the sense of Bushnell-Kutzko, to a semisimple character for G . We also discuss compatibility of this lifting technique with the notion of base change functoriality from the Local Langlands correspondence.

JOSE CRUZ, University of Calgary

[Monday June 8 / lundi 8 juin, 14:00 – OH 104]

On the transcendental nature of the class number formula

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A classical problem in number theory is how to determine if two number fields are isomorphic. One approach is to verify whether the given number fields have the same arithmetical invariants (e.g., discriminant, signature, regulator, among others). In this talk, I will focus on the regulator, and show how much arithmetical information it encodes. More specifically, I will give, conditionally on the Weak Schanuel Conjecture, necessary and sufficient conditions for two totally real number fields to have the same regulator.

We will see that these conditions naturally appear from the following result: Two totally real number fields K_1 and K_2 have the same Dedekind zeta functions $\zeta_{K_1}(s)$ and $\zeta_{K_2}(s)$ if and only if the real numbers

$$\lim_{s \rightarrow 1} (s-1)\zeta_{K_1}(s) \quad \text{and} \quad \lim_{s \rightarrow 1} (s-1)\zeta_{K_2}(s)$$

are linearly dependent over the field of algebraic numbers $\overline{\mathbb{Q}}$. I will conclude with a representation-theoretic reformulation of this result.

JULIA GORDON, University of British Columbia

[Sunday June 7 / dimanche 7 juin, 15:00 – OH 104]

Coefficients of Harish-Chandra's local character expansion are motivic

This talk will be about the joint work with Loren Spice, where we prove that the coefficients of the Harsh-Chjandra's local character expansion for reductive p-adic groups are so-called motivic constants (I will define this notion). This leads to a uniform in p bound on the dimension of the space of fixed vectors of a family of representations of p-adic groups under a given (definable) compact subgroup.

SIMRAN KHUNGER, University of Michigan, Ann Arbor

[Sunday June 7 / dimanche 7 juin, 17:30 – OH 104]

Automorphic multiplicity formulas for inner forms of SL_n

In 2012, Hiraga and Saito proved Arthur's multiplicity formula for cuspidal automorphic representations of inner forms of SL_n , up to an indeterminate constant. Their method of proof utilized the stable trace formula, among other tools.

In this talk, we discuss a strategy to canonicalize Hiraga and Saito's result, effectively removing the indeterminate constant in their work. We use the example of $n = 2$ to illustrate this strategy.

ANDREW KNIGHTLY, University of Maine

[Sunday June 7 / dimanche 7 juin, 15:30 – OH 104]

Counting newforms with prescribed ramified supercuspidal components

We recently gave a general trace formula which counts the number of classical newforms of fixed weight and level whose local components at the primes dividing the level are prescribed supercuspidal representations. To make the formula explicit, one must compute certain local orbital integrals at each such prime. At present, this has been carried out only when the fixed supercuspidals have conductor exponent 2 or 3.

In joint work with Kimball Martin, we obtain a dimension formula that allows for prescribed supercuspidals of any odd-power conductor (the so-called ramified supercuspidals). We are able to get around having to compute the tricky orbital integrals by using the trace of an Atkin-Lehner operator. As a consequence of our formula, we observe a bias in global dimension formulas favoring certain supercuspidals over others with the same conductor exponent, though asymptotically there is balance as first shown in a much more general setting by Kim, Shin and Templier. Interestingly, the magnitude of this bias is independent of the (odd) conductor exponents. The sign of the bias is the global root number.

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DIDIER LESESVRE, Université de Lille

[Sunday June 7 / dimanche 7 juin, 9:00 – OH 104]

Dimension of spaces of modular forms via the Arthur trace formula

Spaces of automorphic forms feature finite-dimensional properties; and obtaining formulas for their dimensions is of natural importance as was already studied by Langlands. We consider the space $S_k(N)$ of modular cusp forms on $\mathrm{SL}_2(\mathbb{R})$ with weight $k \geq 4$ and level $N \geq 1$, relatively to the classical Hecke congruence subgroup $\Gamma_0(N)$. There exists an exact formula for the dimension of these spaces of modular forms, given by

$$\dim S_k(N) = \frac{k-1}{12}\phi(N) - \frac{1}{2}\nu_\infty(N) + c_2(k)\nu_2(N) + c_3(k)\nu_3(N), \quad (1)$$

where each quantity occurring above is explicit, in particular the ν_i are multiplicative functions. Such formulas are derived either from the Riemann-Roch theorem (as in Martin) or by using trace formulas.

The Arthur trace formula is a very general result of harmonic analysis on groups relating distribution of automorphic forms to distribution of arithmetic and geometric quantities. It has already been used in the literature to obtain main terms of dimension formulas, and our aim is to obtain the full dimension formula from it (providing a variation of Knightly works).

The result of the computations gives an interpretation of each term from the trace formula: the first (and dominant) term arises from the contribution of the identity for the maximal Levi $M = G$, the terms ν_i arise from the contribution of the elliptic elements of order i for $M = G$, and the term ν_∞ arises from the contribution of the identity for the minimal Levi $M = T$. We will give an outlook of the methods and tools used to obtain such results.

SPENCER LESLIE, Boston College

[Sunday June 7 / dimanche 7 juin, 16:30 – OH 104]

Endoscopic phenomena in relative Langlands

I will review ideas around the theory of endoscopy and the relative Langlands program. I will review several examples with applications to trace formula comparisons, sums of L-values, and harmonic-analytic anomalies on symmetric varieties.

CALLIE LIDDLE, Carleton University

[Monday June 8 / lundi 8 juin, 9:30 – OH 104]

Singularities of K -orbits on the flag variety of G_2

We define G_2 as a complex Lie group with Lie algebra of type G_2 . K is the centralizer of a particular element of order 2 in G_2 . We parameterize the orbits of K acting on the flag variety of G_2 , and use MAGMA software to determine where the singularities of the K -orbit closures lie. We provide applications for the representation theory of G_2 .

SADIE LIPMAN, University of Michigan

[Sunday June 7 / dimanche 7 juin, 10:00 – OH 104]

Toral supercuspidal representations and Shintani lifting

Given a tame elliptic regular pair $(S(F), \phi)$ of a p -adic group $G(F)$, one can produce a representation of $G(F)$ in two different ways: (twisted) Yu's construction and positive-depth Deligne–Lusztig induction. It is natural to ask when these produce the same representation. In 2023, Chan and Oi proved that if the residue field is sufficiently large, positive-depth Deligne–Lusztig induction and twisted Yu's construction coincide.

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In this talk, we will discuss how to extend this result to small residue fields using Shintani lifting of the associated parahoric representations. This gives us a correspondence between these representations of $G(F)$ and those of $G(F')$ coming from the pair $(S(F'), \phi \circ \text{Nm}_{F'/F})$, where F'/F is a finite unramified extension.

SIDDHARTH MAHENDRAKER, Boston College

[Sunday June 7 / dimanche 7 juin, 16:00 – OH 104]

Regularizing the Geometric RTF for the Galois Period on SL_2

The relative trace formula plays a fundamental role in understanding distinguished automorphic representations. In this talk, I introduce a new regularized relative trace formula for the Galois period on SL_2 . I will give an overview of the proof of convergence of the geometric side, and then discuss the fine geometric expansion, with a special focus on the contribution from relative unipotent orbital integrals. It turns out that these can be understood geometrically in terms of the Springer resolution of the nilpotent cone for $\text{Lie}(\text{SL}_2)$. This clarifies and generalizes formulas first written down by Labesse and Langlands in the setting of the usual trace formula.

GILL MOSS, University of Maine

[Sunday June 7 / dimanche 7 juin, 9:30 – OH 104]

Converse theorems and the local Langlands conjecture in families for $\text{GSp}(4)$

We will outline ongoing joint work-in-progress with Johannes Girsch regarding a generalization of the construction of Novodvorsky local gamma factors for generic representations of $\text{GSp}(4, F)$, where F is a nonarchimedean local field of residue characteristic p . More specifically, we generalize the construction to certain classes of representations where the coefficients are a commutative Noetherian ring in which p is invertible. The gamma factors give descent data for families of Whittaker models. We present a heuristic of how this can be applied in the framework of the local Langlands conjecture in families.

ATONU MUKHERJEE, University of British Columbia

[Monday June 8 / lundi 8 juin, 8:00 – OH 104]

Log Canonical Threshold of Vinberg (enveloping) monoid

The Vinberg enveloping monoid is an important example of a spherical variety, and by the Luna–Vust classification, its geometry is encoded by an associated colored cone. This colored cone governs $(G \times G)$ -equivariant embeddings and encodes boundary divisors, valuation data, and colors of the spherical variety.

The log canonical threshold (LCT) is a numerical invariant that measures the severity of singularities of a divisor relative to a fixed ambient log structure and plays a central role in the minimal model program.

In this setting, the LCT of the Vinberg enveloping monoid is studied via its colored cone. The main result relates the LCT in terms of root-theoretic and combinatorial data extracted from the colored cone of the Vinberg enveloping monoid.

TAEUK NAM, Harvard University

[Monday June 8 / lundi 8 juin, 8:30 – OH 104]

Categorical Trace and Geometric Langlands

I will speak about the categorical trace construction and how it can be used to traverse between categorical levels. Then, I will discuss some applications of categorical trace to representation theory and automorphic functions, including the connection between geometric Langlands and function-theoretic Langlands via taking categorical trace of Frobenius.

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MONICA NEVINS, University of Ottawa

[Sunday June 7 / dimanche 7 juin, 8:30 – OH 104]

On 4-packets of representations of $SL(2,F)$, for F a 2-adic field

The restriction of an irreducible representation of a reductive p -adic group to a sufficiently small open subgroup is governed by the geometry of nilpotent orbits in the dual of the Lie algebra, in a way made precise for local fields of characteristic zero by the analytic Harish-Chandra–Howe local character expansion. Henniart and Vignéras establish a representation-theoretic statement of this result for $SL(2,F)$ that holds without restriction on the characteristic of F , nor on the ring over which we realize the representations. In prior work, we have proven a variant of this result over \mathbb{C} for $p \neq 2$ and, in joint work with Zander Karaganis, for the case of depth-zero supercuspidal representations when $p = 2$.

In ongoing joint work with David Schwein, we connect the two approaches when $p = 2$ for wildly ramified irreducible supercuspidal representations of $SL(2,F)$, where the key objects are the fascinating collections of representations whose L -packets have four elements. In this talk, we present our recent progress, focussing particularly on the case of 4-packet representations of $SL(2, \mathbb{Q}_2)$.

NICK ROSENBLIUM, University of Toronto

[Sunday June 7 / dimanche 7 juin, 17:00 – OH 104]

Categorical representations and traces

I will give a brief overview of the theory of categorical representations and traces. The operation of categorical trace allows to pass from categorical to classical representations. I will describe some applications of these constructions to questions in (usual) representation theory.

THOMAS RÜD, MIT

[Monday June 8 / lundi 8 juin, 9:00 – OH 104]

Jacquet–Rallis Transfer for ramified unitary groups and the Arithmetic Transfer Conjecture

One aspect of relative Langlands program is, given a group G and spherical subgroup H , detecting whether a representation $\pi \subset L^2(G(\mathbb{A}))$ "comes from" a representation of H by a conjectural transfer. This detection relies on the vanishing of period integrals, which themselves are related to the vanishing of automorphic L -functions. For unitary groups, such periods can also be expressed as a generalization of heights of some points in a Shimura variety.

The linear case of Rankin–Selberg Flicker–Rallis periods is historically well-studied, and the modern approach on unitary groups suggested by Gan–Gross–Prasad is to reduce to these two cases by means of the relative trace formula.

The problem is solved for unramified local unitary groups but remains open even in low-dimensional ramified local fields. In this talk I will present what is known and how this relates to orbital integrals and the Arithmetic Transfer Conjecture for Shimura varieties. I will then formulate a conjecture establishing an explicit transfer in the ramified setting, together with a proof for rank one groups. This is joint work with Wei Zhang.

Category Theory Théorie des catégories

Org: Salja Deni, Robert Morisette and/et Dorette Pronk (Dalhousie University)

The scope of research in category theory has significantly grown over the last decade: there are new branches of categorical research such as infinity categories with their applications in homotopy theory and homotopy type theory, and an increased interest in older branches such as tangent categories and double categories, with exciting new applications in logic, theoretical computer science, and systems theory. In this session we welcome researchers in all areas of category theory and applications of category theory to share their latest results and develop new connections.

Le champ de recherche en théorie des catégories s'est considérablement élargi au cours de la dernière décennie : de nouvelles branches ont émergé, telles que les ∞ -catégories et leurs applications en théorie de l'homotopie et en théorie des types homotopiques, tandis qu'un intérêt renouvelé s'est manifesté pour des domaines plus anciens comme les catégories tangentes et les doubles catégories, avec de nouvelles applications prometteuses en logique, en informatique théorique et en théorie des systèmes. Dans cette session, nous invitons les chercheuses et chercheurs de tous les domaines de la théorie des catégories et de ses applications à présenter leurs résultats récents et à développer de nouvelles collaborations.

Schedule/Horaire

Room/Salle: OH 105

Sunday June 7

dimanche 7 juin

8:30 - 9:00	MARTIN FRANKLAND (Regina), <i>An invitation to n-angulated categories</i> (p. 38)
9:00 - 9:30	DANIEL TEIXEIRA (Dalhousie), <i>(∞, ∞)-categories with adjoints are a bit like spaces</i> (p. 42)
9:30 - 10:00	CAMERON KRULEWSKI (Dalhousie), <i>Dagger Categories and Higher Spin Statistics</i> (p. 39)
10:00 - 10:30	DARIEN DEWOLF (St Francis Xavier), <i>Crossed Modules of Inverse Semigroups as Internal Categories</i> (p. 37)
15:00 - 15:30	RORY LUCYSHYN-WRIGHT (Brandon), <i>Infinitary cartesian theories: A logic of locally presentable categories</i> (p. 40)
15:30 - 16:00	NATHAN HAYDON (Dalhousie), <i>Compositional First-Order Logic</i> (p. 38)
16:00 - 16:30	ALEXANDRE CLÉMENT (Dalhousie), <i>Complete Equational Theories for Quantum circuits</i> (p. 37)
16:30 - 17:00	JEAN-BAPTISTE VIENNEY (University of Ottawa), <i>Non-uniqueness of differentiation in differential categories</i> (p. 42)
17:00 - 17:30	MICHAEL LAMBERT (UMass Boston), <i>Twisted Double Functors</i> (p. 39)
17:30 - 18:00	EVAN PATTERSON (Topos Institute), <i>Double-categorical logic for unbiased categorical structures</i> (p. 41)

Monday June 8

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8:00 - 8:30	ROSE KUDZMAN-BLAIS (Kyoto), <i>Linear and Cyclic *-Autonomous Proarrow Equipments</i> (p. 39)
8:30 - 9:00	ALI HAMAD (Ottawa), <i>Ultracategories: Past and Future</i> (p. 38)
9:00 - 9:30	SCOTT WESLEY (Dalhousie), <i>Parameterized Quantum Circuit Semantics Through Enriched Categories</i> (p. 42)
9:30 - 10:00	AMÉLIE COMTOIS (University of Ottawa), <i>Notions of Smallness and Completeness for V-Graded Categories</i> (p. 37)
10:00 - 10:30	ROBERT MORISSETTE (Dalhousie), <i>Oppositizing Cells in Equipments</i> (p. 40)
13:30 - 14:00	JACK JIA (Waterloo), <i>Introduction to Deligne Categories</i> (p. 38)
14:00 - 14:30	AARON FAIRBANKS (Dalhousie), <i>Comonads as spaces</i> (p. 38)
14:30 - 15:00	HAYATO NASU (Dalhousie), <i>On the decomposition of a strong epimorphism into regular epimorphisms</i> (p. 40)
15:00 - 15:30	LAURA SCULL (Fort Lewis), <i>(Lack of) Model Structure for Homotopy of Graphs</i> (p. 41)
15:30 - 16:00	ROBERT PARÉ (Dalhousie), <i>A topos for categories</i> (p. 41)

Abstracts/Résumés

Category Theory Théorie des catégories

ALEXANDRE CLÉMENT, Inria, LMF, Université Paris-Saclay

[Sunday June 7 / dimanche 7 juin, 16:00 – OH 105]

Complete Equational Theories for Quantum Circuits

This talk synthesises recent work on complete sets of relations for quantum circuits. We introduce the first complete equational theory for quantum circuits, thereby answering a question which had been open for two decades. A complete equational theory is a set of equations between circuits that enables one to transform any two equivalent circuits into one another, by successive local rewriting. We obtain this result by means of a back-and-forth encoding between quantum circuits and a graphical language for linear optical circuits, for which we had previously obtained a simple complete equational theory. We show that the set of equations given by this method can be simplified into one made of a few simple and intuitive equations, which we prove to be minimal, in the sense that none of the equations can be derived from the others. One of the equations, although trivial regarding its semantics, acts on an arbitrary number of qubits, and we show that this cannot be avoided in the framework of ancilla-free quantum circuits. Finally, we extend the completeness result to circuits with ancillae and/or qubit discarding, and we show that in this framework, the equation on an arbitrary number of qubits can be removed, leading to an equational theory made of equations acting on at most 3 qubits. Additionally, we also obtain a completeness result for a finitely generated, universal fragment of quantum circuits. This is joint work with Noé Delorme, Nicolas Heurtel, Shane Mansfield, Simon Perdrix, Benoît Valiron, and Renaud Vilmart.

AMÉLIE COMTOIS, University of Ottawa

[Monday June 8 / lundi 8 juin, 9:30 – OH 105]

Notions of Smallness and Completeness for \mathcal{V} -Graded Categories

Categories graded by a monoidal category \mathcal{V} , which we call \mathcal{V} -graded categories, generalize both \mathcal{V} -enriched categories and \mathcal{V} -actegories. In previous work, we studied a notion of weighted limits for \mathcal{V} -graded categories that specializes to recover the usual notion of \mathcal{V} -enriched weighted limit. These \mathcal{V} -graded weighted limits are equivalently $[\mathcal{V}^{op}, SET]$ -enriched weighted limits with representable-valued weights.

In this talk, we continue to explore \mathcal{V} -graded weighted limits by first defining a notion of smallness in the \mathcal{V} -graded context then identifying equivalent conditions for the existence of all small \mathcal{V} -graded weighted limits. Given that \mathcal{V} -graded categories are $[\mathcal{V}^{op}, SET]$ -categories and that $[\mathcal{V}^{op}, SET]$ is not locally small, there are some complications with the usual notion of smallness. We therefore define our own notions of smallness and local smallness of \mathcal{V} -graded categories by requiring that the hom-presheaves be small presheaves. A \mathcal{V} -graded weighted limit is small if the shape of its diagram is a small \mathcal{V} -graded category. This \mathcal{V} -graded notion of smallness specializes to recover the familiar notion of smallness for \mathcal{V} -enriched categories. It is well known that a \mathcal{V} -category has all small weighted limits if it has all powers and small conical limits. We extend this result to provide equivalent conditions for a \mathcal{V} -graded category to admit all small \mathcal{V} -graded weighted limits. This talk is based on joint work with Richard Blute and Rory Lucyshyn-Wright.

DARIEN DEWOLF, St. Francis Xavier University

[Sunday June 7 / dimanche 7 juin, 10:00 – OH 105]

Crossed Modules of Inverse Semigroups as Internal Categories

(This is joint work with Dorette Pronk and David Zeidler.)

A classical theorem of Spencer and Brown (1976) gives an equivalence

$$\mathbf{XMod}/\mathbf{Group} \simeq \mathbf{Cat}(\mathbf{Group}),$$

identifying crossed modules of groups with categories internal to \mathbf{Group} (i.e., 2-groups). This equivalence underlies the 2-dimensional Seifert-van Kampen theorem and stands as one of the earliest uses of higher-dimensional algebra.

In this talk, we extend the Spencer-Brown equivalence to *inverse semigroups*: semigroups in which every element has a unique partial inverse, modelling local or partial symmetries. The proof of Spencer-Brown rests on a tight correspondence between

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split epimorphisms and semidirect products of groups, and neither construction behaves well on the nose in InvSemiGrp . After explaining how Billhardt's *full restricted semidirect product* and *split Billhardt congruences* together recover this correspondence, we introduce *Billhardt categories internal to inverse semigroups* (internal categories in InvSemiGrp whose source map is idempotent-splitting) and prove that

$$\text{XMod}/\text{InvSemiGrp} \simeq \text{BCat}(\text{InvSemiGrp}).$$

The crossed module axioms must be reformulated to compensate for the failure of full invertibility, but the equivalence restricts to Spencer-Brown's on the full subcategory $\text{Group} \subset \text{InvSemiGrp}$.

AARON FAIRBANKS, Dalhousie University

[Monday June 8 / lundi 8 juin, 14:00 – OH 105]

Comonads as spaces

Comonads on Set generalize both categories and topological spaces. We characterize topological spaces as precisely the density comonads of diagrams of subsets of some set, i.e. topological subbases. Following Garner's work on ionads, we develop aspects of the theory of topological spaces for arbitrary comonads on arbitrary categories, including notions of basis, subbasis, continuous map, and specialization. Continuous maps and ordinary comonad morphisms form a double category, which in the case of comonads on Set corresponding to categories recovers the double category of functors and retrofunctors of Clarke and Di Meglio. Joint work with Kevin Carlson and David Spivak.

MARTIN FRANKLAND, University of Regina

[Sunday June 7 / dimanche 7 juin, 8:30 – OH 105]

An invitation to n-angulated categories

Triangulated categories arise in topology and in algebra, to capture the structure of cofiber sequences. Examples include the stable homotopy category of spaces and the derived category of a ring. Geiss, Keller, and Oppermann introduced n-angulated categories to capture the structure found in certain cluster tilting subcategories in quiver representation theory. This talk will provide an introduction to n-angulated categories, highlighting some similarities and differences with triangulated categories (the case $n=3$). I will briefly advertise joint work with Sebastian Martensen and Marius Thauale on Toda brackets in n-angulated categories.

ALI HAMAD, University of Ottawa

[Monday June 8 / lundi 8 juin, 8:30 – OH 105]

Ultracategories: Past and Future

Ultracategories were introduced by Makkai to axiomatise the idea of a category with ultraproduct functors, and to show the conceptual completeness theorem, linking the syntax and semantics of coherent logic. We give an outline of the historical development of the theory of ultracategories, starting with the initial work of Makkai and the subsequent work of Marmolejo and Zawadowski, passing by the new framework of Lurie which redefined ultracategories more concisely. We then explore new research in ultracategories which sprung in three directions: realising ultracategories as certain algebras for a pseudo-monad; using ultracategories to study the idea of continuous families of models; and defining generalisations of ultracategories aimed at showing a more general version of conceptual completeness. We end by exploring new research directions.

NATHAN HAYDON, University of Waterloo

[Sunday June 7 / dimanche 7 juin, 15:30 – OH 105]

Compositional First-Order Logic

We discuss a recent string-diagrammatic calculus that is complete for first-order logic. The calculus achieves its results by combining cartesian and linear bicategories. We present the development of the calculus, motivate the inference rules, and suggest future directions.

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JACK JIA, UW/PI

[Monday June 8 / lundi 8 juin, 13:30 – OH 105]

Introduction to Deligne Categories

A symmetric tensor category is (roughly speaking) an abelian k -linear rigid symmetric monoidal category. The classic examples of such categories take the form $\text{Rep}(G)$ where G is a group. By a remarkable theorem of Deligne, if the base field k has characteristic 0, then all symmetric tensor categories satisfying some dimensional constraints are in fact equivalent to a category of representations (of a supergroup).

But what happens when these constraints are lifted? To explore the case where objects are allowed to have non-integer dimensions, Deligne constructed symmetric tensor categories $\underline{\text{Rep}}(S_t)$, $\underline{\text{Rep}}(GL_t)$, where t is an arbitrary complex number. In this talk, I will introduce these categories and show why they can be viewed as the result of "interpolating" the classical representation categories $\text{Rep}(S_n)$, $\text{Rep}(GL_n)$.

CAMERON KRULEWSKI, Dalhousie University

[Sunday June 7 / dimanche 7 juin, 9:30 – OH 105]

Dagger Categories and Higher Spin Statistics

Dagger categories, which generalize the category of Hilbert spaces equipped with the dagger operation, may be used in functorial field theory to model the physical property of unitarity: one requires unitary functorial field theories to be functors of dagger categories. In the case of invertible, fully-extended functorial field theories, we construct an action of the orthogonal group extending the reflection and spin flip actions on manifolds as well as the complex conjugation and fermion parity operations on super Hilbert spaces. We show that for this subclass of theories, unitarity imposes an equivariance condition for the O -action, which we interpret as a higher version of the spin-statistics theorem in quantum field theory.

This talk is based on joint work with L. Müller and L. Stehouwer.

Cameron Krulewski, Lukas Müller, and Luuk Stehouwer. "A Higher Spin-Statistics Theorem for Invertible Quantum Field Theories." *Commun. Math. Phys.* 406, 230 (2025).

ROSE KUDZMAN-BLAIS, Kyoto University

[Monday June 8 / lundi 8 juin, 8:00 – OH 105]

*Linear and Cyclic *-Autonomous Proarrow Equipments*

There is often more than one type of arrow between objects. Frequently, there are maps which strictly preserve structure and more relaxed morphisms which behave like objects themselves, e.g. functions versus relations. A paradigm to study both simultaneously is given by double categories, introduced by Ehresmann, and pseudo double categories, defined by Grandis and Paré. In particular, these double categories often arise from proarrow equipments, as developed by Wood.

On the other hand, with the advent of linear logic by Girard, and the introduction of cyclic $*$ -autonomous and linear bicategories by Cockett, Koslowski and Seely, it has become clear that certain bicategories have two linked compositions: tensor and par. Indeed, besides standard relational composition, the bicategory Rel is equipped with a relational sum composition. Further examples were then developed by Blute, K-B and Niefield. Crucially, the tensor structures of most examples are canonically proarrow equipments, inducing well-studied double categories. It is then natural to ask how these stricter maps interact with par.

In this talk, we will discuss joint work with Robert Morissette and Dorette Pronk exploring how a proarrow equipment can be compatible with the par of linear bicategories and the linear negation of cyclic $*$ -autonomous bicategories. This compatibility induces new double categories with par as loose composition. We will demonstrate how most examples fit within this paradigm, moreover how piercean bicategories are captured by this new framework, as introduced by Bonchi, Di Giorgio, Trotta to study the cartesian structure of the linear bicategory Rel .

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MICHAEL LAMBERT, Norwich University

[Sunday June 7 / dimanche 7 juin, 17:00 – OH 105]

Twisted Double Functors

A twisted double functor between strict double categories is a lax double functor on the transpose of the source double category. This, together with our canonical examples, inspires a new definition of a "twisted double functor" between double categories that interchanges loose and tight structures as it makes its assignments from source to target. This talk will introduce this new notion and illustrate it by examples. Particularly, a profunctor-valued "twisted hom" functor can be associated to any double category. This packages the loose structure of the represented double category and is naturally twisted in our sense. By precomposition with a point, any such twisted hom functor gives rise to the further example of a canonical twisted representable. Finally, we will also discuss examples of adjunction-valued twisted double functors arising from doctrines and bi-indexed categories. This is a report on joint work with Evan Patterson and David Jaz Myers.

RORY LUCYSHYN-WRIGHT, Brandon University

[Sunday June 7 / dimanche 7 juin, 15:00 – OH 105]

Infinitary cartesian theories: A logic of locally presentable categories

In 1977, Coste defined a system of restricted first-order logic that was later called *cartesian logic* by Johnstone (cf. Freyd), with finite conjunction and provably unique existential quantification. Coste established a complete deductive system of cartesian logic and showed that the categories of models of cartesian theories are equivalently locally finitely presentable categories.

In this talk on joint work with Andrew Krenz, we define a deductive system of α -ary cartesian logic for a regular cardinal α , and we prove a completeness theorem for α -ary cartesian logic. We define a notion of α -ary cartesian theory, and we show that the categories of models of α -ary cartesian theories are equivalently locally α -presentable categories, noting that "limit theories" in the sense of Adámek and Rosický provide special examples of α -ary cartesian theories. Moreover, building on joint work with Jason Parker, we prove a sharper result for a fixed set of sorts S , namely that the categories of models of S -sorted α -ary cartesian theories are equivalently S -sorted locally α -presentable categories in a suitable sense.

ROBERT MORISSETTE, Dalhousie University

[Monday June 8 / lundi 8 juin, 10:00 – OH 105]

Oppositizing Cells in Equipments

Given an arbitrary double category \mathbb{D} , one can define the double category \mathbb{D}^{com} with the same underlying structure as \mathbb{D} , but the directions of the cells formally reversed. For equipments (sometimes called framed bicategories or fibrant double categories), that is, double categories for which every tight arrow f has a representative loose arrow (called a companion of f) with a loose right adjoint (called a conjoint of f), the situation becomes more subtle. It is well-known that, in an equipment, an arbitrary cell can be equivalently represented (as a globular cell) in four different ways. One representation requires only the presence of companions, another only conjoints, and the remaining two require both. However, taking opposites of cells is not well-defined on these equivalence classes. Moreover, for the first two types of these representatives, opposites of each of these kinds of cells naturally fit back together into double categories (these are the double categories of retrocells and coretrocells of Paré), while the other two do not in general.

In this talk, we will examine this idea of oppositizing cells through the lens of the formal theory of fibrations, give some conditions for when each of the four kinds of opposite cells fit back together into double categories, and, time permitting, speak on connections to logic and how we believe this connects two different versions of "double categories of relations".

HAYATO NASU, Dalhousie University

[Monday June 8 / lundi 8 juin, 14:30 – OH 105]

On the decomposition of a strong epimorphism into regular epimorphisms

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One of the most fundamental theorems in algebra is the fundamental theorem of homomorphisms, which states that $\text{Im}(f) \cong A/\text{Ker}(f)$ for any homomorphism $f: A \rightarrow B$. In categorical terms, this states that strong epimorphisms and regular epimorphisms are equivalent in categories of algebraic structures such as groups, rings, and so on. Although this equivalence fails in general, it is known that in any locally presentable category, every strong epimorphism can be decomposed into a transfinite composite of regular epimorphisms. In this talk, I will discuss how many regular epimorphisms are needed in such a decomposition, which measures the extent to which the fundamental theorem of homomorphisms holds for general algebra-like structures such as n -categories.

This talk is based on joint work with Yuto Kawase.

Yuto Kawase, Hayato Nasu. “On the decomposition of a strong epimorphism into regular epimorphisms.” arXiv:2604.05744.

ROBERT PARÉ, Dalhousie University

[Monday June 8 / lundi 8 juin, 15:30 – OH 105]

A topos for categories

The unruly behaviour of coequalizers in \mathbf{Cat} creates problems for double categories. To address these, we embed it into a topos in a way that preserves the desirable features of \mathbf{Cat} and “fixes” the quotients. We treat the objects of this topos as if they were actual categories and go on to investigate what category theory would be like without composition. In this talk we concentrate on adjoints, the cornerstone of category theory.

EVAN PATTERSON, Topos Institute

[Sunday June 7 / dimanche 7 juin, 17:30 – OH 105]

Double-categorical logic for unbiased categorical structures

Double categories are increasingly recognized as a powerful tool for formal category theory. The speaker and collaborators have developed a notion of double-categorical theory whose models are categorical structures, categorifying the familiar story from categorical logic that (one-dimensional) theories have set-theoretical structures as models. A cartesian double theory given by finite presentation describes the operations of a categorical structure in biased terms, categorifying the situation for algebraic theories; for example, a monoidal category is axiomatized in terms binary and nullary products, rather than n -ary products for each natural number n . However, some categorical structures, like multicategories and PROPs, are natively defined in unbiased form, whereas others, like monoidal categories and cartesian categories, admit unbiased axiomatizations that can be more convenient than the standard biased ones. In this talk, we propose a new notion of double theory able to give finitary axiomatizations of unbiased categorical structures, including all those mentioned above. The intended semantics for such a theory is a double monad on Span generalizing the familiar list monad on Set . We argue that this approach lends itself well to type-theoretic and computer implementation, sketching ongoing research to uniformly specify the internal languages of models of such theories and ultimately to implement those languages in the software system CatColab .

LAURA SCULL, Fort Lewis College

[Monday June 8 / lundi 8 juin, 15:00 – OH 105]

(Lack of) Model Structure for Homotopy of Graphs

Since the introduction of discrete homotopy theories for graphs, researchers have been interested in constructing model structures for these homotopy theories. The results along this line have largely been negative and include results of [GS] for \times -homotopy and [CKK] for A -homotopy. I will discuss these results and their generalizations, and what we can learn from these results about the nature of discrete homotopy theories and their resistance to model structures.

This talk is based on joint work with M. Youssef, with support from the rest of the Adjoint School 2025 Homotopy of Graphs Team: R. Hardeman, M. Ramos Huila, J. Nickel, N. Samadzalkava.

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[GS] Goyal, S., Santhanam, R. "(Lack of) Model Structures on the Category of Graphs". *Appl Categor Struct* 29, 671–683 (2021)

[CKK] Daniel Carranza, Krzysztof Kapulkin, and Jinho Kim. "Nonexistence of Colimits in Naive Discrete Homotopy Theory". *Applied Categorical Structures* (2023).

DANIEL TEIXEIRA, Dalhousie University

[Sunday June 7 / dimanche 7 juin, 9:00 – OH 105]

(∞, ∞) -categories with adjoints are a bit like spaces

Recent developments have been reinforcing the idea that (∞, ∞) -categories are directed analogues of spaces (= ∞ -groupoids) (=homotopy types) (=anima). Some examples are the directed analogues of products, cylinders, cones, loop spaces, suspensions, joins, spectra, fibers, fibrations, and so on. Despite this happy observation, in many ways, (∞, ∞) -categories have no hope to behave like spaces precisely because of their directionality. For instance, unlike spaces, the "homotopy monoid" of an (∞, ∞) -category depends tremendously on the choice basepoint.

However, if we restrict ourselves to (∞, ∞) -categories with adjoints (at all levels), the theory starts to resemble the theory of spaces much more closely (essentially because then we can leave the basepoint and come back). We will explain that by examples, focusing in particular in a Grothendieck construction involving such (∞, ∞) -categories with adjoints.

JEAN-BAPTISTE VIENNEY, University of Ottawa

[Sunday June 7 / dimanche 7 juin, 16:30 – OH 105]

Non-uniqueness of differentiation in differential categories

Differential categories are a categorical setting for differentiation based on symmetric monoidal categories. Lemay asked whether the differentiation operator is unique in a differential category. We will present a counterexample answering this question in the negative, that is, a differential category with more than one differentiation operator (actually, infinitely many).

SCOTT WESLEY, Dalhousie University

[Monday June 8 / lundi 8 juin, 9:00 – OH 105]

Parameterized Quantum Circuit Semantics Through Enriched Categories

It is well-known that combinatorial circuits are modeled mathematically by string diagrams in a monoidal category. Given a gate set Σ , the circuits over Σ can be thought of as string diagrams in the free monoidal category generated by Σ . In this model, circuit semantics are then given by monoidal functors out of this free category. For quantum circuits, this functor is often valued in the category of unitary matrices. This model suffices for concrete quantum circuits, but fails to describe parameterized families of quantum circuits, such as those which arise in the analysis of ansatz circuits. In this talk, we introduce an approach to parameterized circuit semantics, which is based on enriched category theory. This framework subsumes many constructions from quantum information, such as parameterized rotations and conditional operations. We show that many of the properties exhibited by these constructions arise from more fundamental categorical concepts, such as enrichment over Cartesian and monoidal closed categories.

Combinatorial Design Theory Théorie des plans combinatoires

Org: Masoomeh Akbari (University of Ottawa), Kianoosh Shokri (University of Ottawa) and/et Brett Stevens (Carleton University)

Combinatorial design theory studies the existence, construction, and structure of arrangements of finite objects, such as subsets, arrays, and graphs, that satisfy prescribed constraints. Leonhard Euler studied pairs of orthogonal Latin squares in the 18th century, with design theory's origins tracing back even earlier to a magic square on a turtle's back in ancient China around 2200 BC. In the 20th century, connections with statistics, algebra, and finite geometry, together with the development of computational methods, opened new directions in the field. Today, combinatorial design theory is a multidisciplinary area with applications in algorithm design, cryptography, wireless communication, and coding theory, and has seen significant recent growth. The purpose of this session is to showcase recent results on classical designs, cycle systems, graph decompositions, Latin squares, and related topics.

La théorie des plans combinatoires étudie l'existence, la construction et la structure d'arrangements d'objets finis, tels que des sous-ensembles, des tableaux et des graphes, qui satisfont des contraintes prescrites. Au XVIII^e siècle, Leonhard Euler a étudié des paires de carrés latins orthogonaux, tandis que les origines de la théorie remontent encore plus loin, notamment à un carré magique figurant sur le dos d'une tortue dans la Chine ancienne vers 2200 av. J.-C. Au XX^e siècle, les liens avec la statistique, l'algèbre et la géométrie finie, ainsi que le développement de méthodes computationnelles, ont ouvert de nouvelles directions dans le domaine. Aujourd'hui, la théorie des plans combinatoires est un domaine multidisciplinaire ayant des applications en conception d'algorithmes, en cryptographie, en communications sans fil et en théorie des codes, et elle a connu une croissance importante ces dernières années. L'objectif de cette session est de mettre en valeur des résultats récents portant sur les plans classiques, les systèmes de cycles, les décompositions de graphes, les carrés latins et des sujets connexes.

Schedule/Horaire

Room/Salle: GH 215

Saturday June 6

samedi 6 juin

8:30 - 9:00	PETER DANZIGER (Toronto Metropolitan University), <i>A complete solution to the directed Oberwolfach problem of order $2 \pmod{4}$ with cycles of even lengths</i> (p. 45)
9:00 - 9:30	MARIE ROSE JERADE (University of Ottawa), <i>The Honeymoon Oberwolfach Problem: A Recursive Approach</i> (p. 46)
9:30 - 10:00	MASOOMEH AKBARI (University of Ottawa), <i>On the generalized honeymoon Oberwolfach problem</i> (p. 44)
10:00 - 10:30	SHAHRIYAR POURAKBAR SAFFAR (Memorial University), <i>On Uniquely Colourable Biclique Designs</i> (p. 47)
15:00 - 15:30	SIMON BLACKBURN (Royal Holloway, University of London), <i>Tredoku Patterns</i> (p. 44)
15:30 - 16:00	KIANOOSH SKOKRI (University of Ottawa), <i>On the Chromatic Number of Cayley Tables of Dihedral Groups</i> (p. 48)
16:00 - 16:30	JOY COOPER (University of Victoria), <i>A Fuzzy Generalization of Latin Squares</i> (p. 44)
16:30 - 17:00	DAVID PIKE (Memorial University), <i>Edge-connectivity of vertex-transitive hypergraphs</i> (p. 47)

Sunday June 7

dimanche 7 juin

8:30 - 9:00	DOUG STINSON (University of Waterloo / Carleton University), <i>Optimal Equidistant Codes—A Detective Story</i> (p. 48)
9:00 - 9:30	PRANGYA PARIDA (University of Ottawa), <i>One Sequence to Rule them All.</i> (p. 46)
9:30 - 10:00	TIM ALDERSON (University of New Brunswick), <i>Length-Maximal Nonlinear Codes with Given Singleton Defect—Structure and Bounds</i> (p. 44)
10:00 - 10:30	AARON DWYER (Carleton University), <i>Perfect Codes in the Lee Scheme</i> (p. 45)
15:00 - 15:30	SHONDA DUECK (University of Winnipeg), <i>The threshold strong dimension of the hypercube</i> (p. 45)
15:30 - 16:00	SAROBIDY RAZAFIMAHATRATRA (Carleton University), <i>Using cyclic codes to solve an Erdős-Ko-Rado type problem on permutation groups</i> (p. 47)
16:00 - 16:30	ANDREW NAGARAJAH (Carleton University), <i>A brief tour of completion results for partial designs</i> (p. 46)

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16:30 - 17:00 SHUXING LI (University of Delaware), *Generalized Additive Bases and Difference Bases For Cartesian Product of Finite Abelian Groups* (p. 46)

Abstracts/Résumés

MASOOMEH AKBARI, University of Ottawa

[Saturday June 6 / samedi 6 juin, 9:30 – GH 215]

On the generalized honeymoon Oberwolfach problem

The Honeymoon Oberwolfach Problem (HOP), introduced by Šajna, is a recent variant of the classic Oberwolfach Problem. This problem asks whether it is possible to seat $2m_1 + 2m_2 + \dots + 2m_t = 2n$ participants, consisting of n newlywed couples, at t round tables of sizes $2m_1, 2m_2, \dots, 2m_t$ for $2n - 2$ nights, so that each participant sits next to their spouse every night and next to every other participant exactly once. This problem is denoted by $\text{HOP}(2m_1, 2m_2, \dots, 2m_t)$. Jerade, Lepine, and Šajna have studied the HOP and resolved several important cases.

We generalized the HOP by allowing tables of size two, relaxing the previous restriction that tables must have a minimum size of four. In the generalized HOP, we aim to seat the $2n$ participants at s tables of size 2 and t round tables of sizes $2m_1, 2m_2, \dots, 2m_t$, where $2n = 2s + 2m_1 + 2m_2 + \dots + 2m_t$ and $m_i \geq 2$, while preserving the adjacency conditions of the HOP. We denote this problem by $\text{HOP}(2^{(s)}, 2m_1, \dots, 2m_t)$.

In this talk, we will present a general approach to this problem, as well as recent solutions to several cases.

TIM ALDERSON, University of New Brunswick, Saint John

[Sunday June 7 / dimanche 7 juin, 9:30 – GH 215]

Length-Maximal Nonlinear Codes with Given Singleton Defect–Structure and Bounds

For a linear $[n, k, d]_q$ code, the columns of a generator matrix form a projective arc, and the maximum length is governed by the classical maximal-arc bound $n \leq (s + 1)(q + 1) + k - 2$, where s is the Singleton defect. We show that this same bound holds for all $(n, q^k, d)_q$ codes, with no assumption of linearity. Codes attaining the bound, which we call length-maximal, are necessarily symbol-uniform and have a sharply constrained distance spectrum. They also satisfy a divisibility condition on s that mirrors, but is weaker than, the condition forced on linear codes. An equivalent form of the bound yields an improved Singleton-type inequality that recovers and extends a result of Guerrini, Meneghetti, and Sala for binary systematic codes. When the defect is large, the bound tightens in discrete steps. We also identify several conditions under which nonlinear codes satisfy the Griesmer bound, and close with open problems, grounded by the central question: *can genuinely nonlinear length-maximal codes exist for parameters where no linear codes do?*

SIMON BLACKBURN, Royal Holloway University of London

[Saturday June 6 / samedi 6 juin, 15:00 – GH 215]

Tredoku Patterns

Tredoku patterns are certain configurations of diamond-shaped tiles (more precisely, lozenges), inspired by a sudoku-like puzzle that appears in some newspapers such as The Times in the UK. (Take a moment to search the web for tredoku: these patterns can be very pretty!) They were introduced in two talks by Donald Preece in 2013, in which he conjectured the range of achievable parameters that tredoku patterns can take. This talk will sketch a proof of Donald's conjectures, taken from the following paper:

Simon R. Blackburn, 'Tredoku patterns', <https://arxiv.org/html/2407.10752v3>.

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JOY COOPER, University of Victoria

[Saturday June 6 / samedi 6 juin, 16:00 – GH 215]

A Fuzzy Generalization of Latin Squares

In *Six Permutation Patterns Force Quasirandomness* by Crudele, Dukes, and Noel (2024), the authors introduce the notion of a fuzzy permutation matrix and what we now call a fuzzy Latin square. A fuzzy permutation matrix is a way of combinatorially embedding a permutation matrix of order k in a matrix of order $n \geq k$. We say a Latin square is partially reduced if its first row is $1, 2, \dots, n$. In the same way that a partially reduced Latin square can be expressed as a sum of permutation matrices, a fuzzy Latin square is a linear combination of fuzzy permutation matrices which total to a constant matrix.

Expanding on their work, we bound the dimension of partially reduced Latin squares of order n as a vector space using the representation theory of the symmetric group, investigate vanishing fuzzy Latin squares, and compute the fuzzy Latin squares with six terms.

This work has been supervised by Peter Dukes.

PETER DANZIGER, Toronto Metropolitan University

[Saturday June 6 / samedi 6 juin, 8:30 – GH 215]

A complete solution to the directed Oberwolfach problem of order $2 \pmod 4$ with cycles of even lengths

The Oberwolfach problem asks for a 2-factorization of the complete graph in which each 2-factor is isomorphic to a specific factor F . Recently, this problem has been extended to directed graphs. In this case, the directed Oberwolfach problem asks for a directed 2-factorization of the complete symmetric digraph in which each directed 2-factor is isomorphic to a specific directed factor F . We consider the directed Oberwolfach problem with directed 2-factors comprised of cycles of even lengths. We provide a complete solution to the case where F is a bipartite 2-factor and the order of the complete symmetric digraph is congruent to 2 modulo 4.

SHONDA DUECK, University of Winnipeg

[Sunday June 7 / dimanche 7 juin, 15:00 – GH 215]

The threshold strong dimension of the hypercube

A set W of vertices of a connected graph G is a *strong resolving set* for G if, for every pair of vertices, one of the vertices in the pair lies on a shortest path from the other vertex to some vertex of W . The smallest cardinality of a strong resolving set of vertices of G is the *strong dimension* of G . The strong dimension is a stronger version of the better known metric dimension of a graph. Highly symmetric graphs, such as the incidence graphs of combinatorial designs, tend to have low metric and strong dimension, and much work has been done constructing resolving sets for these graphs using properties of the designs from which they arise. The *threshold strong dimension* of G is the smallest strong dimension among all graphs having G as a spanning subgraph, and it is denoted by $\tau_s(G)$. We present a geometric characterization of $\tau_s(G)$, which expresses $\tau_s(G)$ in terms of the smallest number of paths (each of sufficiently large order) whose strong product admits a certain type of embedding of G . We use this geometric characterization as a tool to bound the threshold strong dimension of the hypercube. This is ongoing joint work with Nadia Benakli, Novi H. Bong, Linda Eroh, Beth Novick, and Ortrud Oellermann.

AARON DWYER, Carleton University

[Sunday June 7 / dimanche 7 juin, 10:00 – GH 215]

Perfect Codes in the Lee Scheme

The theory of error correcting codes is well explored when we consider the distance between two codewords as the Hamming distance. A well known bound in the Hamming metric and its association scheme is the sphere packing bound. Codes that reach this bound are called perfect. All perfect codes in the Hamming scheme are already categorized. Codes defined over

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cyclic rings with the Lee distance have been less explored. The sphere packing bound and perfect codes can be defined in the Lee scheme. In this talk I aim to explore the basics of Lee codes, focusing on perfect codes, giving some examples and stating some key theorems.

MARIE ROSE JERADE, University of Ottawa

[Saturday June 6 / samedi 6 juin, 9:00 – GH 215]

The Honeymoon Oberwolfach Problem: A Recursive Approach

The *Honeymoon Oberwolfach Problem (HOP)*, first introduced by Mateja Šajna, is a variant of the Oberwolfach Problem (*OP*). The problem asks whether it is possible to seat n couples at ℓ round tables of sizes $2m_1, 2m_2, \dots, 2m_\ell$ for $2(n-1)$ consecutive nights, such that $m_i \geq 2$ for all $i = 1, \dots, \ell$, $\sum_{i=1}^{\ell} m_i = 2n$, and each participant must be seated next to their spouse every night, but next to every other participant exactly once. This problem is denoted by $HOP(2m_1, 2m_2, \dots, 2m_\ell)$.

This seating arrangement problem translates naturally into a graph theoretic problem. It is equivalent to finding a cycle decomposition of the graph $K_{2n} + (2n-3)I$ (that is, the complete graph K_{2n} with $2n-3$ additional copies of a fixed 1-factor I) into 2-factors such that each 2-factor consists of disjoint I -alternating cycles of lengths $2m_1, \dots, 2m_\ell$. So far, solutions to *HOP* have been established in various cases, including: all $n \leq 20$; the case when all tables are of the same size; the case when all table sizes are divisible by 8; and the case when n is odd and $OP(m_1, \dots, m_\ell)$ has a solution.

In this talk, we present a recursive approach to the problem. In particular, we show that if m_1, \dots, m_ℓ are positive even integers, t is an integer satisfying $\sum_{i=1}^{\ell} m_i < t$, and $HOP(2m_1, \dots, 2m_\ell)$ has a solution, then $HOP(2m_1, \dots, 2m_\ell, 2t)$ also has a solution. Moreover, we briefly discuss the case when m_1, \dots, m_ℓ are not all even.

This is joint work with Mateja Šajna.

SHUXING LI, University of Delaware

[Sunday June 7 / dimanche 7 juin, 16:30 – GH 215]

Generalized Additive Bases and Difference Bases For Cartesian Product of Finite Abelian Groups

For a finite group G and a positive integer g , a g -additive basis is a subset of G whose pairwise sums cover each element of G at least g times; g -difference bases are defined analogously using pairwise differences rather than sums. We investigate such bases in the group G^n , the n -fold Cartesian product of a finite abelian group G . We explicitly construct g -additive and g -difference bases in G^n , and in doing so obtain asymptotically sharp upper bounds on the minimal sizes of such bases as n grows.

This talk is based on joint work with Chi Hoi Yip (Georgia Institute of Technology).

ANDREW NAGARAJAH, Carleton University

[Sunday June 7 / dimanche 7 juin, 16:00 – GH 215]

A brief tour of completion results for partial designs

For many kinds of combinatorial design (broadly interpreted) which have a notion of 'partial design', there is a non-trivial threshold such that 'sufficiently large' partial designs can always be completed. Sometimes 'sufficiently small' partial designs must also have completions, and sometimes no non-trivial statement of this type is true. Sometimes partial designs can instead be extended by, say, adding points. Here we survey some phenomena of the first type from the worlds of block designs, intersecting families, geometry, and others.

PRANGYA PARIDA, University of Ottawa

[Sunday June 7 / dimanche 7 juin, 9:00 – GH 215]

One Sequence to Rule them All.

Combinatorial Design Theory Théorie des plans combinatoires

A binary reflected Gray code (BRGC), denoted by $B(n)$, is an ordering of the 2^n binary n -tuples such that any two consecutive tuples differ in exactly one bit. This object can also be generated using a greedy approach (introduced by Williams). It is well-known that the position of the bit that changes at each step in the generation of $B(n)$ is given by the binary ruler sequence (OEIS A001511). This leads to a loopless ($\mathcal{O}(1)$ -time) generation of $B(n)$ (by Bitner, Ehrlich, and Reingold).

Mixed-radix reflected and modular Gray codes are natural extensions of the BRGC, where the base of each position is not necessarily binary. Their respective loopless algorithms can be found as Algorithm H and Exercise 77 in Section 7.2.1.1 of TAOCP Vol. 4A by Knuth. In this talk, we discuss that both of these Gray codes built on a mixed-radix base are guided by the same change sequence, which allows them to be generated in parallel. We show that modular Gray codes can be generated using a greedy cyclic increment approach. Furthermore, we present a new family of modular Gray codes starting from any tuple w that can be constructed by using the same greedy approach to generate the next word that is lexicographically greater than or equal to w . We show that although this order is not a suffix of the full modular Gray code, its change sequence is a suffix of the latter.

Joint work with Lucia Moura, Brett Stevens, and Aaron Williams.

DAVID PIKE, Memorial University of Newfoundland

[Saturday June 6 / samedi 6 juin, 16:30 – GH 215]

Edge-connectivity of vertex-transitive hypergraphs

A graph or hypergraph is said to be vertex-transitive if its automorphism group acts transitively upon its vertices. A classic theorem of Mader asserts that every connected vertex-transitive graph is maximally edge-connected. We generalise this result to hypergraphs and show that every connected linear uniform vertex-transitive hypergraph is maximally edge-connected. By using combinatorial designs, we also show that if we relax either the linear or uniform conditions in this generalisation, then we can construct examples of vertex-transitive hypergraphs which are not maximally edge-connected. This is joint work with Andrea Burgess and Robert Luther.

SAROBIDY RAZAFIMAHATRATRA, Carleton University

[Sunday June 7 / dimanche 7 juin, 15:30 – GH 215]

Using cyclic codes to solve an Erdős-Ko-Rado type problem on permutation groups

Given a finite transitive group $G \leq \text{Sym}(\Omega)$, we say that a subset $\mathcal{F} \subset G$ is an intersecting set if any two elements of \mathcal{F} agree on some elements of Ω . If $|\Omega| = pq$, for some odd primes $q < p$, and $G \leq \text{Sym}(\Omega)$ is transitive, then it was conjectured that any intersecting set of G has size at most the order of a point stabilizer. This conjecture was recently disproved using certain cyclic codes in \mathbb{F}_q^p . In this talk, I will show that the conjecture is essentially true whenever these cyclic codes in \mathbb{F}_q^p do not exist.

This is based on joint work with Roghayeh Maleki and Angelot Behajaina.

SHAHRIYAR POURAKBAR SAFFAR, Memorial University of Newfoundland

[Saturday June 6 / samedi 6 juin, 10:00 – GH 215]

On Uniquely Colourable Biclique Designs

A decomposition of a graph G is a collection of subgraphs of G whose union partitions the edge set of G . An (m_1, m_2) -biclique decomposition \mathcal{D} of a graph G is a decomposition of G where \mathcal{D} consists of complete bipartite graphs with parts of size m_1 and m_2 . A decomposition \mathcal{D} of G is said to be k -colourable if we can assign k colours to the vertices of G so that no member of \mathcal{D} is monochromatic. If a decomposition is k -colourable but not $(k-1)$ -colourable, it is called k -chromatic. A k -colourable decomposition is uniquely k -colourable if its colouring is unique up to the permutation of colour classes.

The study of colouring decompositions has been explored in various settings, but few results are known for unique colourability even for the most prominent families of decompositions such as balanced incomplete block designs and cycle systems. In 2003, Forbes showed that there exist uniquely 3-colourable Steiner triple systems of order n for all admissible $n \geq 25$. More recently, Darijani and Pike proved the existence of uniquely k -colourable e -star systems (for all $k \geq 2$ and $e \geq 3$) and uniquely

Combinatorial Design Theory Théorie des plans combinatoires

2-colourable P_4 systems. Lastly, Burgess, Pike, and Pourakbar-Saffar constructed a uniquely 2-colourable 4-cycle system of order n for all admissible $n \geq 49$.

In this talk, we mainly focus on the construction of uniquely k -colourable (r, r) -biclique decompositions of complete multipartite graphs for all $r \geq 2$ and $k \geq 2$ except $(r, k) = (2, 2)$. These constructions are our stepping stone to find uniquely k -colourable $2r$ -cycle systems.

KIANOOSH SKOKRI, University of Ottawa

[Saturday June 6 / samedi 6 juin, 15:30 – GH 215]

On the Chromatic Number of Cayley Tables of Dihedral Groups

A coloring of a Latin square is an assignment of k colors to its cells such that no two cells in the same row, the same column, or containing the same symbol receive the same color. The chromatic number of a Latin square L is the minimum number of colors for which such a coloring exists, and is denoted by $\chi(L)$. The Cayley table of a finite group G of order n is a Latin square denoted by L_G . For any finite group G of order n , it is known that $\chi(L_G) \neq n + 1$. Hence, $\chi(L_G) = n$ or $\chi(L_G) \geq n + 2$. Recently, it was proven that $\chi(L_G) = n$ if and only if every Sylow 2-subgroup of G is either trivial or non-cyclic. Consequently, finite groups G satisfying $\chi(L_G) = n$ can be completely characterized. In this talk, we show that the dihedral group D_n , for odd n , has a cyclic Sylow 2-subgroup, and therefore $\chi(L_{D_n}) \geq 2n + 2$. We then prove that $\chi(L_{D_p}) = 2p + 2$ for every prime $p > 3$, showing that these Latin squares attain the coloring bound.

This is joint work with E.S. Mahmoodian.

DOUG STINSON, University of Waterloo

[Sunday June 7 / dimanche 7 juin, 8:30 – GH 215]

Optimal Equidistant Codes—A Detective Story

An equidistant code $E(n, d, m)$ consists of m binary codewords of length n , such that the hamming distance between any two distinct codewords is exactly d . We study the following problem: (1) Given n (the length of the codewords), determine the maximum m such an $E(n, d, m)$ exists for some d . Denote this maximum value of m (which of course is a function of n) by m^* . (2) Determine the maximum d such that an $E(n, d, m^*)$ exists. Denote this maximum value of d (which is also a function of n) by d^* . (3) Give a strong combinatorial characterization (in terms of symmetric BIBDs) of $E(n, d^*, m^*)$.

Such optimal equidistant codes have been studied at least since the 1970's. However, many results have been reproved multiple times, and some early work seems to be not well well known. Also, the most comprehensive solution to the problem seems to be incomplete. In this talk, we review the history of this problem and attempt to give a complete unified treatment of the known results.

Combinatorial Game Theory

Théorie combinatoire des jeux

Org: **Svenja Huntemann** (Mount Saint Vincent), **Neil McKay** (UNB Saint John) and/et **Peter Selinger** (Dalhousie University)

Combinatorial game theory is the study of two-player perfect information games such as chess or go. We will be exploring current research directions in combinatorial game theory. Some topics include impartial games, normal play and misère play games, and extensions of this theory to games such as Hex.

La théorie combinatoire des jeux est l'étude des jeux à deux joueurs à information parfaite, tels que les échecs ou le go. Nous explorerons des directions de recherche actuelles en théorie combinatoire des jeux. Parmi les thèmes abordés figurent les jeux impartiaux, les jeux en jeu normal et en jeu misère, ainsi que des extensions de cette théorie à des jeux comme Hex.

Schedule/Horaire

Room/Salle: HH 232

Saturday June 6

samedi 6 juin

15:00 - 15:30	ALEX CLOW (Simon Fraser University), <i>How Expressive is Digraph Placement?</i> (p. 49)
15:30 - 16:00	NEIL MCKAY (UNB Saint John) (p. 50)
16:00 - 16:30	TOMASZ MACIOSOWSKI (Memorial University), <i>Exploring Invertible Subgroups of Dead-ending and Blocking Universes</i> (p. 50)
16:30 - 17:00	ALEX MEADOWS (St. Mary's College of Maryland), <i>Joy and Complexity of Blokus Games</i> (p. 50)
17:00 - 17:30	ETHAN SAUNDERS (University of Calgary) (p. 51)

Sunday June 7

dimanche 7 juin

15:00 - 15:30	PETER SELINGER (Dalhousie University), <i>On 3-terminal positions in Hex</i> (p. 51)
15:30 - 16:00	JEREMIAH HOCKADAY (Dalhousie University), <i>Evaluating positions in Reverse Hex</i> (p. 49)
16:00 - 16:30	VERONIKA KERAS (Dalhousie University), <i>The Combinatorial Game Theory of Rex+</i> (p. 50)
16:30 - 17:00	SVENJA HUNTEMANN (Mount Saint Vincent University), <i>Partizan ArcKayles has unbounded temperature</i> (p. 50)

Abstracts/Résumés

ALEX CLOW, Simon Fraser University

[Saturday June 6 / samedi 6 juin, 15:00 – HH 232]

How Expressive is Digraph Placement?

Digraph Placement is a normal play ruleset which generalizes many long studied normal play games. It is also the only placement game which is known to be universal, that is for all games X , there is a Digraph Placement game G such that $G = X$. We will discuss the proof of this universality and explore questions of the form: what is the smallest class of Digraph Placement game needed to express all games? In particular, we will discuss a conjecture by the author that for all non-negative integers d , there exists number $f(d)$ such that for all Digraph Placement games G with out-degree at most d , the temperature of G is at most $f(d)$. Note that if the claim is true for $d = 6$, this would imply Domineering has bounded temperature, verifying a weak version of a longstanding conjecture of Berlekamp. This is joint work with Neil McKay and Alfie Davies.

JEREMIAH HOCKADAY, Dalhousie University

[Sunday June 7 / dimanche 7 juin, 15:30 – HH 232]

Evaluating positions in Reverse Hex

Combinatorial Game Theory Théorie combinatoire des jeux

Rex, short for Reverse Hex, is a set coloring game in which players try to avoid connecting terminals of their color. Until recently, both Rex and Hex were not examined through the lens of CGT. In this presentation, we develop methods for analyzing Rex positions. We explore how to tell if one position is preferable to another, how to simplify positions, and some special properties of Rex (and antimonotone set coloring games in general).

SVENJA HUNTEMANN, Mount Saint Vincent University

[Sunday June 7 / dimanche 7 juin, 16:30 – HH 232]

Partizan ArcKayles has unbounded temperature

Partizan ArcKayles is a game played on a simple graph in which each edge has been coloured blue or red. The two players take turn selecting an edge and removing it and all incident vertices and edges from the graph, with Left only being allowed to select blue edges and Right red edges. We will show that the temperature of Partizan ArcKayles, a measure of how urgent it is for a player to move first in a component, is unbounded even when restricted to trees. We will also discuss some potential new avenues for showing that the temperature in the game Domineering, of which Partizan ArcKayles is a generalization, is bounded above by 2, as has been long conjectured.

This is joint work with Neil McKay and Craig Tennenhouse.

VERONIKA KERAS, Dalhousie University

[Sunday June 7 / dimanche 7 juin, 16:00 – HH 232]

The Combinatorial Game Theory of Rex+

In this talk we will present the combinatorial game theory of the game Rex+. Rex+ is a variant of the game Hex, played on a four sided board made out of hexagons. Both players take turns placing as many stones of their colour as they would like on the board, with the objective being to force the other player to connect their two sides. We describe a new ordering, and present some preliminary results on it.

TOMASZ MACIOSOWSKI, Memorial University of Newfoundland

[Saturday June 6 / samedi 6 juin, 16:00 – HH 232]

Exploring Invertible Subgroups of Dead-ending and Blocking Universes

Misère play exhibits less structure than normal play, for example, in unrestricted misère, there are no invertible elements. Restricting the comparison test to universes lets us recover some structure, such as a computable comparison test or a characterization of the invertible elements. We investigate the invertible subgroups, which are the \mathcal{P} -free elements, of the dead-ending and blocking universes and discuss challenges caused by losing the other direction of the maintenance/proviso test due to no longer being in a full universe.

NEIL MCKAY, UNB Saint John

[Saturday June 6 / samedi 6 juin, 15:30 – HH 232]

ALEX MEADOWS, ST. MARY'S COLLEGE OF MARYLAND

[Saturday June 6 / samedi 6 juin, 16:30 – HH 232]

Joy and Complexity of Blokus Games

Blokus is a delightful 25-year old board game played by 2-4 people, alternately tiling a grid with polyomino pieces. The game is popular and enjoyable in part due to the large range of game play in spite of very simple rules and a hard limit on the number of moves. We claim that it may also be interesting due to its computational complexity. We introduce some 1 and 2

Combinatorial Game Theory Théorie combinatoire des jeux

player Blokus variants, including versions of the classic combinatorial games Domineering and Cram, and discuss the relation to classic tiling problems. We show that a couple Blokus puzzle games (for 1 player) are NP-Complete by reduction, and that one 2 player game (with many tiles of a single shape) is PSPACE-Complete, by an argument similar to the recent proof for Battle Sheep. This is joint work with Ian Shehadeh.

ETHAN SAUNDERS, University of Calgary
[Saturday June 6 / samedi 6 juin, 17:00 – HH 232]

PETER SELINGER, Dalhousie University
[Sunday June 7 / dimanche 7 juin, 15:00 – HH 232]
On 3-terminal positions in Hex

The theory of passable games is a version of combinatorial game theory over partially ordered sets of atoms. It is suitable for modelling monotone set coloring games such as Hex. In this talk, I will apply this theory to obtain results about 3-terminal positions in Hex. I'll introduce a family of positions called superswitches and give applications to the verification of Hex templates. I'll also give a characterization of pivoting templates, and describe how they can be used to derive a new handicap strategy for 11×11 Hex. This is joint work with Eric Demer.

Geometric Group Theory

Théorie géométrique des groupes

Org: Adam Clay (University of Manitoba), **Eduardo Martinez Pedroza** (Memorial University) and/et **Nicholas Touikan** (University of New Brunswick)

The session's focus on recent advances in the study of finitely generated groups via highlighting combinatorial, geometric, topological, algorithmic, asymptotic, and probabilistic methods. The session aims to have a large ratio of early-career researchers in the area.

Cette session met l'accent sur les avancées récentes dans l'étude des groupes de type fini, en mettant en valeur des méthodes combinatoires, géométriques, topologiques, algorithmiques, asymptotiques et probabilistes. Elle vise également à inclure une forte proportion de chercheuses et chercheurs en début de carrière dans ce domaine.

Schedule/Horaire

Room/Salle: GH 313

Saturday June 6

samedi 6 juin

9:00 - 9:30	NICHOLAS TOUKIAN (University of New Brunswick) (p. 53)
9:30 - 10:00	DIANA VIZCAINO (Memorial University), <i>Finiteness of Homological Dehn Functions</i> (p. 53)
10:00 - 10:30	JEAN PIERRE MUTANGUHA (McGill University), <i>Bounded dynamics in various moduli spaces</i> (p. 53)
15:00 - 15:30	CATHERINE PFAFF (Queens University) (p. 53)
15:30 - 16:00	HAOYANG HE (Memorial University), <i>The curve complex as a coset intersection complex</i> (p. 52)
16:00 - 16:30	TYRONE GHASWALA (University of Waterloo), <i>Promoting circular orderability to left orderability</i> (p. 52)
16:30 - 17:00	ADAM CLAY (University of Manitoba), <i>Borel complexity and isomorphism of bi-orderable groups</i> (p. 52)
17:00 - 17:30	EDUARDO MARTÍNEZ-PEDROZA (Memorial University of Newfoundland) (p. 53)

Abstracts/Résumés

ADAM CLAY, University of Manitoba

[Saturday June 6 / samedi 6 juin, 16:30 – GH 313]

Borel complexity and isomorphism of bi-orderable groups

In this talk I will give an introduction to classification problems from the perspective of descriptive set theory, and describe a recent result with Filippo Calderoni that shows classifying finitely generated bi-orderable groups is conjecturally as infeasible as classifying all finitely generated groups.

TYRONE GHASWALA, University of Waterloo

[Saturday June 6 / samedi 6 juin, 16:00 – GH 313]

Promoting circular orderability to left orderability

Under what conditions does a group that acts on the circle also act on the line? This seemingly innocent question leads to some surprising mathematics!

I will talk about necessary and sufficient conditions for a circularly orderable group to be left-orderable, and introduce the obstruction spectrum of a circularly orderable group. This joint work with Jason Bell and Adam Clay raises a plethora of intriguing open questions.

HAOYANG HE, Memorial University of Newfoundland

[Saturday June 6 / samedi 6 juin, 15:30 – GH 313]

The curve complex as a coset intersection complex

Geometric Group Theory Théorie géométrique des groupes

I will talk about the relationship between the curve complex and a coset intersection complex associated to the mapping class group. In particular, the two complexes are combinatorially equivalent, quasi-isometric, and homotopy equivalent. Moreover, this combinatorial equivalence implies that the automorphism group of the coset intersection complex is the extended mapping class group.

EDUARDO MARTÍNEZ-PEDROZA, Memorial University of Newfoundland
[Saturday June 6 / samedi 6 juin, 17:00 – GH 313]

JEAN PIERRE MUTANGUHA, McGill University
[Saturday June 6 / samedi 6 juin, 10:00 – GH 313]
Bounded dynamics in various moduli spaces

For any compact hyperbolic 3-manifold M with boundary, Thurston defined the skinning map: a self-map of the Teichmüller space for the boundary of M . For any postcritically finite branched cover of the 2-sphere, Thurston defined the pullback map: a self-map of the Teichmüller space of the 2-sphere relative to the postcritical set. For any injective endomorphism of a finitely generated free group, there is a semi-action on (i.e. self-map of) the corresponding outer space. In each of these three cases, the existence of a fixed point for the self-maps was a key component of a broader program. Beyond the existence of a fixed point, I would like to characterise exactly when these self-maps have bounded dynamics; moreover, it seems that there might be an underlying principle unifying the seemingly disparate dynamical systems. I will discuss recent results and the open question that interests me.

CATHERINE PFAFF, Queens University
[Saturday June 6 / samedi 6 juin, 15:00 – GH 313]

NICHOLAS TOUKIAN, University of New Brunswick
[Saturday June 6 / samedi 6 juin, 9:00 – GH 313]

DIANA VIZCAINO, Memorial University of Newfoundland
[Saturday June 6 / samedi 6 juin, 9:30 – GH 313]
Finiteness of Homological Dehn Functions

We partially address a question from S. Bader, R. Kropholler, and V. Vankov regarding the finiteness of homological n -isoperimetric functions over a ring R for groups, as defined in their work. Let R denote the field \mathbb{Q} , \mathbb{R} , or \mathbb{C} with the absolute value norm. We prove that for any group G that admits an $(n + 1)$ -dimensional cocompact model for \underline{EG} , the homological n -isoperimetric function of G over R is either linear or takes infinite values, which follows as a more general result which we will discuss in this talk. In particular, by results of Gersten and Mineyev, in this class of groups, the homological 1-isoperimetric function over R only captures hyperbolicity. This is joint work with Eduardo Martínez-Pedroza.

Geometry and Quantization Géométrie et quantification

Org: Adrian Chitan and/et Lisa Jeffrey (University of Toronto)

The "Geometry and Quantization" session explores the profound mathematical interplay between symplectic geometry, complex geometry, and mathematical physics. By bringing together experts in representation theory and semiclassical analysis, the session will focus on recent advances in geometric quantization, singular moduli spaces, and complex and symplectic geometry more generally.

La session « Géométrie et quantification » explore les interactions mathématiques profondes entre la géométrie symplectique, la géométrie complexe et la physique mathématique. En réunissant des spécialistes de la théorie des représentations et de l'analyse semi-classique, la session se concentrera sur les avancées récentes en quantification géométrique, sur les espaces de modules singuliers, ainsi que plus généralement sur la géométrie complexe et symplectique.

Schedule/Horaire

Room/Salle: IH 107

Saturday June 6

samedi 6 juin

15:00 - 16:00	DMITRY KOROTKIN (Concordia University) (p. 56)
16:00 - 16:30	PETER CROOKS (Utah State University), <i>Algebraic-geometric symplectic slice theorems and quantization</i> (p. 55)
16:30 - 17:00	MARTIN PINSONNAULT (Western University) (p. 56)
17:00 - 17:30	ALEJANDRO URIBE (University of Michigan), <i>Semi-classical aspects of the quantum Zeno effect</i> (p. 57)
17:30 - 18:00	ROBERT CORNEA (University of Waterloo), <i>Stable Wild Vafa-Witten Bundles on \mathbb{P}^2</i> (p. 55)

Sunday June 7

dimanche 7 juin

8:30 - 9:30	JONATHAN WEITSMAN (Northeastern University), <i>Hilbert Polynomials of Calabi Yau Hypersurfaces in Toric Varieties and Lattice Points in Polytope Boundaries</i> (p. 57)
9:30 - 10:30	JOÃO NUNES (Instituto Superior Técnico), <i>Quantization and Hamiltonian flows in imaginary time</i> (p. 56)
15:00 - 16:00	JOSÉ MOURÃO (Instituto Superior Técnico), <i>Fourier-Helgason transform as infinite geodesic time limit in quantization</i> (p. 56)
16:00 - 16:30	MARK HAMILTON (Mount Allison University) (p. 55)
16:30 - 17:00	OFFICE HOURS (p. 55)

Monday June 8

lundi 8 juin

8:30 - 9:30	JACQUES HURTUBISE (McGill University), <i>Quasi-monopoles</i> (p. 56)
9:30 - 10:00	OOD SHABTAI (University of Toronto Mississauga), <i>Localization of quantum systems at Liouville tori</i> (p. 57)
10:00 - 10:30	JACQUES VAN WYK (University of Waterloo), <i>Generalised Complex Structures on Products of Lie Groups</i> (p. 57)
13:30 - 14:30	DANIEL RAMRAS (Indiana University), <i>Spaces of flat connections</i> (p. 56)
14:30 - 15:00	THOMAS BAIRD (Memorial University of Newfoundland), <i>Moduli spaces of Higgs bundles over a real curve</i> (p. 55)
15:00 - 15:30	ABDEL RAHMAN AL-ABDALLAH (Brandon University), <i>Homogeneous Levi-Flat Hypersurfaces in Complex Projective Spaces</i> (p. 54)

Abstracts/Résumés

Geometry and Quantization Géométrie et quantification

ABDEL RAHMAN AL-ABDALLAH, Brandon University

[Monday June 8 / lundi 8 juin, 15:00 – IH 107]

Homogeneous Levi-Flat Hypersurfaces in Complex Projective Spaces

A classical problem in complex geometry asks whether closed Levi-flat hypersurfaces exist in complex projective spaces, with the case of $\mathbb{C}\mathbb{P}^2$ remaining especially delicate. In this talk, I discuss this problem under a natural symmetry assumption: homogeneity. I will consider Levi-flat hypersurfaces in projective space that arise as homogeneous CR manifolds under Lie group actions by projective transformations. Using the structure theory of homogeneous CR manifolds and the geometry of the Levi foliation, I will show that the leaves must be compact homogeneous complex manifolds, hence flag manifolds. In $\mathbb{C}\mathbb{P}^2$, this forces the leaves to be projective curves, and Bézout's theorem gives a contradiction to the disjointness of distinct leaves. This yields strong nonexistence results for homogeneous Levi-flat closed hypersurfaces in complex projective spaces.

THOMAS BAIRD, Memorial University of Newfoundland

[Monday June 8 / lundi 8 juin, 14:30 – IH 107]

Moduli spaces of Higgs bundles over a real curve

The moduli space M of stable Higgs bundles over a smooth complex projective curve admits a well-known hyperkahler metric structure. If the curve is real, then the real locus $M(\mathbb{R}) \subset M$ is a so-called BAA-brane, meaning that it is Lagrangian with respect to half of the hyperkahler structure and complex with respect to the other half.

In this talk, I will explain how to calculate the \mathbb{Z}_2 -Betti numbers of $M(\mathbb{R})$. The proof uses a motivic formula for M due to Schiffmann, Mellit, and Fedorov-Soibelman-Soibelman.

ROBERT CORNEA, University of Waterloo

[Saturday June 6 / samedi 6 juin, 17:30 – IH 107]

Stable Wild Vafa-Witten Bundles on \mathbb{P}^2

Vafa-Witten bundles were originally introduced in the study of S-duality in $\mathcal{N} = 4$ supersymmetric Yang-Mills theory. Specifically, on a Kähler surface X , a Vafa-Witten bundle is a pair (E, Φ) where E is a holomorphic vector bundle on X and $\Phi \in H^0(X, \text{End}E \otimes K_X)$ called the *Higgs field*. It is known that when $X = \mathbb{P}^2$, non-trivial stable Vafa-Witten bundles do not exist under the standard definition. They do emerge when considering the "wild" case, where in the definition of the Higgs field, one replaces the canonical bundle $K_{\mathbb{P}^2}$ with any line bundle L on \mathbb{P}^2 . In this talk, we describe the geometry of moduli spaces of rank-two stable wild Vafa-Witten bundles over \mathbb{P}^2 .

PETER CROOKS, Utah State University

[Saturday June 6 / samedi 6 juin, 16:00 – IH 107]

Algebro-geometric symplectic slice theorems and quantization

I will harness the representation theory of complex reductive groups to present algebro-geometric counterparts of the classical symplectic slice theorems. If time permits, I will outline potential applications to algebro-geometric symplectic implosion and quantization. This represents joint work with Rebecca Goldin and Yiannis Loizides.

MARK HAMILTON, Mount Allison University

[Sunday June 7 / dimanche 7 juin, 16:00 – IH 107]

Geometry and Quantization Géométrie et quantification

OFFICE HOURS,

[Sunday June 7 / dimanche 7 juin, 16:30 – IH 107]

JACQUES HURTUBISE, McGill University

[Monday June 8 / lundi 8 juin, 8:30 – IH 107]

Quasi-monopoles

(w. R. Bielawski and S. Cherkis)

It has been understood for a while that the end of the moduli space of charge k $SU(2)$ monopoles in R^3 decomposes into regions where one has a glueing of monopoles of charges k_1, \dots, k_s ; i.e a picture of well separated particles. This approximation is rather rough, in that comparing the metrics only gives an approximation to order $1/R$, where R is the separation parameter. Any further improvement requires some form of interaction between the particles. We define spaces of quasi-monopoles, with a separate spectral curve for each charge, and an interaction through their intersection divisors. The spaces of these quasi-monopoles are hyperkahler, and approximates the monopole metric to order e^{-cR} . They also have torus actions, which allow a way of finalising Segal-Selby's proof of the Sen conjecture in the coprime case.

DMITRY KOROTKIN, Concordia University

[Saturday June 6 / samedi 6 juin, 15:00 – IH 107]

JOSÉ MOURÃO, Instituto Superior Técnico, University of Lisbon

[Sunday June 7 / dimanche 7 juin, 15:00 – IH 107]

Fourier-Helgason transform as infinite geodesic time limit in quantization

We give a geometric quantization interpretation of the Fourier-Helgason (FH) transform for Riemannian symmetric spaces of noncompact type, $X = G/K$.

First, we show that Lisecki's horizontal polarization is the infinite time limit of the pushforward of the vertical polarization with respect to the geodesic flow for a G -invariant Riemannian metric.

Then we lift the geodesic flow to an intertwining unitary parallel transport on the quantum bundle that we call quantum geodesic transform (QGT). Finally we show that the QGT has a well defined limit as the geodesic time goes to infinity and that is equivalent to the FH transform.

On work in collaboration with A.C. Ferreira, J. Hilgert and J.P. Nunes

JOÃO NUNES, Instituto Superior Tecnico - University of Lisbon

[Sunday June 7 / dimanche 7 juin, 9:30 – IH 107]

Quantization and Hamiltonian flows in imaginary time

I will review the application of Hamiltonian flows in imaginary time to problems in geometric quantization. I will describe applications to symplectic toric manifolds and will also describe how this framework provides a geometric interpretation of the Peter-Weyl theorem.

MARTIN PINSONNAULT, Western University

[Saturday June 6 / samedi 6 juin, 16:30 – IH 107]

Geometry and Quantization Géométrie et quantification

DANIEL RAMRAS, Indiana University Indianapolis

[Monday June 8 / lundi 8 juin, 13:30 – IH 107]

Spaces of flat connections

Given a manifold M and a homomorphism from $\pi_1(M)$ into a Lie group G , one has an associated flat principal bundle over M . The space of flat connections on this bundle measures the failure of this construction to be an equivalence: more precisely, this space is the homotopy fiber of the map taking a homomorphism to the classifying map for its associated bundle.

In this talk, I'll survey results (some joint with T. Baird, and some due to my student A. Davis) on the homotopy type of spaces of flat connections, contrasting the case of surfaces (where Morse Theory for the Yang-Mills functional allows one to analyze flat connections directly) with the situation for higher-dimensional manifolds. In higher dimensions, rational cohomology of M and information about irreducible representations of $\pi_1 M$ can each be leveraged to produce topological information about flat connections.

Time permitting, I'll discuss some ideas for analyzing these phenomena at higher energy (that is, for connections on which the Yang-Mills functional is non-zero), based on work of Atiyah-Bott and Morrison.

OOD SHABTAI, University of Toronto Mississauga

[Monday June 8 / lundi 8 juin, 9:30 – IH 107]

Localization of quantum systems at Liouville tori

We consider a collection of pairwise commuting quantum observables defined via Berezin-Toeplitz quantization of a closed Kähler manifold, and assume that the Arnold-Liouville theorem applies to their principal symbols. We use the joint eigensections of these observables to define isometric embeddings of the quantum spaces into the space of square integrable functions on a fixed Liouville torus; these embeddings may be viewed as a type of semiclassical localization. We discuss applications for contractions of Lie algebra representations and (time permitting) for pairs of spectral projections of quantum observables.

ALEJANDRO URIBE, University of Michigan

[Saturday June 6 / samedi 6 juin, 17:00 – IH 107]

Semi-classical aspects of the quantum Zeno effect

The quantum Zeno effect is an interesting consequence of the collapse of the wave function axiom. It leads to the dynamics of Hamiltonians of the form $\hat{H}_Z = \Pi \hat{H} \Pi$, where \hat{H} is a quantum Hamiltonian driving a free dynamics and Π an orthogonal projection. In this talk I will take Π to be a spectral projector of a quantum Hamiltonian circle action with a Kähler phase space (for example, the span of the harmonic oscillator eigenstates with energy ≤ 1). After discussing some general semi-classical aspects of Zeno Hamiltonians of this form, I will focus on the construction of quasi-modes (in one degree of freedom), which turn out to concentrate not only on the level sets of H intersected with the classically-allowed region corresponding to Π (the unit disk in the example), but also on its boundary. The boundary concentration has strong implications for the propagation of singularities under \hat{H}_Z . This is joint work with L. Charles, Y. Guedes-Bonthonneau, and S. Vu Ngoc.

JACQUES VAN WYK, University of Waterloo

[Monday June 8 / lundi 8 juin, 10:00 – IH 107]

Generalised Complex Structures on Products of Lie Groups

Let M be an even-dimensional manifold, and let H be a closed three-form on M . An H -twisted generalised complex structure on M is an endomorphism of $TM \oplus T^*M$ which squares to -1 , preserves the natural pseudometric of $TM \oplus T^*M$, and whose i -eigenbundle is closed under the H -twisted Dorfman bracket. A natural question is given a fixed closed three-form H on M , does there exist an H -twisted generalised complex structure on M ? We explore this question for products of simple Lie groups. This is motivated by Marco Gualtieri's result that any even-dimensional semisimple Lie group admits a generalised complex structure.

Geometry and Quantization Géométrie et quantification

JONATHAN WEITSMAN, Northeastern University

[Sunday June 7 / dimanche 7 juin, 8:30 – IH 107]

Hilbert Polynomials of Calabi Yau Hypersurfaces in Toric Varieties and Lattice Points in Polytope Boundaries

We show that the Hilbert polynomial of a Calabi-Yau hypersurface Z in a smooth toric variety M associated to a convex polytope Δ is given by a lattice point count in the polytope boundary $\partial\Delta$, just as the Hilbert polynomial of M is known to be given by a lattice point count in the convex polytope Δ . Our main tool is a computation of the Euler class in K-theory of the normal line bundle to the hypersurface Z , in terms of the Euler classes of the divisors corresponding to the facets of the moment polytope. We observe a remarkable parallel between our expression for the Euler class and the inclusion-exclusion principle in combinatorics. To obtain our result we combine these facts with the known relation between lattice point counts in the facets of Δ and the Hilbert polynomials of the smooth toric varieties corresponding to these facets.

Homotopy Theory Théorie de l'homotopie

Org: **Martin Frankland** (University of Regina), **Cameron Krulewski** (Dalhousie University) and/et **Daniel Teixeira** (Dalhousie University)

This session will bring together researchers working in homotopy theory and its applications to related fields, such as algebraic topology, geometric topology, algebraic geometry, and mathematical physics. Speakers will make their talks accessible to attendees outside of their own subfields.

Cette session réunira des chercheurs travaillant dans le domaine de la théorie de l'homotopie et de ses applications à des domaines connexes, tels que la topologie algébrique, la topologie géométrique, la géométrie algébrique et la physique mathématique. Les orateur(trice)s veilleront à ce que leurs exposés soient accessibles aux participant(e)s n'appartenant pas à leur propre domaine de spécialité.

Schedule/Horaire

Room/Salle: HH 126

Saturday June 6

samedi 6 juin

8:30 - 9:00	DANIEL ALMEIDA (University of Ottawa), <i>Strictification of models of generalized algebraic theories</i> (p. 59)
9:00 - 9:30	DORETTE PRONK (Dalhousie University), <i>Examples of Orthogonal Factorization Systems for Double Categories</i> (p. 61)
9:30 - 10:00	THEOFANIS CHATZIDIAMANTIS-CHRISTOFORIDIS (Western University), <i>Fixed Point Properties in Homotopy Type Theory</i> (p. 60)
10:00 - 10:30	DENI SALJA (Dalhousie University) (p. 62)
15:00 - 15:30	MATTHEW ALEXANDER (formerly University of Regina), <i>A (Pr)operad of (Pr)operad algebras</i> (p. 59)
15:30 - 16:00	LAURA SCULL (Fort Lewis College), <i>Twisted Bredon Cohomology is a Morita Invariant</i> (p. 62)
16:00 - 16:30	DANIEL RAMRAS (Indiana University Indianapolis), <i>Homotopy Pullbacks in CAT</i> (p. 61)
16:30 - 17:00	SHASHEN GOUNDEN (University of Regina), <i>Steenrod's cohomology realization problem for some monomial ideal rings</i> (p. 60)
17:00 - 17:30	TAO GONG (Western University), <i>Toric varieties modulo reflections</i> (p. 60)
17:30 - 18:00	THOMAS WILSKOW THORBJØRNSEN (Western University), <i>Finitely Adequate Modules in Synthetic Algebraic Geometry</i> (p. 62)

Sunday June 7

dimanche 7 juin

8:00 - 8:30	YANG HU (University of Regina), <i>Realization of some Stanley-Reisner algebras and graph colorings</i> (p. 61)
8:30 - 9:00	CARLOS GABRIEL VALENZUELA RUIZ (University of Regina), <i>About tight moment-angle complexes</i> (p. 62)
9:00 - 9:30	STEVEN AMELOTTE (Carleton University), <i>Elements of order 4 in the homotopy groups of the 3-sphere</i> (p. 60)

Abstracts/Résumés

MATTHEW ALEXANDER, (Formerly) University of Regina

[Saturday June 6 / samedi 6 juin, 15:00 – HH 126]

A (Pr)operad of (Pr)operad algebras

In this talk we present a construction which takes a coloured operad \mathcal{O} and small category \mathcal{C} , and produces a corresponding coloured operad $\mathcal{O}^{\mathcal{C}}$, whose algebras are \mathcal{C} -shaped diagrams of \mathcal{O} -algebras. We then give an analogous construction for properads.

Homotopy Theory

Théorie de l'homotopie

DANIEL ALMEIDA, University of Ottawa

[Saturday June 6 / samedi 6 juin, 8:30 – HH 126]

Strictification of models of generalized algebraic theories

Generalized algebraic theories, introduced by Cartmell in the late 1970s, extend the framework of Lawvere theories by allowing the introduction of dependent sorts. This feature makes such theories convenient, for example, for axiomatizing (1-categories of) higher categorical structures in a type-theoretic language. If T is a generalized algebraic theory, two different kinds of models of T have been traditionally considered: a strict one, where contexts are interpreted as iterated families of sets, and a categorical one, which is a model of the underlying finite-limit sketch (or clan) of the syntactic category $C(T)$. These two versions often match, but not always.

We will discuss this phenomenon and indicate how it relates to a more general issue regarding generalized algebraic theories: they can be arranged into a 2-category, but the morphisms that preserve all available structure are too strict to directly encode the intended categorical semantics. This can be studied by constructing a Quillen model structure on the category of generalized algebraic theories whose homotopy bicategory correctly expresses the weaker semantics - that gives, in particular, a strictification result for models of cofibrant theories.

STEVEN AMELOTTE, Carleton University

[Sunday June 7 / dimanche 7 juin, 9:00 – HH 126]

Elements of order 4 in the homotopy groups of the 3-sphere

By a classical result of James, all 2-torsion in $\pi_*(S^3)$ has order bounded by 4. Among the elements x of order 4 in the computed range, Martin Bendersky observed that $2x$ is often equal to $\eta^2 y$ for some $y \in \pi_*(S^5)$ and asked whether this is always the case. I'll explain how Toda brackets can be used to show that this is true whenever the Hopf invariant of x is in the image of the double suspension. I'll then discuss some further evidence for a positive answer to Bendersky's question coming from the unstable Adams spectral sequence. This is based on joint work with Paul Selick and Stephen Theriault.

THEOFANIS CHATZIDIAMANTIS-CHRISTOFORIDIS, University of Western Ontario

[Saturday June 6 / samedi 6 juin, 9:30 – HH 126]

Fixed Point Properties in Homotopy Type Theory

Homotopy type theory is a formal system for homotopy-coherent mathematics which can be interpreted in any $(\infty, 1)$ -topos. We investigate what it means for a space to have the property "every self-map has a fixed point" in this system, inspired by work of Szymik in the category of topological spaces. After constructing counterexamples, we show that classifying spaces of non-Abelian finite simple groups satisfy this property. Along the way, we compute the homotopy groups of the space of maps into a classifying space in homotopy type theory. Our results are formalised in the Rocq proof assistant.

This talk is based on joint work with Dan Christensen.

TAO GONG, Western University

[Saturday June 6 / samedi 6 juin, 17:00 – HH 126]

Toric varieties modulo reflections

Let W be a finite group generated by reflections of a lattice M . If a lattice polytope $P \subset M \otimes_{\mathbb{Z}} \mathbb{R}$ is preserved by W , then the quotient P/W admits an embedding into P as a rational polytope. We show that the quotient of the projective toric variety X_P by W is isomorphic to the toric variety $X_{P/W}$. This answers a question of Horiguchi–Masuda–Shareshian–Song. We also study quotients of real toric varieties, proving that $X_P^{\mathbb{R}}/W$ is contractible when P is a permutohedron. This is joint work with Colin Crowley and Connor Simpson.

Homotopy Theory Théorie de l'homotopie

SHASHEN GOUNDEN, University of Regina

[Saturday June 6 / samedi 6 juin, 16:30 – HH 126]

Steenrod's cohomology realization problem for some monomial ideal rings

If A^* is a graded algebra a classical problem in Algebraic Topology asks if there exists a space Z , such that $H^*(Z) \cong A^*$. We investigate this realisation problem for monomial quotient rings A^* of the form $\mathbb{Z}[x_1, \dots, x_m] \otimes \Lambda_{\mathbb{Z}}[y_1, \dots, y_n]$ modulo an ideal generated by monic monomials. We interpret such rings as generalised Stanley–Reisner rings associated to multicomplexes. Within this framework we show that if the even generators of A^* have at most degree 4 then A^* is realizable as the cohomology ring of a homotopy colimit of products of $\mathbb{C}P^i$, $\mathbb{H}P^j$ $0 \leq i, j \leq \infty$ and S^{2k-1} ($k \in \mathbb{N}$) indexed by a sub-poset of the multicomplex.

YANG HU, University of Regina

[Sunday June 7 / dimanche 7 juin, 8:00 – HH 126]

Realization of some Stanley-Reisner algebras and graph colorings

It is a classical problem in algebraic topology to decide whether a given graded \mathbb{Z} -algebra can be realized as the integral cohomology ring of a space. In this talk, we introduce families of Stanley-Reisner algebras depending on graphs and relate their realizability to the span coloring of the graph. This work is joint with Donald Stanley.

DORETTE PRONK, Dalhousie University

[Saturday June 6 / samedi 6 juin, 9:00 – HH 126]

Examples of Orthogonal Factorization Systems for Double Categories

Double categories enable us to consider two types of arrows between objects as part of one structure. For instance, ring homomorphisms and modules, or ordinary arrows and spans of arrows. Typically, one types of arrows, the *tight* arrows, composes with strict identities and associativity, whereas the other type of arrows, the *loose* arrows, composes with weak identities and associativity. The connection between the two structures is given through double cells, which come with a tight and loose composition.

In this talk I will introduce orthogonal factorization systems for double categories as pairs of suitably compatible factorization systems on the category of tight arrows and on the category of double cells, with loose arrows as objects and tight composition. The focus of the talk will be on examples of such factorization systems and ways to construct double orthogonal factorization systems that extend a given orthogonal factorization system on the tight arrows of the double category.

Specifically, we will consider the double categories of paths in a 2-category, the double category of spans in a category with pullbacks, the double category of relations (on sets) and if time permits the double category of rings with ring homomorphisms and modules.

DANIEL RAMRAS, Indiana University Indianapolis

[Saturday June 6 / samedi 6 juin, 16:00 – HH 126]

Homotopy Pullbacks in CAT

In his thesis, Thomason showed that the Grothendieck construction, applied to a diagram of (small) categories, models the homotopy colimit of the diagram. That is, the nerve of the Grothendieck construction is the homotopy colimit of the diagram of nerves. The dual problem, of finding category-theoretical models for homotopy limits of diagrams in CAT, is much less studied. Quillen's Theorem B and Barwick-Kan's Theorem B_n describe homotopy fibers and homotopy pullbacks categorically, but these models are base-point dependent and give the correct homotopy type only when they happen to be invariant under base-change. Shortly after Quillen's work, M. Evrard constructed a category modeling the homotopy fiber of an arbitrary functor by using zig-zags of morphisms, of indeterminate length, to model paths.

Homotopy Theory Théorie de l'homotopie

I'll explain a new approach to Evrard's result, which naturally extends to give a zig-zag model for arbitrary homotopy pullbacks in CAT. This leads to a characterization of homotopy cartesian squares in CAT, as well as a purely combinatorial description for the associated Mayer-Vietoris sequence in homotopy (and, in particular, its connecting homomorphism), answering a question arising in work of Roberts et al. on Algebraic Quantum Field Theory.

CARLOS GABRIEL VALENZUELA RUIZ, University of Regina

[Sunday June 7 / dimanche 7 juin, 8:30 – HH 126]

About tight moment-angle complexes

Let K be a simplicial complex. If the inclusion of any full subcomplex $L \subseteq K$ always induces an injective map in homology, we say K is tight. The property of tightness has been studied before in the context of minimality of manifold triangulations. In this talk, we'll discuss cohomological properties of moment-angle complexes corresponding to tight triangulations of manifolds. This is joint work with Donald Stanley and Daisuke Kishimoto.

DENI SALJA, Dalhousie University

[Saturday June 6 / samedi 6 juin, 10:00 – HH 126]

LAURA SCULL, Fort Lewis College

[Saturday June 6 / samedi 6 juin, 15:30 – HH 126]

Twisted Bredon Cohomology is a Morita Invariant

Bredon cohomology is an equivariant cohomology theory that is designed to consider information from various fixed sets of the action. In its standard form, it is NOT Morita invariant without restrictions on the coefficients, as shown in [PS]. In order to rectify this, we instead use a twisted version of Bredon cohomology defined in [MM], indexed over the tom Dieck fundamental groupoid. We prove that this twisted Bredon cohomology is Morita invariant. In this talk, I will explain this result and the concepts that underly it via examples.

This talk is based on joint work with C. Farsi and J. Watts.

[MM] Amiya Mukherjee and Goutam Mukherjee. "Bredon-Illman cohomology with local coefficients". *Quart. J. Math. Oxford Ser. (2)* 47.186 pp. 199–21 (1996).

[PS] Dorette Pronk and Laura Scull. "Translation Groupoids and Orbifold Bredon Cohomology". *Canad. Jour. Math.* vol 62 pp 614–645 (2010).

THOMAS WILSKOW THORBJØRNSEN, University of Western Ontario

[Saturday June 6 / samedi 6 juin, 17:30 – HH 126]

Finitely Adequate Modules in Synthetic Algebraic Geometry

Synthetic algebraic geometry (SAG) is an extension of homotopy type theory that provides a language for internal reasoning about the big Zariski topos. In SAG, we postulate the existence of a generic local ring R with some additional properties. Schemes over R are not defined by giving the underlying space a structure sheaf; rather, they are defined by a property of the space itself. Sheaves on a scheme are then expressed as bundles over the scheme, and we have many of the usual operations on the sheaves themselves, such as taking cohomology.

However, algebraic geometry often looks different from this internal point of view, compared to the classical external one. For instance, we can show that the generic local ring R is not Noetherian, and so the category of finitely presented R -modules is not abelian. In particular, the cohomology groups of sheaves of finitely presented R -modules may no longer be finitely presented. In this talk, we shall study the abelian closure of the finitely presented R -modules in the category of all R -modules,

Homotopy Theory Théorie de l'homotopie

which we call the finitely adequate R -modules. We will characterize the finitely adequate R -modules which are injective and projective in this subcategory. Then, we prove that finitely adequate R -modules are closed under extensions. We hope that the category of finitely adequate R -modules gives us a suitable replacement for the category of finitely presented modules, so that the cohomology groups of finitely adequate sheaves are finitely adequate.

Mathematical Modelling of Fisheries Dynamics and Management

Modélisation mathématique de la dynamique et de la gestion des pêches

Org: **Sophie Léger** (Université de Moncton) and/et **Alexandre Pepin** (Université Laval)

This session brings together work on mathematical and computational models for fisheries and aquatic population systems. Emphasis will be placed on dynamical systems, model development, and theoretical insights into population and ecosystem behavior.

Cette session rassemble des travaux consacrés aux modèles mathématiques et computationnels applicables aux pêcheries et aux systèmes de populations aquatiques. L'accent sera mis sur les systèmes dynamiques, l'élaboration de modèles et les analyses théoriques du comportement des populations et des écosystèmes.

Schedule/Horaire

Room/Salle: OH 208

Sunday June 7

dimanche 7 juin

8:00 - 8:30	SOKHNA NDIAYE (Université de Moncton), <i>On the Adequacy of Simple Continuous-Time Models for Snow Crab Population Dynamics</i> (p. 65)
8:30 - 9:00	SOPHIE LÉGER (Université de Moncton), <i>The Role of Cannibalism in Cyclic Snow Crab Population Dynamics</i> (p. 64)
9:00 - 9:30	JULIEN THIBODEAU (Université de Moncton), <i>Bifurcation detection in dynamical systems using deep learning</i> (p. 65)
9:30 - 10:00	ELLIE WEISE (Dalhousie University), <i>Close-Kin Mark-Recapture in Atlantic Halibut</i> (p. 66)
10:00 - 10:30	JÉRÔME MAZEROLLE (Université de Moncton), <i>Modeling Snow Crab Diffusion Using a Finite Element Method</i> (p. 64)

Abstracts/Résumés

SOPHIE LÉGER, Université de Moncton

[Sunday June 7 / dimanche 7 juin, 8:30 – OH 208]

The Role of Cannibalism in Cyclic Snow Crab Population Dynamics

The snow crab fishery is among Canada's most valuable fisheries and plays a critical role in the economy of coastal communities across Atlantic Canada and Quebec. As a cold-water stenothermic species, snow crab may be particularly vulnerable to environmental change associated with ocean warming. Understanding the mechanisms governing population variability is therefore essential for sustainable management.

In this talk, we present a discrete-time population dynamics model for snow crab in the southern Gulf of St. Lawrence that incorporates sex-specific developmental stages: immature, adolescent, and adult males, and immature, prepubescent, and adult females. The model includes density-dependent interactions through intercohort cannibalism, while excluding groundfish predation due to its limited influence in this ecosystem.

Using this framework, we analyze how biological interactions and demographic processes influence snow crab population dynamics. In particular, we investigate the effects of cannibalism, recruitment variability, natural mortality, fertility, and fishing mortality on long-term population behaviour. We also examine the conditions under which the model exhibits stable equilibria or cyclic dynamics through the use of dynamical systems tools such as bifurcation analysis and periodograms.

This work aims to improve understanding of the mechanisms driving variability in snow crab populations and to contribute to the development of stock assessment models that better account for nonlinear biological processes in a changing environment.

Mathematical Modelling of Fisheries Dynamics and Management

Modélisation mathématique de la dynamique et de la gestion des pêches

JÉRÔME MAZEROLLE, Université de Moncton

[Sunday June 7 / dimanche 7 juin, 10:00 – OH 208]

Modeling Snow Crab Diffusion Using a Finite Element Method

Snow crabs are an important asset to New Brunswick fisheries. As a cold-water species, their survival is highly sensitive to fluctuations in water temperature. Most snow crab mortality occurs during the larval phase, where only 1.5% of the larvae survive migration.

Being too small to move on their own, snow crab larvae are transported by water currents across the Gulf of St. Lawrence. Their small size also causes them to behave similarly to suspended particles in water, making diffusion an important factor in their movement.

The transport and dispersion of snow crab larvae can therefore be modeled using the advection-diffusion equation :

$$\frac{\partial C}{\partial t} + u \frac{\partial C}{\partial x} + v \frac{\partial C}{\partial y} = D \left(\frac{\partial^2 C}{\partial x^2} + \frac{\partial^2 C}{\partial y^2} \right)$$

In this equation, the advection velocities u and v represent ocean current data provided by Fisheries and Oceans Canada. Because the available data was not sufficiently detailed for direct mathematical modeling, it was interpolated using the Kriging method. The model also includes a diffusion coefficient D and the larval concentration field C , which must be solved for numerically.

Since no realistic analytical solution exists for this system, numerical approximation techniques are required. A finite element method was therefore applied to solve the advection–diffusion equation on a computational mesh designed to simulate the conditions of the Gulf of St. Lawrence.

SOKHNA NDIAYE, Moncton University

[Sunday June 7 / dimanche 7 juin, 8:00 – OH 208]

On the Adequacy of Simple Continuous-Time Models for Snow Crab Population Dynamics

Abstract

Snow crab (*Chionoecetes opilio*) is a major component of the maritime economy in the Gulf of St. Lawrence, with landings generating over \$300 million in 2021 according to Fisheries and Oceans Canada (DFO). Beyond its commercial importance, this species plays a key ecological role, but its management is complicated by high sensitivity to climate change and a life cycle characterized by discontinuous growth and cannibalistic behavior.

In this work, we investigate the relevance of continuous-time modeling for describing the dynamics of this resource using a stage-structured framework distinguishing immature and mature crabs. We compare two approaches: a model incorporating cannibalism as a trophic regulation mechanism, and a delay differential equation model accounting for maturation time.

We conduct a mathematical analysis of both models, focusing on equilibrium points and the occurrence of Hopf bifurcations that may explain observed population oscillations. Analytical results are complemented by numerical simulations to assess the ability of each model to reproduce stock dynamics. These findings provide insight into the suitability of stage-structured continuous-time models for understanding snow crab population cycles and supporting sustainable fisheries management under changing environmental conditions.

JULIEN THIBODEAU, Université de Moncton

[Sunday June 7 / dimanche 7 juin, 9:00 – OH 208]

Bifurcation detection in dynamical systems using deep learning

Mathematical Modelling of Fisheries Dynamics and Management Modélisation mathématique de la dynamique et de la gestion des pêches

Developing robust numerical methods for dynamical systems is an important issue across many scientific and industrial applications. In fisheries science, ordinary differential equation (ODE) models are commonly used to study how parameters such as harvesting rates influence population dynamics. Variations in these parameters can lead to qualitative changes in system behaviour, including the appearance or disappearance of equilibrium points or changes in their stability. These phenomena, known as bifurcations, are crucial to fully understand the long-term dynamics of the system but are often difficult to capture using traditional simulation methods.

Continuation methods, such as the Moore-Penrose continuation, provide an effective framework for tracking equilibrium solutions as parameters vary and can successfully handle many types of bifurcations. However, in more extreme cases of bifurcations, these methods may exhibit convergence difficulties. Detecting such problematic regions in advance would therefore significantly improve the reliability of numerical simulations.

In this work, we propose a deep learning approach for the early detection and classification of bifurcation points from time-series data. The model is trained to recognize characteristic patterns associated with different bifurcation types. Once validated, the model will be integrated with the Moore-Penrose continuation to improve the quality of its simulations. The proposed framework will then be tested on a variety of dynamical systems arising in applied mathematics and population dynamics.

ELLIE WEISE, Dalhousie University

[Sunday June 7 / dimanche 7 juin, 9:30 – OH 208]

Close-Kin Mark-Recapture in Atlantic Halibut

Atlantic Halibut are the target of an important fishery in the Northwest Atlantic; knowledge of their abundance is crucial for proper management and conservation. However, estimating the population size of a widely distributed and abundant marine fish is notoriously difficult. We plan to estimate the population abundance of Atlantic halibut on the Scotian Shelf using the Close Kin Mark Recapture (CKMR) approach. The method is based on the genotypic identification of kin (parent-offspring pairs, half-sib pairs, etc.), which are used as a substitute for physical recaptures in a traditional mark-recapture framework. We genotyped 10,303 samples collected between 2017 and 2024 at 4,000 single nucleotide polymorphic (SNP) markers. Pairwise pseudo-likelihood odds ratios were calculated across all individuals to identify 29 parent-offspring pairs and 571 half-sibling pairs in the sample. The CKMR likelihoods for Atlantic Halibut were constructed for parent-offspring pairs, cross-cohort half-siblings and grandparent-grandchild pairs. Likelihoods were adjusted according to the sex of parent in the kin pair and to include uncertainty from incomplete age information. The ultimate goal of the project is to provide the modeling framework for the estimation of population abundance, survivorship rates and connectivity for Atlantic Halibut that can be used to assess the state of the population on the Scotian Shelf and set sustainable fishing targets.

Mathematical Physics Physique mathématique

Org: Connor Behan (Perimeter Institute) and/et **Ruben Sandapen** (Acadia University)

This session is dedicated to topics in quantum field theories (QFT) and gravitational theories. A remarkable underlying link between QFT and gravity is provided by the holographic principle which will also be explored in this session.

Cette session est consacrée à des sujets en théorie quantique des champs (QFT) et en théories de la gravitation. Un lien sous-jacent remarquable entre la QFT et la gravitation est fourni par le principe holographique, qui sera également exploré dans cette session.

Schedule/Horaire

Room/Salle: OH 104

Saturday June 6

samedi 6 juin

8:00 - 8:30	ADRIAN CHITAN (Western), <i>Stratification and Quantization of Chern-Simons Phase Space: Towards Witten's Asymptotic Conjecture</i> (p. 68)
8:30 - 9:00	WENJUN NIU (Perimeter), <i>Line operators and BPS algebras</i> (p. 69)
9:00 - 9:30	RUBEN SANDAPEN (Acadia), <i>Conformal inversion in the internal light-front dynamics of a pion</i> (p. 69)
9:30 - 10:00	MATTHEW ALEXANDER (Regina), <i>Hopf-Frobenius Gauge Theories</i> (p. 67)
10:00 - 10:30	PETER MARZLIN (St Francis Xavier), <i>Locality and the phase space representation of quantum fields</i> (p. 68)
15:00 - 15:30	CONNOR BEHAN (Perimeter), <i>Supercharge cohomology in holographic theories</i> (p. 68)
15:30 - 16:00	CHRIS WADDELL (Perimeter), <i>On sufficient conditions for holographic scattering</i> (p. 69)
16:00 - 16:30	SETH ASANTE (UNB), <i>Deferred Cyclotomic Representations: Exact Algebraic Evaluation of Quantum Group Invariants and q-Hypergeometric Series</i> (p. 67)
16:30 - 17:00	ADRIAN LOPEZ RAVEN (Perimeter), <i>Categorical 't Hoof Expansion and Chiral Algebras</i> (p. 69)
17:00 - 17:30	SERAPHIM JAROV (Toronto), <i>Novel integrable PDEs from twistor theory</i> (p. 68)
17:30 - 18:00	ROBERT VAN DEN HOOGEN (St Francis Xavier), <i>Using gauge covariant Lie derivatives to impose symmetries</i> (p. 69)

Abstracts/Résumés

MATTHEW ALEXANDER, (Formerly) University of Regina

[Saturday June 6 / samedi 6 juin, 9:30 – OH 104]

Hopf-Frobenius Gauge Theories

Hopf algebras and Frobenius algebras are two structures that have found important roles in formulating quantum field theory: Hopf algebras in the guise of quantum groups, and Frobenius algebras in the realm of topological quantum field theories. In this talk, we present a compatibility structure between these two algebras, which we call *Hopf-Frobenius modules*, and show how these modules generalize the geometric, analytic, and algebraic structures that appear in field theory, allowing us to formulate a notion of gauge theory in this setting.

SETH ASANTE, University of New Brunswick

[Saturday June 6 / samedi 6 juin, 16:00 – OH 104]

Deferred Cyclotomic Representations: Exact Algebraic Evaluation of Quantum Group Invariants and q-Hypergeometric Series

The computation of topological invariants for 3-manifolds, such as the Turaev-Viro state sums, relies heavily on the representation theory of the quantum group $U_q(\mathfrak{sl}_2)$. The fundamental building blocks of these invariants (such as the quantum 6j-symbols) are expressed as complex q-hypergeometric series. Evaluating these rational functions poses severe challenges.

Mathematical Physics Physique mathématique

Standard evaluations rely on dense polynomial or rational formulations, which trigger expression swell in exact symbolic algebra and severe catastrophic cancellation in finite-precision arithmetic.

In this talk, we introduce the Deferred Cyclotomic Representation (DCR) of the q -hypergeometric series, an algebraic framework that resolves these computational bottlenecks. By mapping the multiplicative structure of q -factorials onto a free abelian group generated by irreducible cyclotomic polynomials, the DCR framework translates algebraic multiplication and division into exact sparse integer vector additions. This isolates the combinatorial skeleton of the series from the target evaluation field. We shall demonstrate how DCR enables the extraction of common polynomial divisors, intrinsically resolves root-of-unity poles, and allows the evaluation of generic tensor category identities in exact cyclotomic fields. `QRecoupling.jl` open-source package is developed for further research and applications.

CONNOR BEHAN, Perimeter Institute

[Saturday June 6 / samedi 6 juin, 15:00 – OH 104]

Supercharge cohomology in holographic theories

To leverage the full power of holographic duality, one must be able to interpolate between weak and strong coupling on the field theory side. This can be done for the superconformal index which is coupling independent but still sensitive to the distinction between multi-graviton states and black holes. I will discuss a natural refinement of this which comes from viewing supersymmetric states through the lens of cohomology. Although this space receives corrections in perturbation theory, these appear in a rather controlled way. This viewpoint makes it easier to search the low-lying Hilbert space and it also makes some relations between different theories more transparent. I will give thoughts on how supercharge cohomologies can serve as fundamental data of supersymmetric gauge theories with their own universality classes.

ADRIAN CHITAN, Western University

[Saturday June 6 / samedi 6 juin, 8:00 – OH 104]

Stratification and Quantization of Chern-Simons Phase Space: Towards Witten's Asymptotic Conjecture

In three-dimensional topological quantum field theory, the Witten-Reshetikhin-Turaev (WRT) invariants are famously formulated via the path integral of Chern-Simons gauge theory. The rigorous geometric quantization of the underlying classical phase space—the moduli space of flat $SU(2)$ connections on a Riemann surface—provides a powerful mathematical framework for understanding these physical invariants. However, traditional geometric approaches, such as those relying on the Jeffrey-Weitsman-Witten (JWW) invariants, have historically faced limitations due to the presence of singular strata corresponding to reducible connections.

This talk presents a stratified quantization recipe for the half density, or half-form bundle, over the moduli space which incorporates these singular strata independently into the defining integral. By isolating the treatment of the singularities we more closely harmonize the geometrically derived invariants with the expected WRT invariants from QFT.

SERAPHIM JAROV, Perimeter Institute

[Saturday June 6 / samedi 6 juin, 17:00 – OH 104]

Novel integrable PDEs from twistor theory

Twistor theory beautifully captures the solutions of 4d non-linear PDEs within complex geometric data. I will explain this correspondence and introduce novel deformations of classic PDEs that admit interesting twistorial descriptions. Time permitting, I will also touch on exciting connections to vertex operator algebras, topological string theory, and scattering amplitudes.

PETER MARZLIN, St. Francis Xavier University

[Saturday June 6 / samedi 6 juin, 10:00 – OH 104]

Locality and the phase space representation of quantum fields

Mathematical Physics Physique mathématique

The Hegerfeldt theorem asserts that any localized state of a relativistic particle would become delocalized in an arbitrarily short time. We derive a phase space representation of non-relativistic and relativistic quantum fields that circumvents this problem by using a set of localized wave packets that are neither particles nor anti-particles. The dynamical equation of the probability amplitude takes the form of a classical Vlasov equation with quantum corrections. We discuss applications of the method, including Schwinger and Unruh effect.

WENJUN NIU, Perimeter Institute for Theoretical Physics

[Saturday June 6 / samedi 6 juin, 8:30 – OH 104]

Line operators and BPS algebras

BPS algebras are important invariants of 4d $N=2$ SCFTs. Recently, Gaiotto-Grygoryev-Li proposed that the category of 1/2-BPS line operators of the theory is controlled by the category of bimodules of the corresponding BPS algebra. However, their proposal was incomplete as the category of bimodules lack the structure of a spectral braiding. In this talk, I will explain that by considering a more refined category of bimodules, one can obtain a spectral braiding between objects. We propose this refined category to be the category of 1/2-BPS line operators. We give credence to this proposal by showing that when the BPS algebra is associated to a type A quiver, the corresponding category is equivalent to representations of type-A Yangians. This is based on joint work in preparation with S. DeHority and A. Latyntsev.

ADRIAN LOPEZ RAVEN, Perimeter Institute

[Saturday June 6 / samedi 6 juin, 16:30 – OH 104]

Categorical 't Hooft Expansion and Chiral Algebras

It is over 50 years since 't Hooft noted that Quantum Field Theories with matrix-valued fields furnish a String Theory expansion as the rank of the matrices goes to infinity. Several examples of this correspondence are known and go by the name of Holography, though no general recipe to construct the dual String Theory is known.

In this work, we derive B-model String Theory dual data for a wide family of matrix-valued chiral algebras. Amongst the dual String Theory backgrounds, one finds novel non-commutative geometries. Using techniques from Homological Algebra, we extract universal properties of the conjectural worldsheet theories dual to these chiral algebras, in the form of A_∞ categories and modules. We believe some of the techniques developed in this work may find use in broader examples of Holography.

RUBEN SANDAPEN, Acadia University

[Saturday June 6 / samedi 6 juin, 9:00 – OH 104]

Conformal inversion in the internal light-front dynamics of a pion

In light-front Quantum Chromodynamics (QCD), there is a natural separation between longitudinal and transverse dynamics. Here, we focus on the pion where we find that the equations of motion governing transverse and longitudinal dynamics map onto the infrared and ultraviolet limits of the equation of motion for a scalar field in 5-dimensional anti de Sitter spacetime (AdS) deformed by a quadratic dilaton. While conformal symmetry is explicitly broken on the AdS side for transverse dynamics, it is explicitly broken on the QCD side for longitudinal dynamics.

ROBERT VAN DEN HOOGEN, St. Francis Xavier University

[Saturday June 6 / samedi 6 juin, 17:30 – OH 104]

Using gauge covariant Lie derivatives to impose symmetries

A procedure to determine the initial ansatz for the co-frame and spin connection characterizing a Riemann-Cartan geometry respecting a given group of continuous symmetries is illustrated by employing a gauge covariant Lie derivative to the metric, co-frame and spin connection. The procedure will be applied to a simple non-trivial geometry in teleparallel gravity.

Mathematical Physics Physique mathématique

CHRIS WADDELL, Perimeter Institute

[Saturday June 6 / samedi 6 juin, 15:30 – OH 104]

On sufficient conditions for holographic scattering

In AdS/CFT, scattering in the bulk can be mediated by entanglement on the boundary. The connected wedge theorem (CWT) of May, Penington, and Sorce is a concrete example where bulk scattering implies correlation between certain boundary regions. However the converse does not hold. We investigate a recent proposal of Leutheusser and Liu for a generalization of the CWT with converse. We prove the forward direction: having pairs of CFT "input" (and likewise "output") regions in a phase with connected entanglement wedge implies that a particular bulk subregion (the intersection of "input" and "output" entanglement wedges) is non-empty. We then establish a modified version of the proposal which has a converse, and identify counter-examples to the stronger conjecture.

Mathematics for Play, Community, and Connection: A Public Recreational Math Expo
Mathématiques pour le jeu, la communauté et le lien : une exposition publique de
mathématiques récréatives

Org: Hope Alderson (University of New Brunswick (Saint John)) and/et **John Grant McLoughlin**
(University of New Brunswick (Fredericton))

A public Recreational Mathematics Expo is being held alongside the 2026 CMS Summer Meeting in Saint John. The event welcomes families, teachers, students, and community members to engage with mathematics through hands-on activities, puzzles, and games, highlighting mathematics as playful, creative, and accessible. The Expo will foster community engagement and outreach while complementing the research and education sessions of the CMS meeting.

Une exposition publique de mathématiques récréatives est organisée en parallèle avec la réunion d'été 2026 de la SMC à Saint John. L'événement invite les familles, les enseignantes et enseignants, les étudiantes et étudiants, ainsi que les membres de la communauté à découvrir les mathématiques à travers des activités pratiques, des casse-têtes et des jeux, en mettant en valeur leur caractère ludique, créatif et accessible. L'exposition favorisera l'engagement communautaire et les activités de sensibilisation, tout en complétant les sessions de recherche et d'éducation de la réunion de la SMC.

Noncommutative Geometry and Applications Géométrie non commutative et applications

Org: **Branimir Ćaćić** (University of New Brunswick), **Masoud Khalkhali** (The University of Western Ontario) and/et **Nathan Pagliaroli** (The University of Waterloo)

In recent years have seen promising new links emerge and existing links deepen between Noncommutative geometry and mathematical physics. This session aims to bring together junior and senior researchers that work in noncommutative geometry and adjacent areas, with a focus on: spectral triples, topological quantum field theory, operator algebras, and probability theory.

Ces dernières années ont vu émerger de nouveaux liens prometteurs et s'approfondir des liens existants entre la géométrie non commutative et la physique mathématique. Cette session vise à réunir des chercheuses et chercheurs, juniors et seniors, travaillant en géométrie non commutative et dans des domaines connexes, avec un accent sur : les triplets spectraux, la théorie quantique des champs topologique, les algèbres d'opérateurs et la théorie des probabilités.

Schedule/Horaire

Room/Salle: HH 125

Sunday June 7

dimanche 7 juin

8:00 - 8:30	KONRAD AGUILAR (Pomona College), <i>The Bures metric and the quantum metric on the density space of a C^*-algebra: the non-unital case</i> (p. 72)
8:30 - 9:00	JOE BURRIDGE (University of Nottingham), <i>Fuzzy Geometries with an Internal Space</i> (p. 73)
9:00 - 9:30	SITA GAKKHAR (University of Waterloo), <i>Stochastic quantization and the geometry of open quantum systems</i> (p. 73)
9:30 - 10:00	ASGHAR GHORBANPOUR (Western University) (p. 73)
10:00 - 10:30	ATUL GOTHE (University of Warsaw), <i>A quantum CW-complex for quantum real projective spaces</i> (p. 73)
15:00 - 15:30	CAMERON KRULEWSKI (Dalhousie University), <i>Twisted Atiyah–Bott–Shapiro Maps and SPTs</i> (p. 73)
15:30 - 16:00	JAMES MINGO (Queen's University), <i>Infinitesimal Freeness</i> (p. 73)
16:00 - 16:30	NATHAN PAGLIAROLI (University of Waterloo), <i>Asymmetric phase transitions in random noncommutative geometries</i> (p. 74)
16:30 - 17:00	ILYA SHAPIRO (University of Windsor), <i>Annuli stacking and duoidal categories.</i> (p. 74)
17:00 - 17:30	GIORGOS TSIMPERIS (University of Nottingham) (p. 74)

Abstracts/Résumés

KONRAD AGUILAR, Pomona College

[Sunday June 7 / dimanche 7 juin, 8:00 – HH 125]

The Bures metric and the quantum metric on the density space of a C^ -algebra: the non-unital case*

Building off work of Farenick and Rahaman, we extend the definition of the density space and the Bures metric to the setting of non-unital C^* -algebras equipped with a faithful trace and prove that the Bures metric is a metric in this case and that its topology is weaker than the topology induced by the C^* -norm. Furthermore, we prove a Heine-Borel type theorem for C^* -algebras and the density space, where we prove that for any C^* -algebra (unital or non-unital) equipped with a faithful trace, the density space equipped with the Bures metric topology is not compact if and only if the C^* -algebra is infinite dimensional. Next, building off work from some of the authors, we extend the definition of the quantum metric on the density space to the non-unital C^* -algebra case by introducing the notion of a quantum Lipschitz triple, which form a subclass of quantum locally compact metric spaces of Latrémolière that utilize Rieffel's notion of a quantum metric. Furthermore, we prove that this quantum metric topology is weaker than the topology induced by the C^* -norm and finish the article with an analysis of matrix-valued functions on the quantized interval, where the quantum metric topology on the density space is not compact and the quantum metric is not uniformly equivalent to both the Bures metric and the C^* -norm induced metric. This is joint

Noncommutative Geometry and Applications Géométrie non commutative et applications

work with Karina Behera, Katrine von Bornemann Hjelmberg, Tron Omland, Gregory Wickham, Nicole Wu, and Adam M. Yassine. This work is partially supported by NSF grant DMS-2316892.

JOE BURRIDGE, University of Nottingham

[Sunday June 7 / dimanche 7 juin, 8:30 – HH 125]

Fuzzy Geometries with an Internal Space

The product of a non-commutative matrix spectral triple with a simple two-dimensional internal space is considered. The inner fluctuations of a vacuum Dirac operator are calculated, using the standard technique of Connes' one-forms. This results in the non-commutative analogue of a gauge field, as expected, and also fluctuations of the spacetime geometry. In addition, the fluctuations include a derivative operator that depends on the particle charge.

SITA GAKKHAR

[Sunday June 7 / dimanche 7 juin, 9:00 – HH 125]

Stochastic quantization and the geometry of open quantum systems

In analogy with stochastic quantization of Euclidean QFT, a quantum Langevin equation associated with the spectral action is sought. For Gaussian type test functions, the Evans-Hudson quantum stochastic differential equation provides a candidate. The structure maps for the qSDE are constructed from the noncommutative Laplacian and live on a space over noncommutative differential forms similar to the commutative setting. This motivates viewing a canonical open quantum system as a noncommutative Wiener space and relating the noncommutative Laplacian of products of spectral triples to more general Lindbladians.

ASGHAR GHORBANPOUR, Western University

[Sunday June 7 / dimanche 7 juin, 9:30 – HH 125]

ATUL GOTHE, University of Warsaw / IMPAN

[Sunday June 7 / dimanche 7 juin, 10:00 – HH 125]

A quantum CW-complex for quantum real projective spaces

A CW-complex is a topological space which can be built up inductively by attaching n -balls B^n along their boundary $(n-1)$ -spheres S^{n-1} . Quantum CW-complexes generalise the classical construction by dualising the pushouts of topological spaces to pullbacks of C^* -algebras, and allowing the C^* -algebras to be noncommutative. Topological graphs, introduced by Katsura, provide a generalisation of discrete graph algebras and homeomorphism C^* -algebras and provide a convenient framework to describe various well-known C^* -algebras. Additionally, they have nice correspondence between the algebraic properties of the C^* -algebras, and combinatorial and topological properties of the graphs. Using this notion of topological graphs, I'll discuss a quantum CW-complex structure for quantum real projective spaces.

CAMERON KRULEWSKI, Dalhousie University

[Sunday June 7 / dimanche 7 juin, 15:00 – HH 125]

Twisted Atiyah–Bott–Shapiro Maps and SPTs

The Atiyah–Bott–Shapiro orientation $MTSpin \rightarrow KO$ produces a KO -theory Thom class from a spin manifold. We develop a twisted version of this map for $\text{spin}-(\ell, k)$ manifolds: manifolds with a spin structure on their tangent bundle augmented by $\ell + k$ -many line bundles. We compute a dual version of this map, which admits a physical interpretation in terms of fermionic symmetry protected topological phases. This talk is based on joint work with Arun Debray and Luuk Stehouwer.

Arun Debray, Cameron Krulewski, Luuk Stehouwer. "Unraveling the Bott spiral." arXiv:2605.00316

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JAMES MINGO, Queen's University

[Sunday June 7 / dimanche 7 juin, 15:30 – HH 125]

Infinitesimal Freeness

A universal rule for computing mixed moments of independent and unitarily invariant random matrices gives, in the large N limit, the rule for free independence. In the forty years since Voiculescu gave this rule many extensions and generalizations have been found.

One extension, found by Belinschi and Shlyakhtenko, is called infinitesimal freeness. This has been shown to model the case where the random matrices have different scales, however there are cases where the model doesn't cover some standard examples, in particular the Gaussian orthogonal ensemble. Guillaume Cébron and I have found the extension of infinitesimal freeness to the case of orthogonal invariance. In addition to covering the orthogonal case, real infinitesimal freeness also turns out to be the model of freeness needed for the subleading term of finite freeness, which has recently been found by Arizmandi, Perales, and Vázquez Becerra.

NATHAN PAGLIAROLI, University of Waterloo

[Sunday June 7 / dimanche 7 juin, 16:00 – HH 125]

Asymmetric phase transitions in random noncommutative geometries

In this talk we will outline study the asymmetric phases of the quartic type $(0,1)$ and $(1,0)$ Dirac ensembles. The focus of this work is on asymmetric solutions to the Schwinger-Dyson and saddle point equations of these models, whose solution spaces prove deeply intricate. Via the Riemann-Hilbert approach, we are able to give explicit formulae for the eigenvalue distributions and free energy of various solutions. Using Hamiltonian Monte Carlo simulations, we are able to reconstruct the phase structure. Lastly, using bootstrapping with positivity, we are able to reconstruct the eigenvalue distribution of these models from their bootstrapped moments. All three methods show excellent agreement for large matrix size. This talk is based on upcoming joint work with Benedek Bukor, Masoud Khalkhali, Samuel Kováčik, Katarína Magdolenová, and Juraj Tekel.

ILYA SHAPIRO, University of Windsor

[Sunday June 7 / dimanche 7 juin, 16:30 – HH 125]

Annuli stacking and duoidal categories.

When considering Hopf-cyclic cohomology in the braided setting one is led to a natural notion of a monoidal product on the Hochschild homology category of the underlying braided category. It turns out that this product also appears in factorization homology, as a key ingredient in bridging the algebra and topology in the study of 2d TQFTs; the braided category is the algebraic input. Motivated by duality, we will discuss extending this product from the braided to the duoidal setting.

GIORGOS TSIMPERIS, University of Nottingham

[Sunday June 7 / dimanche 7 juin, 17:00 – HH 125]

Problems in Graph Searching Problèmes de recherche dans les graphes (graph searching)

Org: Beth Ann Austin (Memorial University), **Iain Beaton** (Acadia University) and/et **Danielle Cox** (Mount Saint Vincent University)

Many problems in graph searching include searcher(s) trying to capture a mobile evader in a network. There is a rich history of variant problems which explore different actions of searchers and robbers, conditions of capture, speed, or visibility. Recently, there have been more developments in the field of graph searching, especially when it comes to deterministic and probabilistic problems. This session aims to draw on the research of people working on a variety of graph searching problems such as cops and robbers, localization, firefighting, graph burning, and eternal domination.

De nombreux problèmes de graph searching mettent en jeu un ou plusieurs chercheurs tentant de capturer un évadé mobile dans un réseau. Il existe une riche variété de problèmes qui explorent différentes actions des chercheurs et des poursuivis, ainsi que des conditions de capture, de vitesse ou de visibilité. Récemment, le domaine du graph searching a connu d'importants développements, notamment en ce qui concerne les problèmes déterministes et probabilistes. Cette session vise à mettre en lumière les travaux de recherche portant sur divers problèmes de graph searching, tels que le jeu des gendarmes et voleurs, la localisation, la lutte contre les incendies (firefighting), la combustion de graphes (graph burning) et la domination éternelle.

Schedule/Horaire

Room/Salle: GH 115

Saturday June 6

samedi 6 juin

8:00 - 8:30	TEDDY MISHURA (Toronto Metropolitan University), <i>Cooling Generalized Hypercubes</i> (p. 78)
8:30 - 9:00	ANTHONY BONATO (Toronto Metropolitan University), <i>What we know and what we don't know about cooling</i> (p. 76)
9:00 - 9:30	TRENT MARBACH (Acadia University), <i>Between Burning and Cooling: Liminal Burning on Graphs</i> (p. 77)
9:30 - 10:00	MARGARET-ELLEN MESSINGER (Mount Allison University), <i>The Infectious Vaccination Problem, Part 1</i> (p. 78)
10:00 - 10:30	MELISSA HUGGAN (Vancouver Island University), <i>The Infectious Vaccination Problem, Part II</i> (p. 76)
15:00 - 15:30	GRIFFIN BARTLETT (Memorial University), <i>The Lamplighter Game on Paths with Complete Lamps</i> (p. 76)
15:30 - 16:00	MEAGAN MANN (Queen's University), <i>Predicting The Cop Number Using Machine Learning</i> (p. 77)
16:00 - 16:30	AMANDA PORTER (University of Victoria), <i>Edge Cops and Robber on Triangle-Free Graphs</i> (p. 79)
16:30 - 17:00	BETH ANN AUSTIN (Memorial University), <i>Calling in reinforcements to limit damage</i> (p. 75)
17:00 - 17:30	NANCY CLARKE (Acadia University), <i>Further results on the Cops and Insightful Robber model</i> (p. 76)
17:30 - 18:00	ALEX CLOW (Simon Fraser University), <i>Can Cop Number Equal Independence Number?</i> (p. 76)

Sunday June 7

dimanche 7 juin

8:30 - 9:00	TODD MULLEN (University of Prince Edward Island), <i>Cops and Robbers and Barricades</i> (p. 78)
9:00 - 9:30	JOY MORRIS (University of Lethbridge), <i>Eternal domination in Cayley graphs</i> (p. 78)
9:30 - 10:00	LOGAN PIPES (Memorial University), <i>On The Radius of Location of Trees</i> (p. 79)
10:00 - 10:30	JOHN MARCOUX (Toronto Metropolitan University), <i>Localization and the Ball Dimension</i> (p. 77)

Abstracts/Résumés

BETH ANN AUSTIN, Memorial University
[Saturday June 6 / samedi 6 juin, 16:30 – GH 115]
Calling in reinforcements to limit damage

Problems in Graph Searching Problèmes de recherche dans les graphes (graph searching)

The damage number of a graph, introduced by Cox and Sanaei, is the minimum number of distinct vertices a robber can visit without capture. We consider the variant where multiple cops are allowed, and give results on several families of graphs. This is joint work with Danny Dyer and Melissa Huggan.

GRIFFIN BARTLETT, Memorial University of Newfoundland

[Saturday June 6 / samedi 6 juin, 15:00 – GH 115]

The Lamplighter Game on Paths with Complete Lamps

Lamplighter graphs are a class of finite graphs exhibiting exotic geometries. We establish non-trivial upper and lower bounds on the cop number of lamplighter graphs by considering retracts of these graphs, and we provide a linear upper bound on the cop number of a certain subclass of lamplighter graphs by considering the Lamplighter Game played on paths of finite length.

ANTHONY BONATO, Toronto Metropolitan University

[Saturday June 6 / samedi 6 juin, 8:30 – GH 115]

What we know and what we don't know about cooling

Cooling uses the same rules as burning, but instead of spreading efficiently, it spreads as inefficiently as possible. For some graphs, cooling is easier to analyze than burning and vice versa. We provide an overview of what is known and unknown in cooling, give results for graph families and bounds, and discuss new results on cooling graph products.

NANCY CLARKE, Acadia University

[Saturday June 6 / samedi 6 juin, 17:00 – GH 115]

Further results on the Cops and Insightful Robber model

We consider a variation of the Cops and Robber game, introduced by Huggan and Nowakowski, in which the cops and the robber move simultaneously yet the robber is able to react to the cops' moves. As per usual with such models, our parameter of interest is the minimum number of cops that suffice to win on a given graph. We consider our parameter for planar and, in particular, bipartite planar graphs, and give bounds for strong and lexicographic products and some exact results. We also introduce a new parameter, the push number of a graph, and use it to compare this game with other variants. This is joint work with Danny Dyer and William Kellough.

ALEX CLOW, Simon Fraser University

[Saturday June 6 / samedi 6 juin, 17:30 – GH 115]

Can Cop Number Equal Independence Number?

In 2022 Turcotte asked if $c(G) < \alpha(G)$ for all graphs with $\alpha(G) \geq 3$. Recently, Char, Maniya, and Pradhan proved this is false when $\alpha = 3$ by demonstrating a single graph with cop number and independence number 3. The problem was not resolved for graphs with independence number greater than 3. We settle this problem using random graphs by proving the stronger result that for all $k \geq 1$ there exists a graph G such that $c(G) = \alpha(G) = \theta(G) = k$. Next, we consider the structure of graphs achieving $c(G) = \theta(G)$, and in doing so we prove that if G is a perfect graph with $\alpha(G) \geq 4$ then $c(G) < \alpha(G)$.

This is joint work with Imed Zaguia.

Problems in Graph Searching

Problèmes de recherche dans les graphes (graph searching)

MELISSA HUGGAN, Vancouver Island University

[Saturday June 6 / samedi 6 juin, 10:00 – GH 115]

The Infectious Vaccination Problem, Part II

This is a continuation of the talk by Margaret-Ellen Messinger about the model for the competing spread of a virus and self-disseminating vaccine. In this talk, we present some results about infinite n -dimensional Cartesian and strong grids, and examine a connection to the strength of n -dimensional hypercubes. This is joint work with J. Enright, E. Hunter-Frankland, M.E. Messinger, and D. Pearson.

MEAGAN MANN, Queen's University

[Saturday June 6 / samedi 6 juin, 15:30 – GH 115]

Predicting The Cop Number Using Machine Learning

Cops and Robbers is a pursuit evasion game played on a graph, first introduced independently by Quilliot and Nowakowski and Winkler over four decades ago. A main interest in recent the literature is identifying the cop number of graph families. The cop number of a graph, $c(G)$, is defined as the minimum number of cops required to guarantee capture of the robber. Determining the cop number is computationally difficult and exact algorithms for this are typically restricted to small graph families. This paper investigates whether classical machine learning methods and graph neural networks can accurately predict a graph's cop number from its structural properties and identify which properties most strongly influence this prediction. Of the classical machine learning models, tree-based models achieve high accuracy in prediction despite class imbalance, whereas graph neural networks achieve comparable results without explicit feature engineering. The interpretability analysis shows that the most predictive features are related to node connectivity, clustering, clique structure, and width parameters, which aligns with known theoretical results. Our findings suggest that machine learning approaches can be used in complement with existing cop number algorithms by offering scalable approximations where computation is infeasible.

TRENT MARBACH, Acadia University

[Saturday June 6 / samedi 6 juin, 9:00 – GH 115]

Between Burning and Cooling: Liminal Burning on Graphs

Liminal burning generalizes both the burning and cooling processes in graphs. In k -liminal burning, a Saboteur reveals k -sets of vertices in each round, with the goal of extending the length of the game, and the Arsonist must choose sources only within these sets, with the goal of ending the game as soon as possible. The result is a two-player game with the corresponding optimization parameter called the k -liminal burning number. For $k = |V(G)|$, liminal burning is identical to burning, and for $k = 1$, liminal burning is identical to cooling.

Using a variant of Sperner sets, k -liminal burning numbers of hypercubes are studied along with bounds and exact values for various values of k . In particular, we determine the exact cooling number of the n -dimensional hypercube to be n . We analyze liminal burning for several graph families, such as Cartesian grids and products, paths, and graphs whose vertex sets can be decomposed into many components of small diameter.

JOHN MARCOUX, Toronto Metropolitan University

[Sunday June 7 / dimanche 7 juin, 10:00 – GH 115]

Localization and the Ball Dimension

In this talk we introduce a new variant of the metric dimension called the *ball dimension* as a tool for studying a multi-robber variant of the Localization game as well as the original Localization game. This new variant weakens the resolving condition of the metric dimension and only requires vertices which share a neighbour to be resolved. We will first explore connections between the metric dimension, ball dimension, and the Localization game. We will then use the ball dimension as a tool to explore bounds on the localization number for highly symmetric graphs, namely hypercubes, Johnson graphs, and Grassmann

Problems in Graph Searching Problèmes de recherche dans les graphes (graph searching)

graphs. We also demonstrate a surprising connection between the ball dimension, Johnson graphs, and projective planes. We conclude with some open problems.

This is joint work with Trent Marbach and Kerry Ojakian.

MARGARET-ELLEN MESSINGER, Mount Allison University

[Saturday June 6 / samedi 6 juin, 9:30 – GH 115]

The Infectious Vaccination Problem, Part 1

We consider a variant of b -FIREFIGHTER called the Infectious Vaccination Problem (INFECTVAX) in which the defence also spreads. An infection breaks out at time-step 0 and during each time-step $t > 0$, the vaccine spreads, new vertices are directly inoculated, and the contagion spreads. Thus, INFECTVAX is a deterministic discrete-time model for the competing spread of a virus and self-disseminating vaccines in a graph. In this preliminary talk, we introduce the model, present some hardness results, and make some observations about subgraphs. This is joint work with J. Enright, M.A. Huggan, E. Hunter-Frankland, and D. Pearson.

TEDDY MISHURA, Toronto Metropolitan University (TMU)

[Saturday June 6 / samedi 6 juin, 8:00 – GH 115]

Cooling Generalized Hypercubes

Graph cooling was introduced as an analogue to the well known game of graph burning. Both of these games are round based processes where fires spread from burning vertices to adjacent vertices and the player (the Arsonist) lights a vertex on fire every round. In graph burning, the player must burn all the vertices of G as quickly as possible, whereas in cooling, the player must burn all the vertices of G as slowly as possible. The hypercube graph of dimension n , written Q_n , is the Cartesian product of n copies of the graph P_2 . Its cooling number was recently shown to be exactly n . In this talk, I analyze the cooling number of two families of graphs that can be viewed as extensions of Q_n —Cartesian products of complete graphs K_m and Cartesian products of path graphs P_k . I end the talk with a brief discussion of open problems.

Based on joint work with Anthony Bonato, MacKenzie Carr, Caleb Jones, and Trent Marbach.

JOY MORRIS, University of Lethbridge

[Sunday June 7 / dimanche 7 juin, 9:00 – GH 115]

Eternal domination in Cayley graphs

As usual, a dominating set in a graph is a set of D vertices such that every vertex of the graph is either in D , or is adjacent to a vertex of D . We can turn the idea of domination into a defensive game or strategy by thinking of the dominating set as a collection of guards, and insisting that should any vertex outside of D be attacked, the guards must be able to move along edges so that one of the guards moves to the attacked vertex, and the layout of the guards after the move is again a dominating set for the graph. If it is possible to continue to reconfigure the guards in this way forever, no matter what sequence of vertices is attacked, then we say that D is an *eternal dominating set* for the graph.

A Cayley graph is a graph with a great deal of symmetry: its automorphism group acts transitively on the vertices of the graph; moreover there is a subgroup of the automorphism group that acts regularly (sharply transitively) on the vertices. In some situations, symmetry can provide interesting and effective strategies for graph searching problems, but the presence of game pieces such as searchers often essentially breaks the symmetry of the graph, rendering it much less useful.

In this talk I will present recent results about eternal dominating sets for Cayley graphs. This is based on joint work with MacKenzie Carr, Nancy Clarke, and Gary MacGillivray.

Problems in Graph Searching Problèmes de recherche dans les graphes (graph searching)

TODD MULLEN, University of Prince Edward Island

[Sunday June 7 / dimanche 7 juin, 8:30 – GH 115]

Cops and Robbers and Barricades

In a game of Cops and Robber, a barricade is an object that can be placed to occupy a vertex, preventing that vertex from being used in future turns. The concept of a barricade opens up a number of questions such as "Where are they placed?", "When are they placed?", "Who can place them?", and "Who can and cannot occupy those vertices on future turns?". We will discuss the classification of Cops and Robber variants and how barricades somewhat evade strict classification. Joint work with Dr. Erin Meger.

LOGAN PIPES, Memorial University of Newfoundland

[Sunday June 7 / dimanche 7 juin, 9:30 – GH 115]

On The Radius of Location of Trees

The metric dimension of a graph represents the minimum number of cell towers needed to be placed among the vertices of a graph such that the location of an unknown agent can be uniquely determined using only its distances to each of the cell towers. The radius of location of that graph then represents the minimum possible "strength" of the cell towers over all optimal layouts this number of towers. In particular, a cell tower cannot distinguish two locations if they are outside of the range of that tower. We discuss this parameter on several classes of graph, with emphasis on caterpillars and trees in general. This is joint work with Danny Dyer and Melissa Huggan.

AMANDA PORTER, University of Victoria

[Saturday June 6 / samedi 6 juin, 16:00 – GH 115]

Edge Cops and Robber on Triangle-Free Graphs

We consider an edge variant of the classic game of Cops and Robber, introduced by Dudek, Gordinowicz, and Prałat, where players occupy edges rather than vertices. The parameter of interest in this setting is the edge cop number of a graph: the minimum number of cops required to guarantee capture of the robber. We study the edge cop number of triangle-free graphs via its relationship to the cop number of their associated line graphs. In particular, we show that the edge cop number is unbounded on the class of triangle-free graphs, and characterize the triangle-free graphs that are edge cop-win.

This is joint work with Melissa Huggan and Gary MacGillivray.

Structural and Algorithmic Graph Theory

Théorie structurelle et algorithmique des graphes

Org: Ben Cameron (University of Prince Edward Island), Alexander Clow (Simon Fraser University) and/et Margaret-Ellen Messinger (Mount Allison University)

It is generally believed that for most fundamental problems on graphs and networks, efficient algorithms that apply to all possible inputs cannot exist. One approach to finding efficient algorithms is to study the structure of graphs which are restricted in various ways. This session will focus on graph structure and its application to designing efficient algorithms for important problems including graph colouring, homomorphisms, combinatorial reconfiguration, flows, packings and coverings, and finding Hamiltonian cycles.

On considère généralement que, pour la plupart des problèmes fondamentaux portant sur les graphes et les réseaux, il n'existe pas d'algorithmes efficaces applicables à toutes les instances possibles. Une approche pour concevoir des algorithmes efficaces consiste à étudier la structure de graphes soumis à diverses contraintes. Cette session portera sur la structure des graphes et ses applications à la conception d'algorithmes efficaces pour des problèmes importants, notamment la coloration des graphes, les homomorphismes, la reconfiguration combinatoire, les flots, les empaquetages et les recouvrements, ainsi que la recherche de cycles hamiltoniens.

Schedule/Horaire

Room/Salle: GH 313

Sunday June 7

dimanche 7 juin

8:00 - 8:30	BEN CAMERON (University of Prince Edward Island), <i>An infinite family of k-critical $(2P_3, K_{k-1})$-free graphs for each $k \geq 5$</i> (p. 81)
8:30 - 9:00	IAIN BEATON (Acadia University), <i>k-vertex-critical graphs in $(P_4 + \ell P_1)$-free graphs</i> (p. 81)
9:00 - 9:30	MACKENZIE CARR (Toronto Metropolitan University), <i>Reconstructing C_4-free graphs from their digital convexity</i> (p. 81)
9:30 - 10:00	EDUARDO MARTINEZ-PEDROZA (Memorial University), <i>Gromov's Approximating Tree and the All-pairs Bottleneck Paths Problem</i> . (p. 83)
10:00 - 10:30	GENA HAHN (Université de Montréal), <i>Resurrection II - revisiting old problems</i> (p. 82)
15:00 - 15:30	ALEXANDER CLOW (Simon Fraser University), <i>An Algorithm for the Small Quasi-Kernels Conjecture</i> (p. 81)
15:30 - 16:00	JULIEN CODSI (Princeton University), <i>A Tale of the Tree-Independence Number</i> (p. 82)
16:00 - 16:30	TAITE LAGRANGE (Waterloo University), <i>When the twin-width is sub-linear</i> (p. 83)
16:30 - 17:00	ANN TRENK (Wellesley College), <i>Degree sequences, split graphs and geometric representations</i> (p. 84)
17:00 - 17:30	KAREN COLLINS (Wesleyan University), <i>Partitioned Split Graphs</i> (p. 82)
17:30 - 18:00	SEAN KIM (Simon Fraser University), <i>Lower Bound on Degenerate Induced Subgraphs</i> (p. 82)

Monday June 8

lundi 8 juin

8:30 - 9:00	MARGARET-ELLEN MESSINGER (Mount Allison University), <i>Domination reconfiguration: a mixed model</i> (p. 83)
9:00 - 9:30	NANCY CLARKE (Acadia University), <i>Polychromatic Dominating Sets</i> (p. 81)
9:30 - 10:00	AGNES TOTSCHNIG (Massachusetts Institute of Technology), <i>Almost perfect graph classes</i> (p. 84)
10:00 - 10:30	BEN SEAMONE (Dawson College), <i>Removeable edges in cubic graphs which admit nowhere-zero 4-flows</i> (p. 83)

Abstracts/Résumés

IAIN BEATON, Acadia University

[Sunday June 7 / dimanche 7 juin, 8:30 – GH 313]

k-vertex-critical graphs in $(P_4 + \ell P_1)$ -free graphs

A graph G is k -vertex-critical if $\chi(G) = k$ but $\chi(G - v) < k$ for all $v \in V(G)$. In this presentation we make progress on the open problem of the finiteness of k -vertex-critical $(P_4 + \ell P_1)$ -free graphs by showing that there are only finitely many k -vertex-critical $(P_4 + \ell P_1, 2P_2)$ -free graphs, $(P_4 + \ell P_1, \text{chair})$ -free graphs, and $(P_4 + \ell P_1, P_5, \text{cricket})$ -free graphs for all $k \geq 1$ and $\ell \geq 0$. Our results imply the existence of simple polynomial-time certifying algorithms to decide the k -colourability of all graphs in these subfamilies for every fixed k . This is joint work with Dr. Ben Cameron.

BEN CAMERON, UPEI

[Sunday June 7 / dimanche 7 juin, 8:00 – GH 313]

An infinite family of k-critical $(2P_3, K_{k-1})$ -free graphs for each $k \geq 5$

In 2020, Chudnovsky, Goedgebeur, Schaudt, and Zhong showed that there are only finitely many 4-critical H -free graphs if and only if H is an induced subgraph of P_6 , $2P_3$, or $P_4 + \ell P_1$ for some natural number ℓ . This led to substantial efforts to classify which of these induced subgraphs can be forbidden to leave only finitely many k -critical graphs for every $k \geq 4$. Much of this work has focused on subfamilies of P_6 -free graphs, with some more very recent attention on subfamilies of $(P_4 + \ell P_1)$ -free graphs. However, very little has been done on subfamilies of $2P_3$ -free graphs. In this talk, we will construct an infinite family of k -critical $(2P_3, K_{k-1})$ -free graphs for each $k \geq 5$.

(This is joint work with Iain Beaton)

MACKENZIE CARR, Toronto Metropolitan University

[Sunday June 7 / dimanche 7 juin, 9:00 – GH 313]

Reconstructing C_4 -free graphs from their digital convexity

Fomin, Kratochvíl, Lokshtanov, Mancini, and Telle showed that every C_4 -free graph is reconstructible from the multiset of closed neighborhoods. We strengthen their result, proving that every C_4 -free graph is reconstructible from the set of closed neighborhoods. A subset S of vertices in a graph G is digitally convex if, for every $v \notin S$, there is a private neighbor of v with respect to S . We establish that reconstruction from digitally convex sets is equivalent to reconstruction from the set of closed neighborhoods, thereby extending the work of Lafrance, Oellermann, and Pressey by showing that all C_4 -free graphs, and hence all graphs of girth at least five, are reconstructible from their digital convexity.

This is joint work with Steffen Borgwardt, Ce Chen, Wayne Ge, Stephen G. Hartke, Yixuan Huang and Alex Moon.

NANCY CLARKE, Acadia University

[Monday June 8 / lundi 8 juin, 9:00 – GH 313]

Polychromatic Dominating Sets

For a graph G with a (not necessarily proper) vertex colouring, a set $D \subseteq V(G)$ is a polychromatic dominating set of G if it is a dominating set and each vertex in D is a different colour. Our parameter of interest is the *polychromatic domination number* of G , $\rho(G)$, defined to be the minimum number of colours such that, for any $\rho(G)$ -colouring (with exactly $\rho(G)$ colours) of the vertices of G , there exists a polychromatic dominating set. In this talk, we present a variety of results including exact values of our parameter for several classes of graphs and, more generally, tight upper and lower bounds which are functions of the minimum degree of G . This is joint work with B Claiborne, R Haas, S Hanson, M Harris, K Martin, S Viel, and J Woods.

Structural and Algorithmic Graph Theory

Théorie structurelle et algorithmique des graphes

ALEXANDER CLOW, Simon Fraser University

[Sunday June 7 / dimanche 7 juin, 15:00 – GH 313]

An Algorithm for the Small Quasi-Kernels Conjecture

In a digraph D , a quasi-kernel is an independent set Q such that for every vertex u , there is a vertex $v \in Q$ satisfying $\text{dist}(v, u) \leq 2$. In 1974 Chvátal and Lovász showed every digraph contains a quasi-kernel. In 1976, P. L. Erdős and Székely conjectured that every sourceless digraph has a quasi-kernel of order at most $\frac{n}{2}$. Despite significant recent attention by the community the problem remains far from solved, with no bound of the form $(1 - \epsilon)n$ known. We introduce a polynomial time algorithm which greedily constructs a small quasi-kernel. Using this algorithm we prove that for any sourceless digraph D with maximum out-degree 3 contains a quasi-kernel of order at most $4n/7$.

JULIEN CODSI, Princeton University

[Sunday June 7 / dimanche 7 juin, 15:30 – GH 313]

A Tale of the Tree-Independence Number

Treewidth is a graph parameter commonly used to quantify how "close" a graph is to a tree. Although it is a cornerstone of structural graph theory and algorithm design, it is nearly useless for algorithmic purposes in many dense graph classes. In this talk, we discuss the tree-independence number, a more versatile graph parameter that replaces the standard width measure with the stability number. We will present recent results aimed at characterizing the graph classes in which this parameter enables sub-exponential time algorithms for problems that are, in general, NP-hard.

KAREN COLLINS, Wesleyan University

[Sunday June 7 / dimanche 7 juin, 17:00 – GH 313]

Partitioned Split Graphs

A graph G is a split graph if its vertex set can be partitioned into a clique K and a stable set S . Thus, the complement of a split graph is also a split graph. Unbalanced partitioned split graphs have a swing vertex that can move from either K to S (or S to K), while balanced partitioned split graphs have a unique partition. For a fixed choice of K and S , we define $G_{(K,S)}$ to be a partitioned split graph.

We discuss the action of three natural operators on the class of partitioned split graphs. The *inverse operator*, $Inv(G_{(K,S)})$, is the partitioned split graph that results from removing all edges within K and adding all edges between vertices S . The *swing operator*, $Sw(G_{(K,S)})$, is the partitioned split graph that results from moving a swing vertex from K to S (or S to K) if $G_{(K,S)}$ is unbalanced, and the identity map otherwise. The *complementary operator* of a partitioned split graph, $Comp(G_{(K,S)})$, is the graph complement, keeping the partition, so that the vertices in K become the stable set and the vertices in S become the clique.

These operators generate a group Γ on the class of partitioned split graphs. We show that there are graphs with all possible orbit sizes by dividing the class of partitioned split graphs into nine natural subclasses and describing the action of Γ between the classes.

Joint work with Ann Trenk, Wellesley College and Tantan Dai, Georgia Institute of Technology.

GENA HAHN, Université de Montréal

[Sunday June 7 / dimanche 7 juin, 10:00 – GH 313]

Resurrection II - revisiting old problems

Following *Resurrection* at CMS 2024 in Vancouver, we continue with reminders of old problems that I think still merit attention, this time including infinite graphs.

Structural and Algorithmic Graph Theory

Théorie structurelle et algorithmique des graphes

SEAN KIM, Simon Fraser University

[Sunday June 7 / dimanche 7 juin, 17:30 – GH 313]

Lower Bound on Degenerate Induced Subgraphs

Let G be a graph and let k, d be non-negative integers such that $k \geq d$. We define $\alpha_d(G)$ to be the order of the largest d -degenerate induced subgraph of G and $\alpha_d(k) = \inf_{G \text{ with degeneracy } k} \left\{ \frac{\alpha_d(G)}{|V(G)|} \right\}$. There has been a good amount of research done on α_d in the planar graph case, however, not much has been done in the general case. In this talk, we will discuss results on lower bounding α_d for the general graph case, as well as a conjecture on $\alpha_1(2)$.

TAITE LAGRANGE, University of Waterloo

[Sunday June 7 / dimanche 7 juin, 16:00 – GH 313]

When the twin-width is sub-linear

Twin-width is a graph and matrix parameter that was introduced in 2021 by Bonnet, Kim, Thomassé, and Watrigant as essentially a measure of the accumulated 'error' between vertex neighbourhoods over a series of vertex contractions. This talk focuses on when the twin-width of a graph class can be bounded by some sub-linear function on the number of vertices. We present a technique for obtaining twin-width bounds in general by contracting a graph based on a partition by distinct neighbourhoods and use this to give a sub-linear upper bound on the twin-width of graphs of bounded VC-dimension, a parameter which can be formulated for graphs to measure the structural complexity of vertex neighbourhoods. Our result implies that a hereditary class of graphs \mathcal{C} has sub-linear twin-width if and only if \mathcal{C} has bounded VC-dimension.

This is joint work with Therese Biedl and Sophie Spirkl.

EDUARDO MARTINEZ-PEDROZA, Memorial University

[Sunday June 7 / dimanche 7 juin, 9:30 – GH 313]

Gromov's Approximating Tree and the All-pairs Bottleneck Paths Problem.

Let X be a simple connected graph on $n+1$ vertices. The Gromov hyperbolicity constant $\delta \geq 0$ measures "tree-likeness" of X . For a fixed vertex w , the Gromov approximating tree of (X, w) is an optimal tree T whose vertex set contains that of X , such that distances to the root are preserved, $\text{dist}_X(x, w) = \text{dist}_T(x, w)$, and pairwise distances satisfy $\text{dist}_X(x, y) - 2\delta \log_2 n \leq \text{dist}_T(x, y) \leq \text{dist}_X(x, y)$ for all $x, y \in X$.

We present an explicit algorithm that constructs Gromov approximating tree of (X, w) from the adjacency matrix of the graph in quadratic time. Our approach reduces the construction of the tree to the All-Pairs Bottleneck Paths (APBP) problem for a weighted graph on n vertices, which is known to be solvable in $O(n^2)$ time.

Joint work with Anders Cornect.

MARGARET-ELLEN MESSINGER, Mount Allison University

[Monday June 8 / lundi 8 juin, 8:30 – GH 313]

Domination reconfiguration: a mixed model

Let G be a graph. A domination reconfiguration graph of G is a graph whose vertices correspond to the dominating sets of G . Adjacencies are typically determined by using either the token addition/removal (TAR) or the token sliding (TS) rule. While the domination reconfiguration graph obtained by using only the TAR rule will never have a Hamilton cycle, we show that for some classes of graphs G , by adding a relatively small number of TS edges, the resulting domination reconfiguration graph is not only hamiltonian, but in fact pancyclic. This is joint work with Logan Pipes (MUN).

Structural and Algorithmic Graph Theory

Théorie structurelle et algorithmique des graphes

BEN SEAMONE, Dawson College

[Monday June 8 / lundi 8 juin, 10:00 – GH 313]

Removeable edges in cubic graphs which admit nowhere-zero 4-flows

A conjecture by Hoffmann-Ostenhof states that every cubic graph G with a nowhere-zero 4-flow has an edge e such that $G - e$ has a nowhere-zero 4-flow. We present progress on this conjecture.

AGNES TOTSCHNIG, Massachusetts Institute of Technology

[Monday June 8 / lundi 8 juin, 9:30 – GH 313]

Almost perfect graph classes

Perfect graphs form one of the central graph classes in structural graph theory. Many optimization problems that are hard in general become tractable on them. They are exactly the graphs with no odd holes or odd antiholes. A natural way to relax perfection is to ask whether a graph becomes perfect after deleting only a bounded number of vertices. We call such classes of graphs bounded-apex-perfect. In this talk, we characterize the sets H of at most two forbidden induced subgraphs for which the class of H -free graphs is bounded-apex-perfect. We will also explain how this characterization extends to several important subclasses of perfect graphs, including chordal, bipartite, complete multipartite, interval, and split graphs.

Joint work with Cicely Henderson, Hidde Koerts, Taite LaGrange, Sophie Spirkl, Massimo Vincenzo and Rebecca Whitman.

ANN TRENK, Wellesley College

[Sunday June 7 / dimanche 7 juin, 16:30 – GH 313]

Degree sequences, split graphs and geometric representations

A graph is a *split graph* if its vertex set can be partitioned into a clique and a stable set and is a *partitioned split graph* if the partition is also specified. The *inverse* of a partitioned split graph is formed by removing all edges within the clique and adding all edges between vertices in the stable set.

In this talk we consider two forms of the degree sequences of a graph: the conventional form and the block form. We show the effect on the block form of taking complements of graphs and inverses of split graphs, the latter of which is complicated by the fact that some split graphs have two different inverses. When there are two different inverses, we show how the degree sequences of these inverses are related to one another in both the conventional and block forms. We also demonstrate geometric interpretations of these results using Ferrers diagrams.

This is joint work with Karen Collins, Wesleyan University and Tantan Dai, Georgia Institute of Technology.

Student Research Session Séance de recherche étudiante

The Student Research Session invites graduate students to share their work with a general mathematical audience at the 2026 CMS Summer Meeting. This session offers a supportive environment to practice giving a conference-style talk and to gain experience presenting research at a national meeting.

Les étudiant(e)s aux cycles supérieurs sont invité(e)s à présenter leurs travaux à un large public de mathématiciens lors de la séance de recherche étudiante. Cette séance offre un environnement accueillant pour pratiquer une présentation de type conférence et acquérir de l'expérience avant de participer à des séances de recherche plus formelles.

Schedule/Horaire

Room/Salle: HH 126

Sunday June 7

dimanche 7 juin

15:00 - 15:30	JOY MORRIS (Lethbridge), <i>Making your academic job application stand out</i> (p. 85)
16:00 - 16:30	AIDEN TAYLOR (University of Calgary), <i>Wavelet Optimization in Wavelet Convolutional Neural Networks</i> (p. 86)
16:30 - 17:00	KATRINA DE VERA (Acadia University), <i>Clique Cut Sets of Signed Graphs and Zero-Free Chromatic Equivalence</i> (p. 85)
17:00 - 17:30	HIN LON LAO (York University), <i>Acyclic Presentation of Transversal Matroid</i> (p. 85)
17:30 - 18:00	KATERYNA TRETIAKOVA (University of Ottawa), <i>Beyond the Lecture: Testing Pedagogical Formats in Undergraduate Mathematics Tutorials</i> (p. 86)

Abstracts/Résumés

KATRINA DE VERA, Acadia University

[Sunday June 7 / dimanche 7 juin, 16:30 – HH 126]

Clique Cut Sets of Signed Graphs and Zero-Free Chromatic Equivalence

Introduced by Thomas Zaslavsky, the *Zero-Free Chromatic Polynomial* is a function of a signed graph and an even positive integer, λ , which evaluates to the number of proper colourings of the signed graph with a symmetric set of λ nonzero integers. If two signed graphs have the same zero-free chromatic polynomial then they are *zero-free chromatically equivalent*. In this presentation we will consider signed graphs containing a clique cut set, and introduce a method to simplify the computation of their zero-free chromatic polynomials. We will also give a method for determining zero-free chromatic equivalence of such signed graphs.

HIN LON LAO, York University

[Sunday June 7 / dimanche 7 juin, 17:00 – HH 126]

Acyclic Presentation of Transversal Matroid

A matroid M on a finite set S is said to be *transversal* if the collection of independent sets of M are partial transversals of a set system $\mathcal{A} = (A_1, \dots, A_n)$ of S . A set system \mathcal{A} can be represented by a bipartite graph $G_{\mathcal{A}} = (S \cup V, E)$, where \mathcal{A} or $G_{\mathcal{A}}$ is called a *presentation* of M . If a transversal matroid M admits an acyclic presentation $G_{\mathcal{A}}$, the circuits of M can be spotted easily from $G_{\mathcal{A}}$. Moreover, we are going to look at some conditions under which we may find another presentation $G_{\mathcal{A}'}$ of M such that part of $G_{\mathcal{A}'}$ is acyclic.

JOY MORRIS, University of Lethbridge

[Sunday June 7 / dimanche 7 juin, 15:00 – HH 126]

Making your academic job application stand out

Student Research Session Séance de recherche étudiante

I will provide an overview of the typical components of an academic job application in Canada (very similar to the USA but quite different from some other countries). I will briefly discuss what should be included in each component, and how to make your application stand out from other applications. There will be lots of time for questions, answers, and interactive discussion.

AIDEN TAYLOR, University of Calgary

[Sunday June 7 / dimanche 7 juin, 16:00 – HH 126]

Wavelet Optimization in Wavelet Convolutional Neural Networks

The Wavelet Convolutional Neural Network (CNN) architecture addresses the spectral limitations of traditional CNNs by reformulating a CNN as a multiresolution analysis. This reformulation allows one to incorporate wavelets into the learning process, introducing a spectral dimension to a traditionally spatial approach. In recent years, there has been a push to optimize such wavelet CNNs by optimizing the wavelets in the end-to-end learning process instead of having them be fixed throughout. In our research, we explore using the vanishing moments of wavelets as a viable avenue for optimization. As justification, we compute the classification accuracy of a labeled dataset of images using an implementation of a traditional CNN, a wavelet CNN with fixed wavelets, and a wavelet CNN that optimizes vanishing moments. Comparing the results, we find that optimizing vanishing moments in the learning process gives us a higher classification accuracy than both traditional CNNs and wavelet CNNs that use fixed wavelets.

KATERYNA TRETIAKOVA, University of Ottawa

[Sunday June 7 / dimanche 7 juin, 17:30 – HH 126]

Beyond the Lecture: Testing Pedagogical Formats in Undergraduate Mathematics Tutorials

The university mathematics tutorial is an understudied pedagogical space that, in practice, often defaults to a slower version of the lecture. Yet it holds genuine potential for active engagement and consolidation that many graduate student instructors never fully explore, in part because access to pedagogical training varies considerably across institutions.

Drawing on personal reflection and informal student feedback across introductory calculus, service-level, and proof-based courses, this talk compares several tutorial formats: traditional lecturing in various forms, the Thinking Classroom framework in whole-group and small-group settings, and more. Each is evaluated for cognitive demand, participation breadth, and characteristic failure modes. I argue that the choice of tutorial structure is itself a deliberate pedagogical decision, and conclude with practical recommendations for instructors who may be navigating that choice without formal training.

Teaching and learning of university mathematics: how have things evolved (or not)? Enseignement et apprentissage des mathématiques universitaires : comment les choses ont-elles évolué (ou non) ?

Org: **Andrijana Burazin** (University of Toronto, Mississauga)

Studying how university mathematics teaching and learning have evolved is challenging due to time, financial, and logistical constraints, as well as diverse student populations and rapidly changing contexts. This education session brings together a diverse set of university instructors at different career stages to reflect and provide examples on shifts in teaching practices, student attitudes, assessment design, supervision, and the role of technology, including generative AI. By sharing real-time experiences, presenters will explore what has meaningfully changed, what has remained the same, and what actions (if any) are needed moving forward.

L'étude de l'évolution de l'enseignement et de l'apprentissage des mathématiques universitaires est complexe en raison de contraintes de temps, de ressources financières et de logistique, ainsi que de la diversité des populations étudiantes et de contextes en évolution rapide. Cette session en éducation réunit un groupe diversifié d'enseignantes et enseignants universitaires à différents stades de leur carrière afin de réfléchir et de proposer des exemples des changements dans les pratiques d'enseignement, les attitudes des étudiantes et étudiants, la conception des évaluations, l'encadrement, ainsi que le rôle des technologies, y compris l'intelligence artificielle générative. En partageant des expériences en temps réel, les personnes intervenantes examineront ce qui a réellement changé, ce qui est demeuré inchangé et quelles actions (le cas échéant) sont nécessaires pour l'avenir.

Schedule/Horaire

Room/Salle: HH 125

Saturday June 6

samedi 6 juin

8:00 - 8:30	REBECCA MCKAY (University of New Brunswick, Saint John), <i>University mathematics education is always changing but maybe in the same ways</i> (p. 88)
8:30 - 9:00	TODD MULLEN (University of Prince Edward Island), <i>Reaction is necessary (but is it sufficient?)</i> (p. 88)
9:00 - 9:30	MEGHAN ALLEN ROSE (Mount Allison University), <i>Breaking out of online echo chambers: is the manosphere influencing classroom behaviour?</i> (p. 89)
9:30 - 10:00	ALYSSA SANKEY (University of New Brunswick), <i>Reflections on academic apathy</i> (p. 89)
10:00 - 10:30	MIROSLAV LOVRIC (McMaster University), <i>Mathematical habits of mind in the 2020s</i> (p. 88)
15:00 - 15:30	MARIE MACDONALD (Cornell University), <i>Balancing lessons from teaching throughout the early to mid 2020s</i> (p. 88)
15:30 - 16:00	DANIELLE COX (Mount Saint Vincent University), <i>Evolving Perspectives</i> (p. 88)
16:00 - 16:30	RICHARD CLEARY (Babson College & Mathematical Association of America) (p. 88)
16:30 - 17:00	LEE VAN BRUSSEL (McMaster University), <i>Observations from an Early-Career Mathematics Educator</i> (p. 89)
17:00 - 17:30	HOPE ALDERSON (University of New Brunswick, Saint John), <i>Balancing Technology and First Principles in Engineering Mathematics</i> (p. 87)
17:30 - 18:00	GENERAL DISCUSSION (p. 88)

Abstracts/Résumés

HOPE ALDERSON, University of New Brunswick

[Saturday June 6 / samedi 6 juin, 17:00 – HH 125]

Balancing Technology and First Principles in Engineering Mathematics

While the mathematical content of many university courses has changed little over time, the context in which students learn mathematics has changed considerably. Engineering students today have immediate access to computational software, online resources, and generative AI tools, prompting renewed questions not only about how to solve problems, but also why certain mathematical skills still matter.

Teaching and learning of university mathematics: how have things evolved (or not)? Enseignement et apprentissage des mathématiques universitaires : comment les choses ont-elles évolué (ou non) ?

Drawing on experiences teaching mathematics courses for engineering students, coordinating mathematics support services, and engaging with industry, this presentation reflects on how students' attitudes toward mathematics, problem solving, and computation may be evolving alongside changing accreditation requirements and professional expectations within engineering education. While technology can increasingly perform symbolic computation, the need for students to understand first principles, assess the reasonableness of results, and apply mathematical judgment may be stronger than ever. The talk will explore what mathematics educators may need to adapt, or perhaps preserve, in response to these changing learning environments.

RICHARD CLEARY, Babson College & Mathematical Association of America

[Saturday June 6 / samedi 6 juin, 16:00 – HH 125]

DANIELLE COX, Mount Saint Vincent University

[Saturday June 6 / samedi 6 juin, 15:30 – HH 125]

Evolving Perspectives

Over the last two decades my teaching practice has changed in many ways, and in other ways it has remained quite constant. This talk will focus on asking "Why?" and "How?". I will share reflections on why I think my teaching practice has evolved over the years and how that has affected my students.

GENERAL DISCUSSION,

[Saturday June 6 / samedi 6 juin, 17:30 – HH 125]

MIROSLAV LOVRIC, McMaster University

[Saturday June 6 / samedi 6 juin, 10:00 – HH 125]

Mathematical habits of mind in the 2020s

I have been asking myself many questions as I am planning to teach two math courses this Fall. At the top of my list is "How can I make sure that students will actually learn some math?" To answer this question, I am revisiting the idea of building a curriculum around the *mathematical habits of mind* to adjust it to the realities of the mid 2020s.

MARIE MACDONALD, Cornell University

[Saturday June 6 / samedi 6 juin, 15:00 – HH 125]

Balancing lessons from teaching throughout the early to mid 2020s

In this talk I will reflect on how my teaching and mentoring has evolved over the past several years. In 2020 we witnessed an institutional push for kindness and accommodations. I have spent a lot of time thinking about how to retain that philosophy in 2026 when many students have lost motivation to generative artificial intelligence. I will also reflect on how the work of graduate TAs has changed over the years.

REBECCA MCKAY, University of New Brunswick - Saint John

[Saturday June 6 / samedi 6 juin, 8:00 – HH 125]

University mathematics education is always changing but maybe in the same ways

Based on my experience teaching at a small Atlantic Canadian institution, in this talk, I will highlight some drivers of change and describe a few of these changes in recent years. What is notable is that many of the changes are just an evolution of previous changes and challenges. Then I will provide some ideas of how I will move forward in this ever-evolving teaching landscape.

Teaching and learning of university mathematics: how have things evolved (or not)? Enseignement et apprentissage des mathématiques universitaires : comment les choses ont-elles évolué (ou non) ?

TODD MULLEN, University of Prince Edward Island

[Saturday June 6 / samedi 6 juin, 8:30 – HH 125]

Reaction is necessary (but is it sufficient?)

In 2026, undergraduate students are not engaging with class material in a way that is familiar to many of their instructors. When we react to this change with changes of our own in the curriculum, syllabus, method of instruction, etc., are we maintaining the quality of education we hope to provide? Or does it feel like we are just putting out fires? In this talk, I hope to honestly assess the ways that I have altered my teaching approach in the age of AI.

MEGHAN ALLEN ROSE, Mount Allison University

[Saturday June 6 / samedi 6 juin, 9:00 – HH 125]

Breaking out of online echo chambers: is the manosphere influencing classroom behaviour?

As online male influencers increasingly shape discussions on gender and equity, diversity, and inclusion (EDI), how do their perspectives on gender roles and masculinity inform behaviour in our classrooms? Using an autoethnographic approach, this talk analyses instructional experiences in two courses at Mount Allison University (*Introduction to Data Science* and *Discrete Mathematics*) between 2023 and 2025. The talk examines patterns of student resistance to real-world examples related to EDI and consider how students' responses to these examples intersect with their use of AI to complete course tasks.

ALYSSA SANKEY, University of New Brunswick

[Saturday June 6 / samedi 6 juin, 9:30 – HH 125]

Reflections on academic apathy

This talk will be a reflection on my teaching practice, how it has changed in recent years, and how student learning (from what I have observed) has evolved over the same time frame. I will focus on aspects of teaching and learning related to effort, resilience, motivation, and preparation. A central question for discussion is: What would encourage students to try harder?

LEE VAN BRUSSEL, McMaster University

[Saturday June 6 / samedi 6 juin, 16:30 – HH 125]

Observations from an Early-Career Mathematics Educator

University teaching appears to be changing quickly. Attendance is declining, academic integrity concerns are becoming more complex, and take-home work increasingly invites cognitive offloading. This talk shares observations from an early-career educator on these shifts, including the role of AI and how it may weaken learning for some students while supporting more ambitious inquiry for others.

Theory and applications of scientific machine learning Théorie et applications de l'apprentissage automatique scientifique

Org: Emmanuel Lorin (Carleton University) and/et Sophie Morin (Polytechnique Montréal)

This session is devoted to recent progress in theory, implementation, and applications of scientific machine learning and related techniques in numerical analysis and scientific computing. Topics include (but are not limited to) deep neural networks, function estimation, structure-preserving approximation, and stochastic optimization, as well as applications in fields including quantum computing, meteorology, and geophysics.

Cette session est consacrée aux avancées récentes en matière de théorie, de mise en œuvre et d'applications de l'apprentissage automatique scientifique et des techniques connexes dans le domaine de l'analyse numérique et du calcul scientifique. Les thèmes abordés comprennent (sans s'y limiter) les réseaux neuronaux profonds, l'estimation de fonctions, l'approximation avec conservation de la structure et l'optimisation stochastique, ainsi que leurs applications dans des domaines tels que l'informatique quantique, la météorologie et la géophysique.

Schedule/Horaire

Room/Salle: OH 208

Sunday June 7

dimanche 7 juin

15:00 - 15:30	ABANI PATRA (Tufts) (p. 91)
15:30 - 16:00	MOHAMMED NYUYDINI KIVEN (Memorial), <i>VARIATIONAL MOVING MESH METHODS FOR DIFFERENTIABLE NUMERICAL SOLVERS</i> (p. 90)
16:00 - 16:30	EMMANUEL LORIN (Carleton), <i>Informed Normalized Gradient Flow Method for Point Spectrum in Spectral Gaps: Application to Edge-State Computation</i> (p. 91)
16:30 - 17:00	MATHIEU BAZINET (Laval), <i>Introduction to PAC-Bayes theory and its applications</i> (p. 90)
17:00 - 17:30	SOPHIE MORIN (Polytechnique Montréal), <i>Conditioning and equivariance in a contact detection problem</i> (p. 91)

Abstracts/Résumés

MATHIEU BAZINET, Université Laval

[Sunday June 7 / dimanche 7 juin, 16:30 – OH 208]

Introduction to PAC-Bayes theory and its applications

Introduced in 1998 by David A. McAllester, PAC-Bayes theory has found an important place in the field of statistical learning theory. Given a stochastic predictor or a majority vote, PAC-Bayes provides high-probability tail bounds on the true risk of the model. The seminal works of Dziugaite and Roy (2017) and Pérez-Ortiz et al. (2021) demonstrated that it was possible to achieve tight generalization bounds for deep neural networks. This talk aims to be an introduction to PAC-Bayes theory, starting from the basic definitions and building up to the proof of a PAC-Bayesian bound. We will finish this talk with some applications of this framework.

MOHAMMED NYUYDINI KIVEN, Memorial University of Newfoundland

[Sunday June 7 / dimanche 7 juin, 15:30 – OH 208]

VARIATIONAL MOVING MESH METHODS FOR DIFFERENTIABLE NUMERICAL SOLVERS

Moving mesh methods for partial differential equations (PDEs) are a class of adaptive schemes aiming to optimize accuracy with a fixed number of degrees of freedom by allowing the spatial domain to transform with the solution. Optimal mesh transformations can often require nonlinear equations, even for linear problems, introducing significant computational overhead. Concessions to the mesh optimality can compromise the advantages of these approaches. In this work, we introduce a mesh adaptation strategy leveraging an automatically differentiable moving mesh solver to define schemes which depends on the

Theory and applications of scientific machine learning

Théorie et applications de l'apprentissage automatique scientifique

continuous PDE and its discretization directly. Differentiating through the solver allows for the definition of novel schemes which are parsimonious in their design and exhibit orders of magnitude higher accuracy compared to standard r -adaptive monitor functions. We describe two numerical schemes: (i) using an a posteriori error indicator based on a reference solution, and (ii) a self-supervised scheme based on a prescribed mesh quality function and a parametric mesh transformation. Our methods are applied to several partial differential equations where we study their numerical properties and accuracy benefits.

EMMANUEL LORIN, Carleton University

[Sunday June 7 / dimanche 7 juin, 16:00 – OH 208]

Informed Normalized Gradient Flow Method for Point Spectrum in Spectral Gaps: Application to Edge-State Computation

This presentation is devoted to the derivation of a physics-informed normalized gradient flow method for the computation of eigenvalues in spectral gaps, namely eigenvalues located between two continuous spectra. We present a mathematical analysis of the algorithm together with numerical experiments in the context of edge-state computation in photonic graphene.

SOPHIE MORIN, Polytechnique Montréal

[Sunday June 7 / dimanche 7 juin, 17:00 – OH 208]

Conditioning and equivariance in a contact detection problem

In several areas of physical science and engineering involving systems of hard or elastic objects, an essential computational task is to detect contacts and to compute contact forces between objects that are in contact. This is generally done in simulations, for instance via the Discrete Element Method, by allowing the objects to overlap slightly and then computing the elastic force from the overlap distance.

However, given two objects parametrized by relative position, orientation, and relevant shape parameters, the problem of computing the signed distance between them is generally ill-conditioned, and a closed form is unavailable for all but the simplest object geometries. The problem is surprisingly subtle even for ellipses in the plane, creating a nontrivial computational bottleneck for high-precision simulations.

We will discuss ongoing computational and theoretical investigations into this problem from the perspective of equivariant machine learning, focusing on fundamental issues in the application of neural networks to this kind of ill-conditioned problem.

ABANI PATRA, Tufts

[Sunday June 7 / dimanche 7 juin, 15:00 – OH 208]

AARMS-CMS Student Poster Session
Présentations par affiches des étudiants - AARMS-SMC

Org: Ludovick Bouthat (Université Laval) and/et Kate Tretiakova (University of Ottawa)

This session highlights recently completed or ongoing research by graduate students and brings it to the full CMS Meeting audience. Presenters can practice effective poster design, discuss their work with visitors, and build connections for future collaborations.

La séance d'affiches étudiantes met en valeur les projets de recherche récemment terminés ou en cours aux cycles supérieurs devant l'ensemble des personnes participant au congrès de la SMC. C'est l'occasion de concevoir une affiche scientifique, de présenter votre travail au public et d'échanger en vue de futures collaborations.

Room/Salle: Ganong Hall Gallery and Foyer

Abstracts/Résumés

WILLIAM FORGET, Bishop's University

[Saturday June 6 / samedi 6 juin, 13:00 – Ganong Hall Gallery and Foyer]

Understanding Neural Networks Through the Knowledge Matrix

This project investigates formal methods for analysing neural network performance using a compact knowledge matrix that captures relationships among learned features across all layers of the model. For each input, the knowledge matrix is treated as a point in a high-dimensional space, forming a point cloud that reflects the network's internal representation of the data. We then apply dimensionality reduction techniques such as PCA and LDA to study the structure of these representations in lower dimensions. The resulting embeddings are compared with representations from the penultimate and output layers in order to evaluate how well the knowledge matrix preserves information about the network's behaviour.

FATIMA ISLAM, University of New Brunswick

[Saturday June 6 / samedi 6 juin, 13:00 – Ganong Hall Gallery and Foyer]

Impact of Dispersal on Total Equilibrium Biomass in Patch-Structured Logistic Models.

Understanding how dispersal asymmetry influences total equilibrium biomass in spatially structured populations remains a key challenge in mathematical ecology. This study extends classical two-patch logistic models by incorporating a mixed dispersal strategy that combines random and density-dependent movement. The dispersal rate from each patch is governed by a fitness function parameterized by dispersal strength and asymmetry ratio. Using geometric phase-plane analysis, specifically the intersection of an ellipse and a hyperbola derived from the equilibrium conditions, we characterize the unique positive equilibrium and prove its global asymptotic stability via Dulac's criterion and the Poincaré–Bendixson theorem. Our results reveal four distinct dispersal regimes based on the position of a limiting hyperbola relative to three critical points on the ellipse. These regimes determine whether total equilibrium biomass increases, decreases, peaks at an intermediate dispersal strength, or crosses the isolated baseline. The framework resolves the so-called Perfect-Mixing Paradox by showing that asymmetry fundamentally alters the relationship between connectivity and total biomass, offering a more complete picture than previous symmetric or purely nonlinear models.

HIN LON LAO, York University

[Saturday June 6 / samedi 6 juin, 13:00 – Ganong Hall Gallery and Foyer]

TRANSVERSAL MATROIDS AND THEIR PRESENTATIONS

A matroid M on a finite ground set S is said to be *transversal* if its collection of independent sets are partial transversals of a system $\mathfrak{A} = (A_1, \dots, A_n)$ of subsets of S . The system \mathfrak{A} can be represented by a bipartite graph $G_{\mathfrak{A}} = (S \cup V, E)$. We are going

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to see how to spot the circuits of M by looking at $G_{\mathcal{A}}$. If $S' \subseteq S$, let $S_{\mathcal{A}}$ denote the induced subgraph of S', V' in $G_{\mathcal{A}}$, where V' is the elements from V which are adjacent to at least one element in S' . If a $G_{\mathcal{A}}$ for a transversal matroid M is acyclic, then $C_{\mathcal{A}}$ admits a particular nice description for every circuit C of M . Moreover, if the members of $\{C_{\mathcal{A}} : C \text{ is a circuit of } M\}$ intersect in some particular way in $G_{\mathcal{A}}$, we can get another presentation $G_{\mathcal{A}'}$ of M such that part of $G_{\mathcal{A}'}$ is acyclic.

MARZIEH ROSHANI, University of Manitoba

[Saturday June 6 / samedi 6 juin, 13:00 – Ganong Hall Gallery and Foyer]

Rate-Dependent Tipping in Human–Ecological Systems

Tipping points are thresholds beyond which ecosystems undergo dramatic and sometimes irreversible regime shifts. Rate-induced tipping (r-tipping) occurs because external changes outpace a system's capacity to adapt. This is especially relevant in socio-ecological systems, where rapid increases in resource exploitation, pollution, or abrupt policy shifts can drive the system away from its basin of attraction, triggering unintended regime shifts. Pollution rates depend on ecological, economic, and social factors, and policy interventions such as fines or incentives can influence them. The rate at which interventions change can trigger r-tipping, shifting the system between ecologically desirable and undesirable states. For example, rapid policy relaxation can lead to abrupt shifts to highly polluted states. On the other hand, sufficiently rapid strengthening of incentives can deliberately induce a shift toward healthy ecosystems, making r-tipping either a risk or a management tool. Oscillation amplitude also affects outcomes in complex ways. Under certain circumstances, only intermediate amplitudes can trigger r-tipping to an ecologically undesirable state; low amplitudes produce no tipping (as expected), but surprisingly, very high amplitudes also avoid tipping. This non-trivial pattern is not yet theoretically understood and highlights a clear direction for further research. I plan to explore how seasonal fluctuations in social, economic, and associated ecological costs affect ecological outcomes. I will model these seasonal effects by allowing associated parameters to oscillate and change in biologically meaningful ways. In addition, I will investigate gradual parameter shifts, such as slowly increasing fines or climate change trends that alter baseline ecological conditions.

AIDEN TAYLOR, University of Calgary

[Saturday June 6 / samedi 6 juin, 13:00 – Ganong Hall Gallery and Foyer]

Wavelet Optimization in Wavelet Convolutional Neural Networks

The Wavelet Convolutional Neural Network (CNN) architecture addresses the spectral limitations of traditional CNNs by reformulating a CNN as a multiresolution analysis. This reformulation allows one to incorporate wavelets into the learning process, introducing a spectral dimension to a traditionally spatial approach. In recent years, there has been a push to optimize such wavelet CNNs by optimizing the wavelets in the end-to-end learning process instead of having them be fixed throughout. In our research, we explore using the vanishing moments of wavelets as a viable avenue for optimization. As justification, we compute the classification accuracy of a labeled dataset of images using an implementation of a traditional CNN, a wavelet CNN with fixed wavelets, and a wavelet CNN that optimizes vanishing moments. Comparing the results, we find that optimizing vanishing moments in the learning process gives us a higher classification accuracy than both traditional CNNs and wavelet CNNs that use fixed wavelets.

LUYAO ZHAO, University of New Brunswick

[Saturday June 6 / samedi 6 juin, 13:00 – Ganong Hall Gallery and Foyer]

A Unified Mathematical Study of Four Within-Host Mycobacterium tuberculosis Models

Tuberculosis infection within a host is shaped by interactions among uninfected macrophages, infected macrophages, and extracellular *Mycobacterium tuberculosis* (MTB). In this poster, we develop and compare four within-host MTB models within a unified three-dimensional framework. The models share the same infection and bacterial-production structure, but differ in how they represent macrophage maintenance, local proliferation, local crowding, and macrophage-mediated bacterial loss. For each model, we derive the nontrivial disease-free equilibrium and compute the basic reproduction number R_0 using the

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Présentations par affiches des étudiants - AARMS-SMC

next-generation matrix method. A unified Lyapunov approach is then used to establish global stability of the disease-free equilibrium when $R_0 \leq 1$, under suitable biological assumptions.

We further study the existence and local stability of positive equilibria, which represent persistent chronic infection states. The analysis shows how different modeling assumptions change the threshold conditions for infection persistence and the stability of chronic infection. In addition, Hopf bifurcation analysis with respect to the infection rate β illustrates that increasing infection efficiency may destabilize the positive equilibrium and generate oscillatory dynamics in infected cells and extracellular bacterial load. Numerical simulations are used to support the analytical results and to compare stable, unstable, and oscillatory regimes. Overall, this work highlights how local macrophage regulation, external cell recruitment, and bacterial clearance mechanisms jointly shape MTB persistence and within-host infection dynamics.



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It is a pleasure to announce the 2nd International Online Conference on Mathematics and Applications, following the first edition held in 2023. The conference is organized by MDPI and the scientific journal *Mathematics* and will be held from 10 to 12 June 2026. It has been designed to closely align with the innovative new section structure of the journal.

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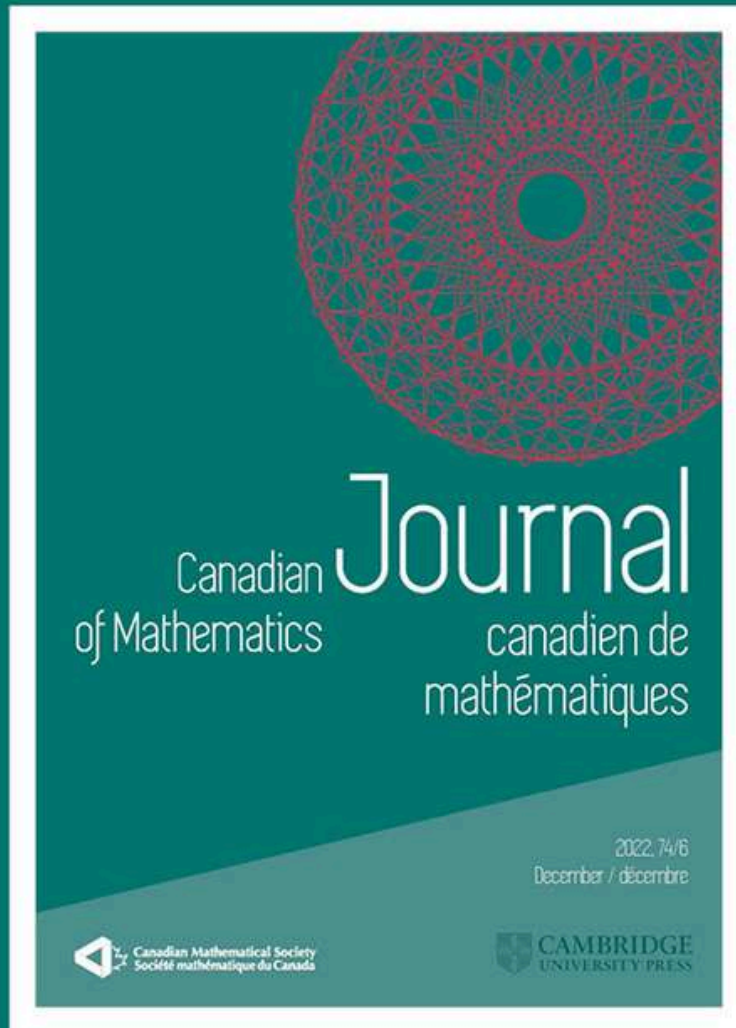


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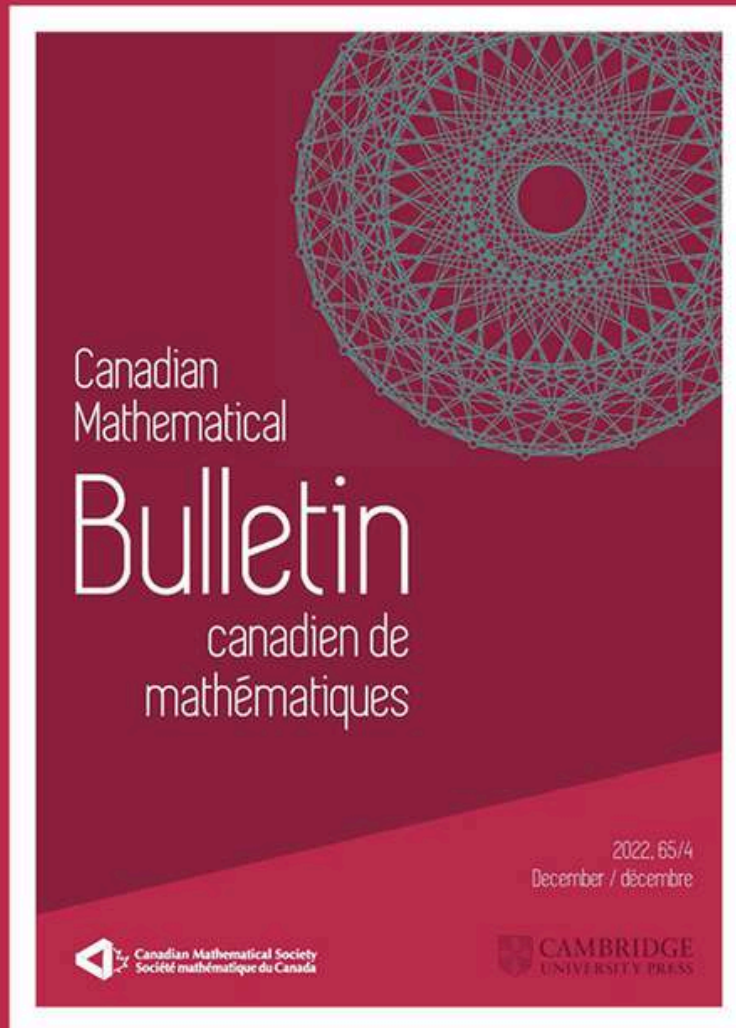
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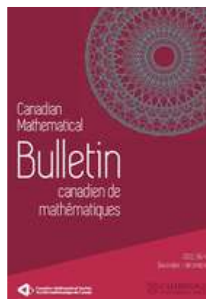
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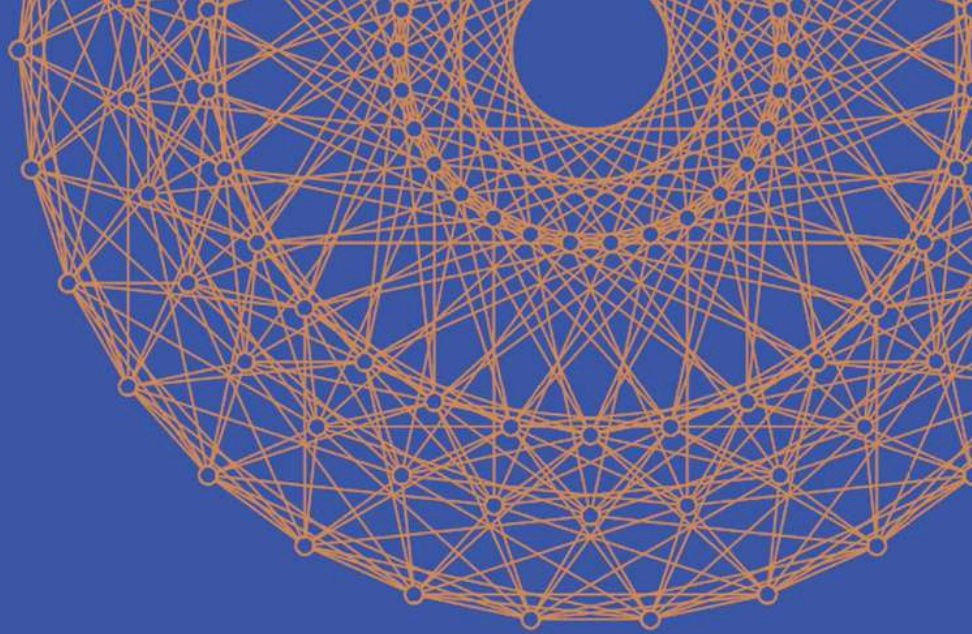
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no later than September 30, 2026.

Soumettez tous les documents à
prixkn@smc.math.ca
au plus tard le 30 septembre 2026.



Call for Nominations Appel de mises en candidature

2027 CMS

Prix Coxeter-James Prize

2027 de la SMC

In recognition of young mathematicians who have made outstanding contributions to mathematical research.

En reconnaissance d'un(e) jeune mathématicien(ne) qui s'est distingué(e) par l'excellence de sa contribution à la recherche mathématique.

Submit all documentation to
cjprize@cms.math.ca
no later than September 30, 2026.

Soumettez tous les documents à
prixcj@smc.math.ca
au plus tard le 30 septembre 2026.



Call for Nominations Appel de mises en candidature

2027 CMS

Prix Jeffery-Williams Prize

2027 de la SMC

In recognition of mathematicians who have made outstanding contributions to mathematical research.

En reconnaissance d'un(e) mathématicien(ne) ayant fait une contribution exceptionnelle et soutenue à la recherche mathématique.

Submit all documentation to
jwprize@cms.math.ca
no later than September 30, 2026.

Soumettez tous les documents à
prixjw@smc.math.ca
au plus tard le 30 septembre 2026.



Call for Nominations Appel de mises en candidature

2027 CMS

Prix Cathleen Synge Morawetz Prize

2027 de la SMC

In recognition of outstanding research publication by one or more author(s). A series of closely related publications can be considered if they are clearly connected and focused on the same topic. Subject area for 2027:

Geometry and Topology.

En reconnaissance d'un article de recherche exceptionnel ou d'une série d'articles interreliés et axés sur un même sujet par un ou plusieurs auteur(s). Domaine de recherche pour 2027 : *La géométrie et la topologie.*

Submit all documentation to csmprize@cms.math.ca
no later than September 30, 2026.

Soumettez tous les documents à prixcsm@smc.math.ca
au plus tard le 30 septembre 2026.



Réunion d'hiver 2026 de la SMC 2026 CMS Winter Meeting

Appel aux sessions | Call for Sessions

The Canadian Mathematical Society (CMS) welcomes and invites scientific session proposals for the 2026 CMS Winter Meeting in Montreal from December 11-14, 2026.

The purpose of the scientific sessions is to share cutting edge research on a given mathematical topic, as suggested by the organizers.

Sessions are scheduled blocks, with each block ranging from 2 to 2.5 hours in length, and take place from December 12-14. Typical scientific sessions have between 10 and 20 talks of 20 minutes each, with 10 minutes between talks, but 50-min talks are possible. Indeed, the organizers are welcome to suggest non-traditional usage of the block times and format.

In accordance with the CMS mandate to propose conferences which are accessible and welcoming to all groups, diversity amongst organizers and speakers is strongly encouraged. To support organizers in their important work and in their efforts towards inclusivity and diversity, the CMS will host an open call for abstracts for all sessions, and asks organizers to consider all eligible abstract submissions for their session.

Diversity includes topics of interest, career stages, geographic location, and demographics; designated underrepresented groups include, but are not limited to, women, Indigenous Peoples, persons with disabilities, members of visible minority/racialized groups, and members of LGBTQ2+ communities.

All proposed sessions should be in line with the [CMS Code of Conduct](#).

Proposals should be submitted online, and will require the following:

1. Names, affiliations, and contact information for two or three organizers: A lead organizer and one or two co-organizer(s).
2. A title and a two to three-sentence summary that will be posted on the website for potential speakers.
3. The number of blocks requested (blocks are 2 or 2.5 hours long).
4. A pdf file including a description of the topic and purpose of the session (1-2 paragraphs), as well as a description of considerations made towards an equitable and inclusive session for a diverse group of participants. This file will not be publicly posted.
5. A spreadsheet including list of possible speakers. Please have columns "Last Name", "First Name", "Affiliation", "Career Stage", and "Webpage", with as much information filled out for potential speakers as possible. This file will not be publicly posted. The template for the list of potential speakers can be found [here](#).

Proposals will be selected by the Scientific Organizing Committee, limited by available classroom space, with priority for sessions that show intention to include a mix of senior and junior researchers, to make parts of their session accessible to graduate students, and to include speakers from designated underrepresented groups.

A note on Organizers

The lead organizer should hold a PhD or equivalent in the area of expertise relevant to the subject of the session. Having a senior researcher (e.g. Professor or tenured Associate Professor) paired with someone earlier in their career (e.g. tenure track Assistant Professor or Postdoctoral Fellow) would be ideal.

We ask that each potential organizer only propose a single session.

Submission Form and Deadlines:

Please submit proposals by filling out [this form](#). There will be two rounds of submissions. Proposals submitted by June 19, 2026, will be considered in the first round, with responses ongoing. The deadline for the second round will be August 31, 2026.



Réunion d'hiver 2026 de la SMC 2026 CMS Winter Meeting

Appel aux sessions | Call for Sessions

La Société mathématique du Canada (SMC) accueille et invite les propositions de sessions scientifiques pour la Réunion d'hiver 2026 de la SMC à Montréal du 11 au 14 décembre 2026.

L'objectif des sessions scientifiques est de partager les recherches de pointe sur un sujet mathématique donné, tel que proposé par les organisateur(trice)s.

Les sessions sont organisées par blocs horaires de 2 à 2,5 heures et se déroulent du 12 au 14 décembre. En général, les sessions scientifiques comprennent entre 10 et 20 présentations d'qui durent 20 minutes chacune, séparées par des pauses de 10 minutes entre chacune. Des présentations de 50 minutes sont toutefois possibles. Les organisateur(trice)s sont invité(e)s à proposer des modalités d'utilisation non conventionnelles de la durée et du format des blocs.

Conformément au mandat de la SMC, qui est de proposer des conférences accessibles et accueillantes pour toutes et tous, la diversité parmi les organisateur(trice)s et les orateur(trice)s est fortement encouragée. Afin de soutenir les organisateur(trice)s dans leur travail essentiel et leurs efforts en faveur d'inclusion et de diversité, la SMC lancera un appel à résumés ouvert pour toutes les sessions et invite les organisateur(trice)s à examiner toutes les propositions de résumés admissibles.

La diversité englobe les sujets d'intérêt, les étapes de carrière, la situation géographique et les données démographiques ; les groupes désignés comme sous-représentés comprennent, sans toutefois s'y limiter, les femmes, les peuples autochtones, les personnes handicapées, les membres des minorités visibles/groupes racialisés et les membres des communautés LGBTQ2+.

Toutes les sessions proposées doivent être conformes au [code de conduite de la SMC](#).

Les propositions doivent être soumises en ligne et doivent comporter les éléments suivants :

1. Noms, affiliations et coordonnées de deux ou trois organisateur(trice)s : un(e) organisateur(trice) principal(e) et un ou deux co-organisateur(trice)s.
2. Un titre et un résumé de deux à trois phrases qui seront publiés sur le site Web à l'intention des orateur(trice)s potentiel(le)s.
3. Le nombre de blocs horaires demandés (les créneaux durent 2 ou 2,5 heures).
4. Un fichier PDF contenant une description du sujet et de l'objectif de la session (1 à 2 paragraphes), ainsi qu'une description des mesures prises pour garantir une séance équitable et inclusive pour un groupe diversifié de participant(e)s. Ce fichier ne sera pas diffusé publiquement.
5. Un tableur contenant la liste des orateur(trice)s potentiel(le)s. Veuillez inclure les colonnes « Nom », « Prénom », « Affiliation », « Étape de carrière » et « Site Web » avec le maximum d'informations possible pour chaque orateur(trice). Ce fichier ne sera pas publié. Le modèle de liste des orateur(trice)s potentiel(le)s est disponible [ici](#).

Les propositions seront sélectionnées par le Comité scientifique d'organisation, dans la limite des salles de classe disponibles, avec priorité aux sessions qui manifestent l'intention d'inclure un mélange de chercheurs seniors et juniors, de rendre certaines parties de leur session accessibles aux étudiants de cycles supérieurs et d'inclure des conférenciers issus de groupes sous-représentés désignés.

Note sur les organisateur.trice.s

L'organisateur(trice) principal(e) doit être titulaire d'un doctorat ou d'un diplôme équivalent dans le domaine d'expertise pertinent au sujet de la session. L'idéal serait qu'un(e) chercheur(euse) chevronné(e) (par exemple, un.e professeur.e ou un.e professeur.e agrégé.e titulaire) fasse équipe avec une personne en début de carrière (par exemple, un.e professeur.e assistant.e en voie de titularisation ou chercheur.euse postdoctoral.e).

Nous demandons à chaque organisateur(trice) potentiel(le) de ne proposer qu'une seule session.

Formulaire de soumission et dates limites :

Veuillez soumettre vos propositions en remplissant [ce formulaire](#). Deux phases de sélection sont prévues. Les propositions reçues avant le 19 juin 2026 seront examinées lors de la première phase, les réponses étant envoyées au fur et à mesure. La date limite pour la seconde phase est le 31 août 2026.



Réunion d'hiver 2026 de la SMC 2026 CMS *Winter* Meeting

Appel aux sessions d'éducation Call for Education Sessions

The Canadian Mathematical Society (CMS) welcomes and invites education session proposals for the 2026 CMS Winter Meeting in Montreal, Quebec, from December 11-14, 2026.

The education session proposals will be selected by the CMS Meeting Education Session Committee, which will also schedule the accepted sessions, in communication with the session co-organizers.

In accordance with the CMS mandate to propose conferences which are accessible and welcoming to all groups, diversity amongst organizers and speakers is strongly encouraged. To support organizers in their important work and in their efforts towards inclusivity and diversity, the CMS will host an open call for abstracts for all sessions, and asks organizers to consider all eligible abstract submissions for their session.

Diversity includes topics of interest, career stages, geographic location, and demographics; designated underrepresented groups include, but are not limited to, women, Indigenous Peoples, persons with disabilities, members of visible minority/racialized groups, and members of LGBTQ2+ communities. Please see here for more information about what is meant by diversity, and for tips towards organizing an inclusive session.

All proposed sessions should be in line with the [CMS Code of Conduct](#).

Proposals should be submitted online, and will require the following:

1. Names, affiliations, and contact information for all session co-organizers. Early career researchers are welcomed to propose sessions.
2. The education session's title, and a 2-3-sentence summary that will be posted on the CMS Meeting website if your proposal is selected.
3. A pdf file including a description of the topic and purpose of the session (1-2 paragraphs), as well as a description of considerations made towards an equitable and inclusive session for a diverse group of participants. This file will not be publicly posted.
4. Indicate the number of time blocks needed. A block can be between 2 and 2.5 hours in length.
5. A list of potential speakers, which includes those who have tentatively confirmed to present, with their full name and affiliation. A request of tentatively confirmed speakers is based on the need to evaluate an education session proposal on EDI consideration. An inclusive and diverse set of speakers is highly encouraged.
6. The structure of your session. Traditionally, each presenter gets 20 minutes to talk, 5 minutes of Q&A, and a 5-minute buffer for transition. We are open to different formats as well, such as a panel, interactive session/workshop, 10-minute lightning talks, etc.

We kindly ask that organizers consider not presenting at their own session. However they are welcome to consider presenting at any other education session.

Proposals will be selected by the CMS Education Oversight Meetings Committee. If you have any questions, please email Andie Burazin (a.burazin@utoronto.ca) and Sarah Watson (meetings@cms.math.ca).

The CMS kindly asks session organizers to consider all eligible abstract submissions for their session, as up to 30 speakers per session can be accommodated.

All sessions will take place from December 12 to 14, 2026.

Submission Form and Deadlines:

Please submit proposals by filling out [this form](#). There will be two rounds of submissions. Proposals submitted by June 19, 2026, will be considered in the first round, where preference will be given to first round submissions. The deadline for the second round will be August 31, 2026.



Réunion d'hiver 2026 de la SMC 2026 CMS Winter Meeting

Appel aux sessions d'éducation Call for Education Sessions

La Société mathématique du Canada (SMC) accueille et invite les propositions de sessions d'éducation pour la Réunion d'hiver 2026 de la SMC à Montréal, Québec, du 11 au 14 décembre 2026.

Les propositions de sessions d'éducation seront sélectionnées par le Comité des sessions d'éducation des réunions de la SMC, qui planifiera également les sessions acceptées, en communication avec les co-organisateur(trice)s des sessions.

Conformément au mandat de la SMC qui est de proposer des réunions accessibles et accueillantes pour toutes et tous, la diversité parmi les organisateur(trice)s et les orateur(trice)s est fortement encouragée. Afin de soutenir les organisateur(trice)s dans leur travail essentiel et leurs efforts en faveur d'inclusion et de diversité, la SMC lancera un appel à résumés ouvert pour toutes les sessions et invite les organisateur(trice)s à examiner toutes les propositions de résumés admissibles.

La diversité englobe les centres d'intérêt, les étapes de carrière, la situation géographique et les caractéristiques démographiques. Les groupes sous-représentés comprennent, sans s'y limiter, les femmes, les peuples autochtones, les personnes handicapées, les membres des minorités visibles ou racialisés, et les membres des communauté LGBTQ2+. Pour en savoir plus sur la diversité et obtenir des conseils pour organiser une session inclusive, veuillez consulter cette page.

Veuillez noter qu'un appel à sessions distinct sera lancé pour les sessions scientifiques.

Toutes les sessions proposées doivent être conformes au [code de conduite de la SMC](#).

Les propositions doivent être soumises en ligne et doivent comporter les éléments suivants :

1. Noms, affiliations et coordonnées de tous les co-organisateur(trice)s de la session. Les chercheur(euse)s en début de carrière sont invité(e)s à proposer des sessions.
2. Le titre de la session d'éducation et un résumé de 2 à 3 phrases qui seront publiés sur le site Web de la réunion si votre proposition est sélectionnée.
3. Un fichier PDF contenant une description du sujet et de l'objectif de la session (1 à 2 paragraphes), ainsi qu'une description des mesures prises pour garantir une session équitable et inclusive pour un groupe diversifié de participant(e)s. Ce fichier ne sera pas partagé publiquement.
4. Indiquez le nombre de blocs horaires nécessaires. Un bloc horaire peut durer entre 2 et 2,5 heures.
5. Une liste des orateur(trice)s potentiel(le)s, comprenant ceux et celles qui ont donné leur accord de principe pour intervenir, avec leur nom complet et leur affiliation. La demande d'orateur(trice)s ayant donné leur accord provisoire repose sur la nécessité d'évaluer une proposition de session d'éducation en fonction des considérations EDI. Un panel d'orateur(trice)s inclusif et diversifié est vivement encouragé.
6. Le déroulement de votre session. Traditionnellement, chaque orateur(trice) dispose de 20 minutes de présentation, suivies de 5 minutes de questions-réponses et de 5 minutes de transition. Nous sommes également ouverts à d'autres formats, tels qu'une table ronde, un atelier interactif, des présentations éclair de 10 minutes, etc.

Nous demandons aux organisateur(trice)s de bien vouloir éviter de présenter lors de leur propre session. Ils/Elles sont toutefois invité(e)s à envisager de présenter lors de toute autre session d'éducation.

Les propositions seront sélectionnées par le Comité de supervision des réunions de la SMC. Pour toute question, veuillez contacter Andie Burazin (a.burazin@utoronto.ca) et Sarah Watson (meetings@cms.math.ca).

La SMC prie les organisateur(trice)s de session de bien vouloir prendre en considération toutes les soumissions de résumés admissibles pour leur session, car jusqu'à 30 orateur(trice)s par session peuvent être accueilli(e)s.

Toutes les sessions se dérouleront du 12 au 14 décembre 2026.

Formulaire de soumission et dates limites :

Veuillez soumettre vos propositions en remplissant [ce formulaire](#). L'examen des propositions se déroulera en deux phases. Les propositions soumises avant le 19 juin 2026 seront examinées lors de la première phase, qui sera prioritaire. La date limite pour la seconde phase est le 31 août 2026.



Canadian Mathematical Society
Société mathématique du Canada

See you this winter

SAVE THE

DATE

RÉSERVEZ

LA DATE

On se voit en hiver

2026 CMS Winter Meeting
Réunion d'hiver 2026 de la SMC

December 11 to 14 | Du 11 au 14 décembre

MONTRÉAL, QC



Canadian Mathematical Society
Société mathématique du Canada

See you next year

SAVE THE

DATE

RÉSERVEZ

LA DATE

À l'année prochaine

2027 CMS Summer Meeting
Réunion d'été 2027 de la SMC

June 4 to 7 | Du 4 au 7 juin

WINNIPEG, MB

Wi-Fi



External visitors can use **UNB visitors' WIFI**: public@UNB.

To connect:

1. Select 'public@unb' from the list of available networks on your device
2. Read and agree to UNB's Acceptable use of Information and Communication Technologies policy
3. Select 'Visitors to UNB'
4. Follow the instructions to connect to eduroam visitor access

You can also find more information here:

[Wi-Fi on the UNB campus.](#)

You can also connect VIA the Conference Service Network.

Network name: Conference@UNBSJ

Password: &UNB3li3vabl3

Wi-Fi



Les visiteurs externes peuvent utiliser le **Wi-Fi réservé aux visiteurs de l'UNB**
: public@UNB.

Pour vous connecter :

1. Sélectionnez « public@unb » dans la liste des réseaux disponibles sur votre appareil
2. Lisez et acceptez la politique de l'UNB relative à l'utilisation acceptable des technologies de l'information et de la communication
3. Sélectionnez « Visitors to UNB »
4. Suivez les instructions pour vous connecter à l'accès eduroam réservé aux visiteurs

Vous trouverez également plus d'informations ici :

[Wi-Fi on the UNB campus.](#)

Vous pouvez également vous connecter via le réseau du service des conférences.

Nom du réseau : Conference@UNBSJ

Mot de passe : &UNB3li3vabl3

GH 115

Saturday | Samedi : CMS Annual General Meeting (AGM) | Assemblée générale annuelle (AGA) de la SMC
Problems in Graph Searching

Sunday | Dimanche :

Problems in Graph Searching

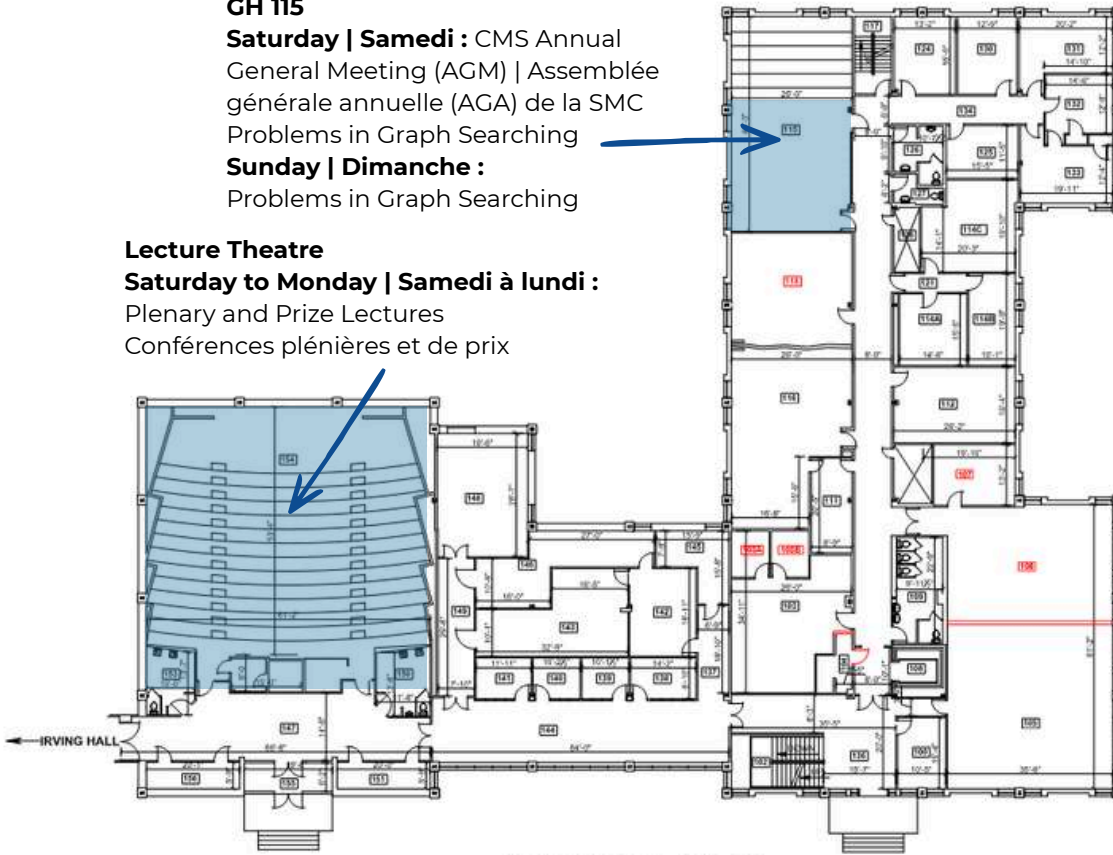
Lecture Theatre

Saturday to Monday | Samedi à lundi :

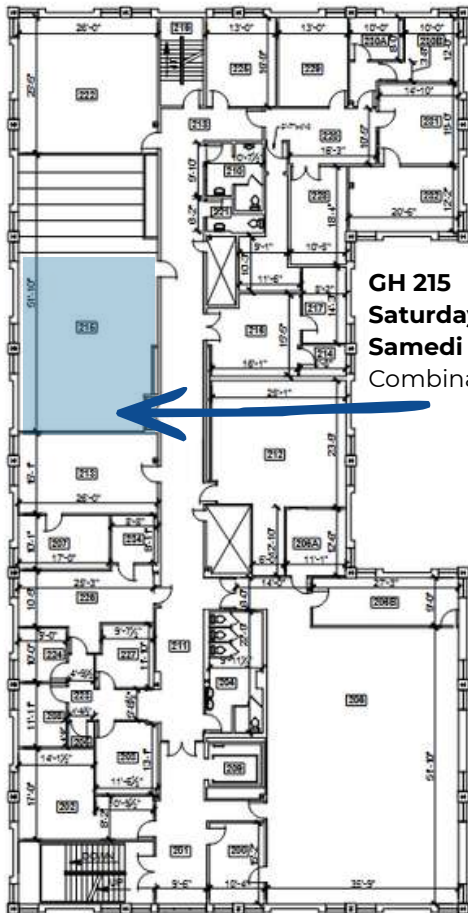
Plenary and Prize Lectures

Conférences plénières et de prix

Ganong Hall



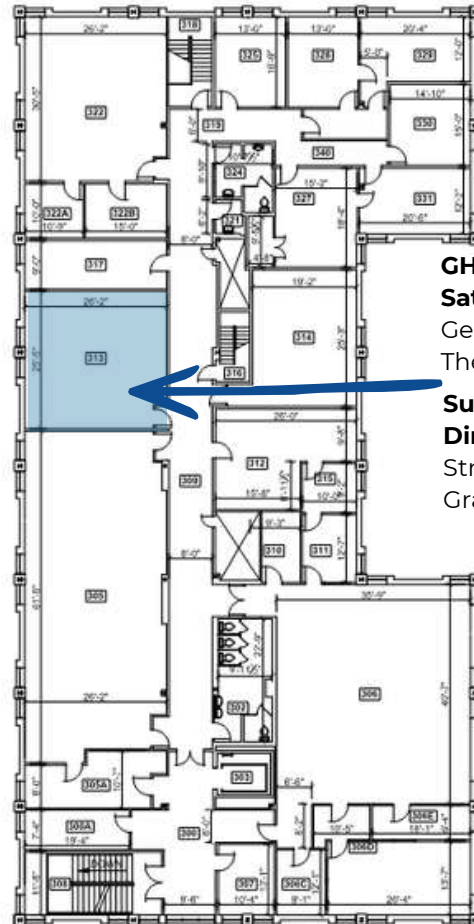
FIRST FLOOR PLAN



SECOND FLOOR PLAN

GH 215

**Saturday and Sunday
Samedi et dimanche :**
Combinatorial Design



THIRD FLOOR PLAN

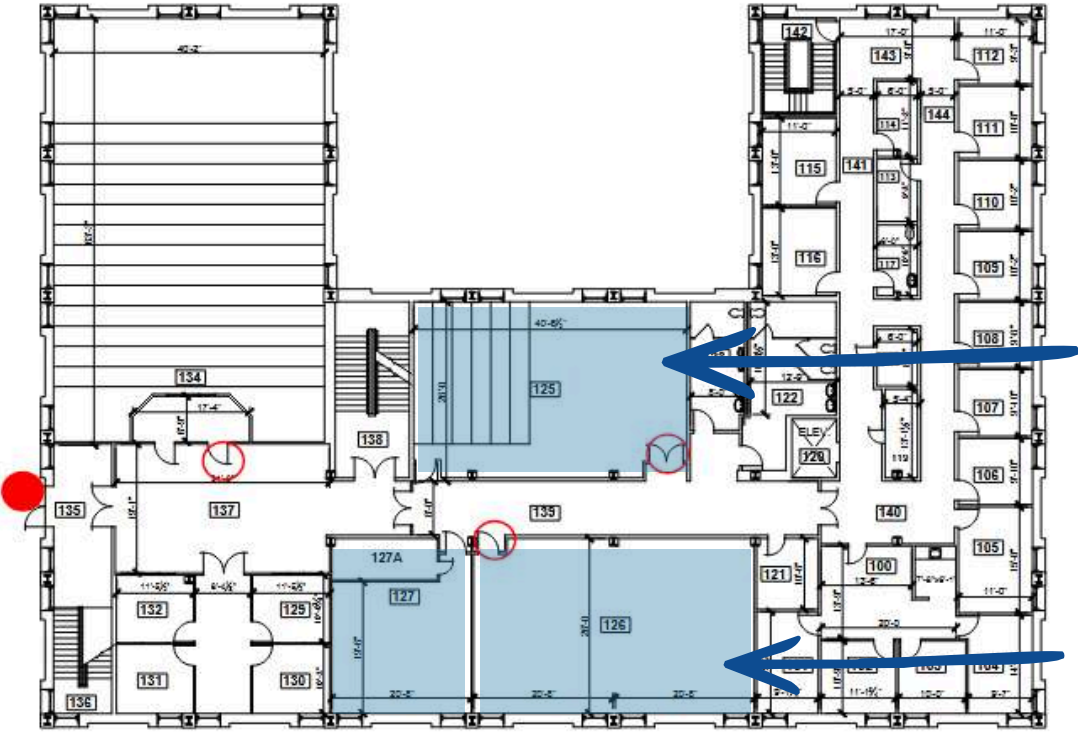
GH 313

Saturday | Samedi :
Geometric Group Theory

**Sunday and Monday
Dimanche et lundi :**

Structural and Algorithmic Graph Theory

Hazen Hall



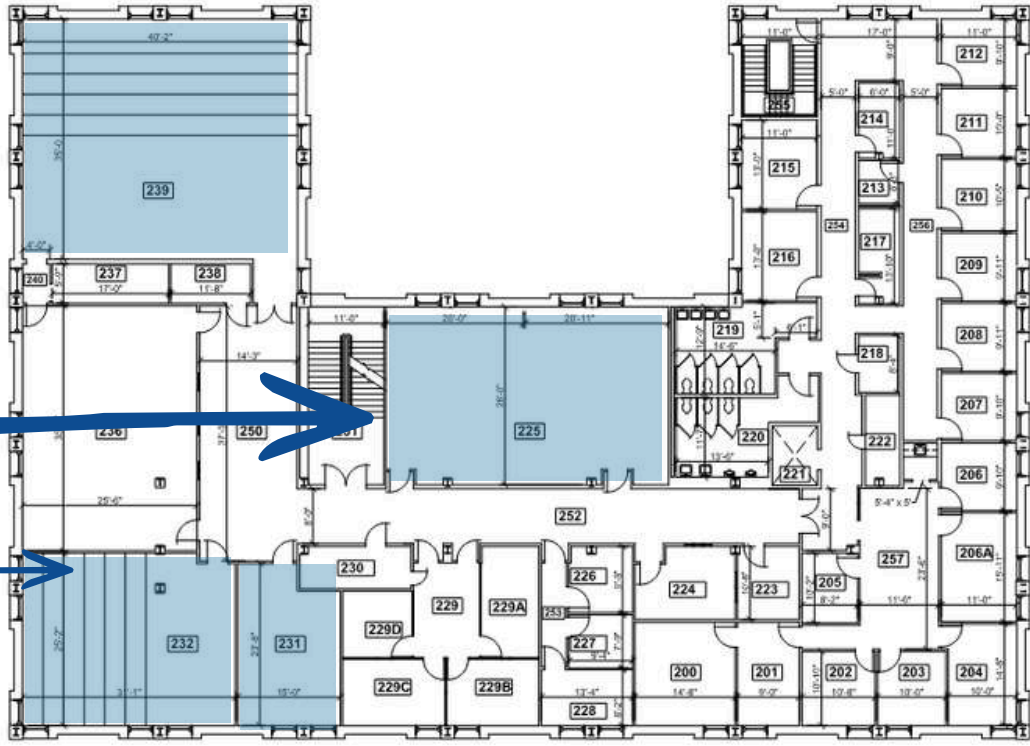
- HH 125**
Saturday | Samedi :
 Teaching and learning of university mathematics: how have things evolved (or not)?
- Sunday | Dimanche :**
 Noncommutative Geometry and Applications
- HH 126**
Saturday and Sunday (AM)
Samedi et dimanche (AM) :
 Homotopy Theory
- Sunday (PM) | Dimanche (PM) :**
 Student Research Sessions
 Sessions de recherche étudiante

FIRST FLOOR PLAN

SCALE 1/4" = 1'-0"

HH 225
Saturday and Sunday (AM)
Samedi et dimanche (AM) :
 Applied Dynamical Systems and Mathematical Biology

HH 232
Saturday and Sunday
Samedi et dimanche :
 Combinatorial Game Theory



SECOND FLOOR PLAN

SCALE 1/4" = 1'-0"

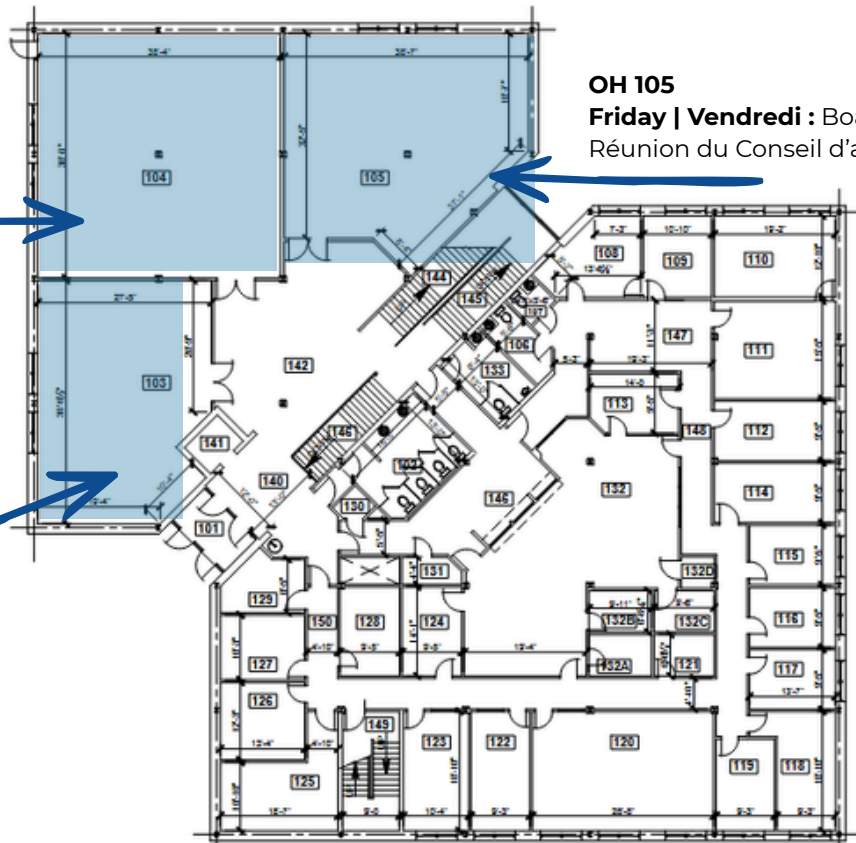
Oland Hall

OH 104
Saturday | Samedi :
Mathematical Physics

Sunday and Monday
Dimanche et lundi :
Automorphic forms and
representations

OH 103
Sunday | Dimanche :
SPECTRA Lunch
Dîner SPECTRA

OH 105
Friday | Vendredi : Board Meeting |
Réunion du Conseil d'administration



FIRST FLOOR PLAN

SCALE 1/4" = 1'-0"

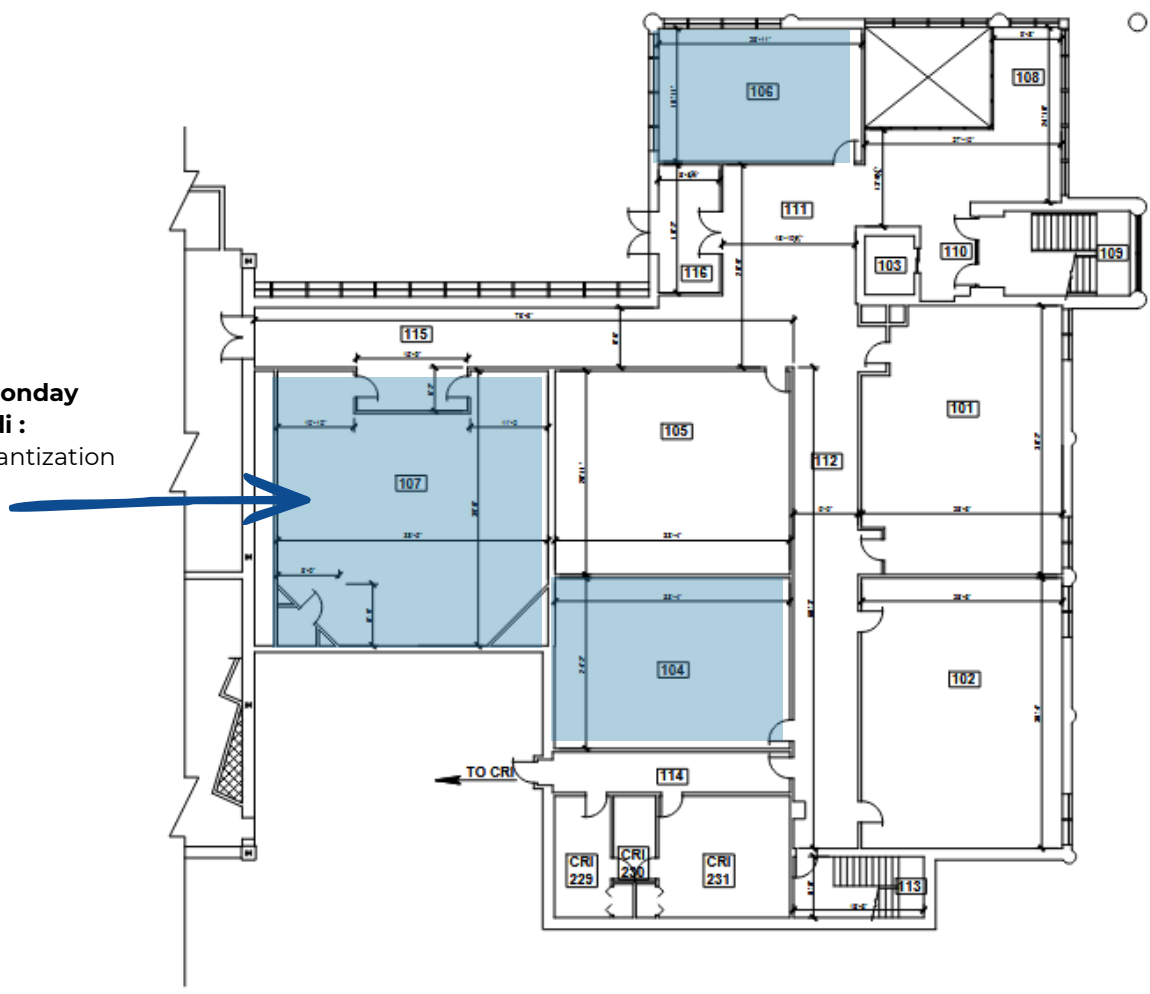
OH 208
Sunday (AM) | Dimanche (AM) :
Mathematical Modelling of
Fisheries Dynamics and
Management

Sunday (PM) | Dimanche (PM) :
Theory and applications of
scientific machine learning



Irving

IH 107
Saturday to Monday
Samedi à lundi :
Geometric Quantization



FIRST FLOOR PLAN

SCALE 1/8" = 1'-0"





Last updated August 2024

- | | | |
|---|---|--|
| 1. G. Forbes Elliot Athletics Centre | 10. Health & Social Innovation Centre | 19. Dalhousie Medicine New Brunswick |
| 2. Maintenance Building | 11. Jeux Canada Games Stadium | 20. Facilities Management |
| 3. Student Health Centre | 12. Quad | 21. Hans W. Klohn Commons |
| 4. Thomas J. Condon Student Centre | 13. William F. Ganong Hall (GH) | 22. Barry and Flora Beckett Residence |
| 5. Colin B. Mackay Residence | 14. Ganong Hall Lecture Theatre | 23. Greenhouse |
| 6. Sir James Dunn Residence | 15. Canadian Rivers Institute | 24. Annex A & B |
| 7. Philip W. Oland Hall (OH) | 16. K.C. Irving Hall (IH) | 25. Community Garden |
| 8. Sir Douglas Hazen Hall (HH) | 17. Engineering Machine Shop and Lab | |
| 9. Backflow/Water Building | 18. NBCC Saint John Allied Health Centre | |

UNB.ca

Shuttle Schedule

Horaire de la navette

FRIDAY, SATURDAY, SUNDAY & MONDAY
SHUTTLE WILL TRAVEL BETWEEN:



Crowne Plaza Saint John Harbour View
10 Portland St, Saint John, NB E2K 4H8
and
Delta Hotel (uptown) 39 King St, Saint John, NB E2L 2A7
and
UNB SJ 100 Tucker Park Rd, Saint John, NB E2K 5E2

VENDREDI, SAMEDI, DIMANCHE & LUNDI
LA NAVETTE CIRCULERA ENTRE :
Crowne Plaza Saint John Harbour View
10, rue Portland, Saint John, N.-B. E2K 4H8
et
Hôtel Delta (centre-ville)
39, rue King, Saint John (N.-B.) E2L 2A7
et
UNB SJ 100, Tucker Park Rd, Saint John, N.-B. E2K 5E2

FRIDAY JUNE 5 15:30 - 20:30
VENDREDI 5 JUIN

SATURDAY JUNE 6 7:00 - 11:00
SAMEDI 6 JUIN 15:30 - 19:00

SATURDAY JUNE 6 Shuttle between the hotel, UNB, and banquet venue
SAMEDI 6 JUIN (Lilly Lake Pavilion) | Navette entre l'hôtel, UNB et le
(BANQUET) site du banquet (Lilly Lake Pavilion)
 18:30 - 19:30
 21:00 - 22:30

SUNDAY JUNE 7 7:00 - 11:00
DIMANCHE 7 JUIN 15:30 - 19:00

MONDAY JUNE 8 7:00 - 11:00
LUNDI 8 JUIN 15:30 - 19:00
