Pacific Institute *for the* Mathematical Sciences

PIMS MONTHLY CONNECTION | **November 2020**

Hello from PIMS

Things continue to bustle along at PIMS, with many events happening this month. Researchers are spoiled for choice when it comes to a diverse range of topics - check out the Feature Events section to select your event of interest!

PIMS is excited to announce registration is now open for 10 new network-wide graduate courses. Students will be able to access expertise remotely in a variety of mathematics courses. More details can be found in the News section and on this website.

This month, we are featuring the works of both Sergii Myroshnychenko and Zafer Selcuk Aygin in, Emergent Research: The PIMS Postdoctoral Fellow Seminar. Read on to learn more about their research.

If you would like to engage with the Kantorovich Initiative and learn about upcoming events and research surrounding optimal transport, sign up to the mailing list.

Sincerely,
The PIMS Team

FEATURE EVENTS

Emergent Research: The PIMS Postdoctoral Fellow Seminar
November 4: Hosted Virtually by PIMS
Sergii Myroshnychenko: Shape recognition of convex bodies

A broad class of convex geometry problems deals with questions on retrieval of information about (convex) sets from data about different types of their projections, sections, or both. Examples of such assumptions are volume estimates, rigidity of structure, symmetry conditions etc.

In this talk, we will discuss known results and recent developments regarding the dual notions of point-projections and non-central sections of convex bodies. In particular, we provide a partial affirmative answer to the question on a shape recognition posed by A. Kurusa, and discuss a generalization of V. Klee's theorem for polyhedra.
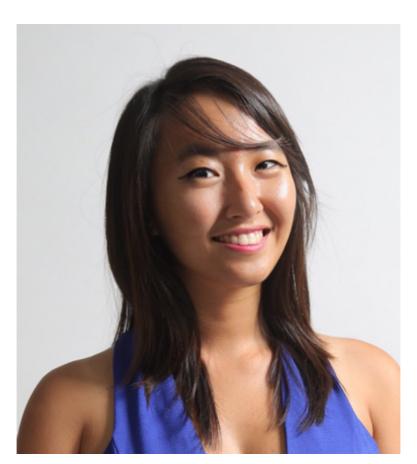
[PIMS-UNBC Distinguished Colloquium Talk](#)

November 4: Hosted virtually by the University of Northern British Columbia & PIMS

Steven J. Miller: Benford's Law: Why the IRS might care about the 3x + 1 problem and zeta (s)

Many systems exhibit a digit bias. For example, the first digit base 10 of the Fibonacci numbers or of 2^n equals 1 about 30% of the time; the IRS uses this digit bias to detect fraudulent corporate tax returns. This phenomenon, known as Benford's Law, was first noticed by observing which pages of log tables were most worn from age- it's a good thing there were no calculators 100 years ago! We'll discuss the general theory and application, talk about some fun examples (ranging from the 3x + 1 problem to the Riemann zeta function), and discuss some current open problems suitable for undergraduate research projects.

[The quanTA CRG Seminar](#)

November 4: Hosted Virtually by the University of Saskatchewan Monica Jinwoo Kang: The Infinite HaPPY Code

I will construct an infinite-dimensional analog of the HaPPY code as a growing series of stabilizer codes defined respective to their Hilbert spaces. These Hilbert spaces are related by isometries that will be defined during this talk. I will analyze its system in various aspects and discuss its implications in AdS/CFT. Our result hints that the relevance of quantum error correction in quantum gravity may not be limited to the CFT context.

[PIMS Distinguished Lecture](#)
November 6: Hosted Virtually by PIMS
Tian Zheng: Adjusted Visibility Metric for Scientific Articles

Measuring the impact of scientific articles is important for evaluating the research output of individual scientists, academic institutions, and journals. While citations are raw data for constructing impact measures, there exist biases and potential issues if factors affecting citation patterns are not properly accounted for. In this work, we address the problem of field variation and introduce an article-level metric useful for evaluating individual articles' visibility. This measure derives from joint probabilistic modeling of the content in the articles and the citations among them using latent Dirichlet allocation (LDA) and the mixed membership stochastic blockmodel (MMSB). Our proposed model provides a visibility metric for individual articles adjusted for field variation in citation rates, a structural understanding of citation behavior in different fields, and article recommendations that take into account article visibility and citation patterns.

[2020 CRM-Fields-PIMS Prize Lectures: Catherine Sulem](#)
November 24 - 25, hosted virtually by the Fields Institute

Professor Sulem is being recognized for her numerous and influential contributions to the study of non-linear partial differential equations. Her deep results on the non-linear Schrödinger equation resolved multiple questions that had resisted analysis for years. In particular, her work is central to the understanding of self-focusing singularities to this equation. Her analysis of water waves introduced powerful new probabilistic ideas to that field. These and other ground-breaking achievements have been acknowledged earlier through her election as a Fellow of both the Royal Society of Canada and the American Mathematical Society, through winning the Krieger-Nelson prize of the Canadian Mathematical Society and the 2019 Association for Women in Mathematics - Society for Industrial and Applied Mathematics (AWM-SIAM) Sonia Kovalevsky Lecture, and through the award of a Killam Research Fellowship of the Canada Council for the Arts.

Zafer Selcuk Aygin

Relations Between $\triangle + \cdots + \triangle + 3\triangle + \cdots + 3\triangle$ and $\square + \cdots + \square + 3\square + \cdots + 3\square$

For more lectures and PIMS resources, please visit mathtube.org

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Click below for all events|November 2020

Scientific

NEWS & ANNOUNCEMENTS

France Canada Research Funds (FCRF)

The FCRF is open to all areas of research, and exclusively funds new collaborative projects. Research teams must include students and young researchers.

Applications are accepted for collaborative projects that involve a French establishment (university, Grande École or research organization) and one of twenty FCRF member universities in Canada.

New Virtual PIMS Graduate Courses!

PIMS is pleased to announce ten new [network-wide graduate courses](#) in the mathematical sciences! These courses provide remote access to experts across the PIMS network. Students at PIMS Canadian member universities can get graduate credit via the [Western Deans Agreement](#). Be advised, in some cases, students must enrol 6 weeks in advance of the next term.

Algebraic Topology

Instructor: Martin Frankland (University of Regina)

Algebraic Topology with Applications in Combinatorics

Instructor: Bojan Mohar (Simon Fraser University)

Cantor Minimal Dynamics

Instructor: Ian F. Putnam (University of Victoria)

Comparative Prime Number Theory

Instructor: Greg Martin (University of British Columbia)

Stochastic Differential Equations

Instructor: Yaozhong Hu (University of Alberta)

Design and Analysis of Experiments

Instructor: Adam Kashlak (University of Alberta)

Ergodic Theory

Instructor: Chris Hoffman (University of Washington)

Introduction to Vertex Algebras and its Representation Theory

Instructor: Fei Qi (University of Manitoba)

Mathematical Data Science
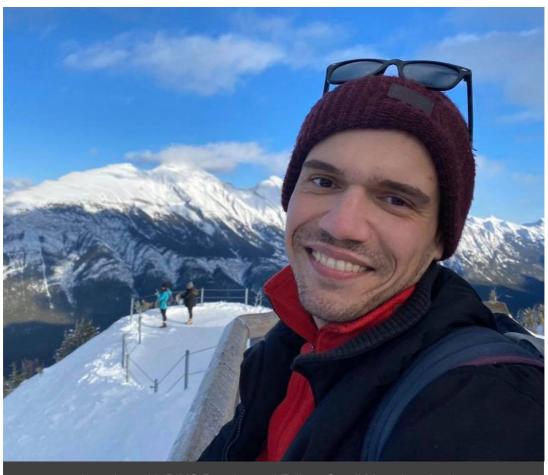
Instructor: Lele Wang (University of British Columbia)

Parallel Programming for Scientific Computing

Instructor: Raymond Spiteri (University of Saskatchewan)

PIMS Postdoctoral Fellowships

Outstanding young researchers are invited to apply through MathJobs. Applicants must be nominated by a scientist or department affiliated with PIMS. The deadline to apply is December 1, 2020. Please see the MathJobs posting for more details.

MEDIA

Interview with PIMS Postdoctoral Fellow: Sergii Myroshnychenko

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PIMS COMMUNITY RECENT PUBLICATIONS

1. Kadiri, H., Ng, N., & Wong, P. J. (2019). The least prime ideal in the Chebotarev density theorem. *Proceedings of the American Mathematical Society, 147*(6), 2289-2303.

2. Cole, S., & Zhu, Y. (2020). Exact recovery in the hypergraph stochastic block model: a spectral algorithm. *Linear Algebra and its Applications*

3. Drimbe, D. (2020). Prime II1 factors arising from actions of product groups. *Journal of Functional Analysis, 278*(5), 108366.

ABOUT PIMS

The Pacific Institute for the Mathematical Sciences (PIMS) was created in 1996 to promote discovery, understanding and awareness in the mathematical sciences. PIMS has expanded from the mathematics community of **Alberta** and **British Columbia** to include **Washington State**, **Saskatchewan** and **Manitoba**. We are proponents of mathematical **collaboration with industry**, **innovation in mathematics education** from K-12 to graduate level initiatives, **public outreach** and **partnerships** with similar organizations around the globe. We fund Collaborative Research Groups, Post-Doctoral Fellowships, individual events, and competitive prizes in mathematics.

FOLLOW US!