Pacific Institute for the Mathematical Sciences

PIMS MONTHLY CONNECTION | **April 2021**

Hello from PIMS

PIMS is looking forward to spring and summer events taking place around our member sites and affiliate universities. As the semester winds down, we hope you will have time to attend some of the online talks hosted by our community this April.

The **PIMS Network Course on Algebraic Topology and Applications in Combinatorics**, will host Nati Linial (Hebrew University, Jerusalem), **April 1**, for a guest lecture on " A taste of random simplicial complexes". The lecture may be of interest to people in the areas of combinatorics or topology and will take place online.

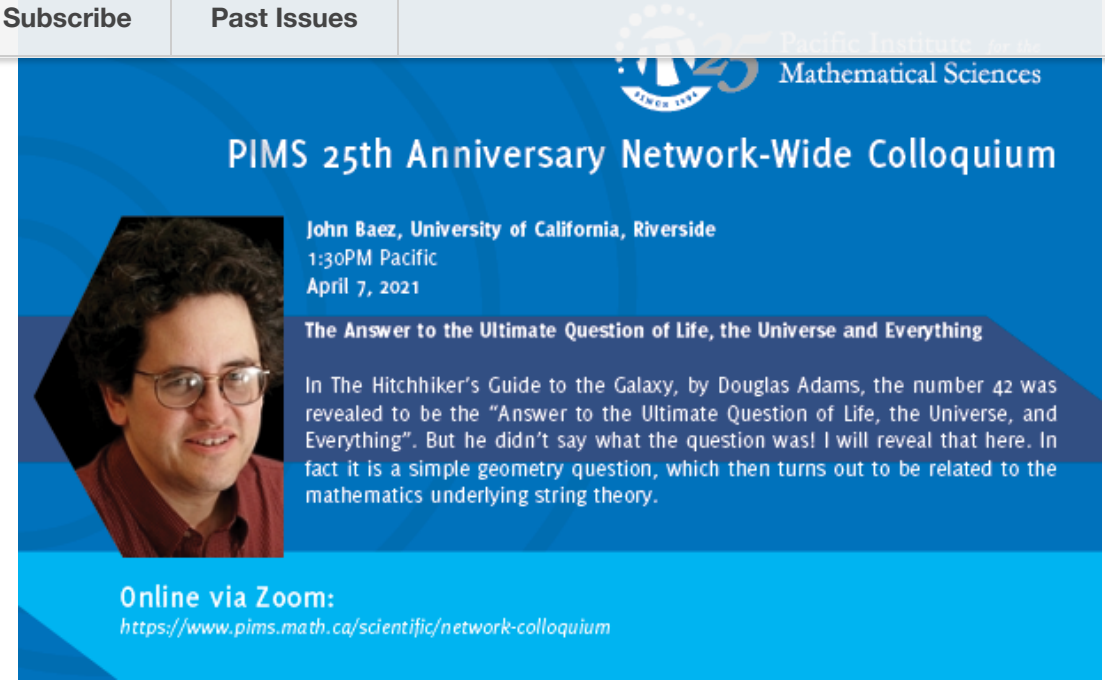
Join us on **April 7,** for our third **Network-Wide Colloquium**: John Baez (University of California, Riverside) on "The Answer to the Ultimate Question of Life, the Universe and Everything". This is the last talk this semester and we will continue this series in the fall. If you would like to nominate a mathematical researcher to speak, let us know.

Our **PIMS PDF**, Zafer Selcuk Aygin (University of Calgary) has his work featured in the list of "Best Articles of 2020" in the International Journal of Number Theory (IJNT). A great accomplishment for this rising researcher! We would also like to welcome our 2021 cohort of postdoctoral fellows who will be joining the PIMS Community in the 2021 academic year.

More details on this month's featured events, news and publications are provided below.

Sincerely,
The PIMS Team

FEATURE EVENTS



PIMS 25th Anniversary Network-Wide Colloquium

April 7, 1:30PM Pacific Time. Hosted online by PIMS
John Baez, University of California, Riverside
The Answer to the Ultimate Question of Life, the Universe and Everything

In The Hitchhiker's Guide to the Galaxy, by Douglas Adams, the number 42 was revealed to be the "Answer to the Ultimate Question of Life, the Universe, and Everything". But he didn't say what the question was! I will reveal that here. In fact it is a simple geometry question, which then turns out to be related to the mathematics underlying string theory.

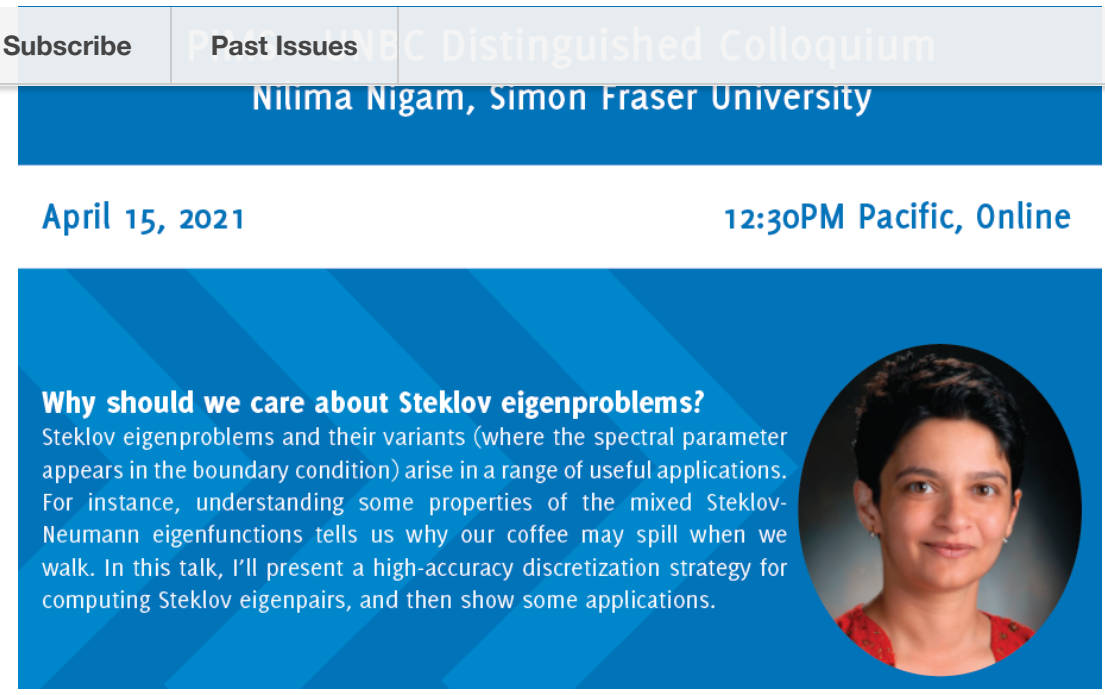
Emergent Research: The PIMS Postdoctoral Fellow Seminar

April 7, 9:30AM Pacific Time. Hosted online by PIMS
Sajad Fathi Hafshejani, University of Lethbridge
The non-monotone technique for optimization algorithms.

There are various iterative approaches for solving unconstrained optimization problems. Between them, the non-monotone technique is a popular approach for improving the iterative algorithms in optimization. The non-monotone technique not only can improve the likelihood of finding the global optimum but also can improve the numerical performance of approaches. Here, we investigate the non-monotone strategy and present some properties of this technique. Some numerical results are also presented.

April 28, 9:30AM Pacific Time. Hosted online by PIMS
Eric Jones, Simon Fraser University
Stochasticity in an ecological model of the microbiome influences the efficacy of simulated bacteriotherapies.

We consider a stochastic bistable two-species generalized Lotka-Volterra model of the microbiome and use it as a testbed to analytically and numerically explore the role of direct (e.g., fecal microbiota transplantation) and indirect (e.g., changes in diet) bacteriotherapies. Two types of noise are included in this model, representing the immigration of bacteria into and within the gut (additive noise) and variations in growth rate associated with the spatially inhomogeneous distribution of resources (multiplicative noise). The efficacy of a bacteriotherapy is determined by comparing the mean first-passage times (the average time required for the system to transition from one basin of attraction to the other) with and without the intervention. Concepts from transition path theory are used to investigate how the role of noise affects these bacteriotherapies.



PIMS- UNBC Distinguished Lecture

April 15, 12:30PM Pacific Time. Hosted online by UNBC
Nilima Nigam, Simon Fraser University
Why should we care about Steklov eigenproblems?

Steklov eigenproblems and their variants (where the spectral parameter appears in the boundary condition) arise in a range of useful applications. For instance, understanding some properties of the mixed Steklov-Neumann eigenfunctions tells us why our coffee may spill when we walk. In this talk, I'll present a high-accuracy discretization strategy for computing Steklov eigenpairs, and then show some applications.

Click below for all events: April 2021

Scientific

NEWS & ANNOUNCEMENTS

PIMS Announces the 2021 Cohort of Postdoctoral Fellows

We are pleased to announce the 2021 cohort of PIMS Postdoctoral Fellows. This year's selection was adjudicated by the PDF Panel: Amir Akbary (ULethbridge), Martin Argerami (URegina), Kristine Bauer (UCalgary), Terry Gannon (UAlberta), Karen Gunderson (UManitoba), Valerie King (Uvic), Mathav Murugan (UBC), Ebrahim Samei (USaskatchewan) and Weiran Sun (SFU).
In addition to the regular PDFs, the panel reviewed nominations for the PIMS-CNRS PDF and the Collaborative Research Group (CRG) PDF. The 2021 list is available through the PIMS page here.

PIMS Digital Courses 2021-2022: Call for Proposals

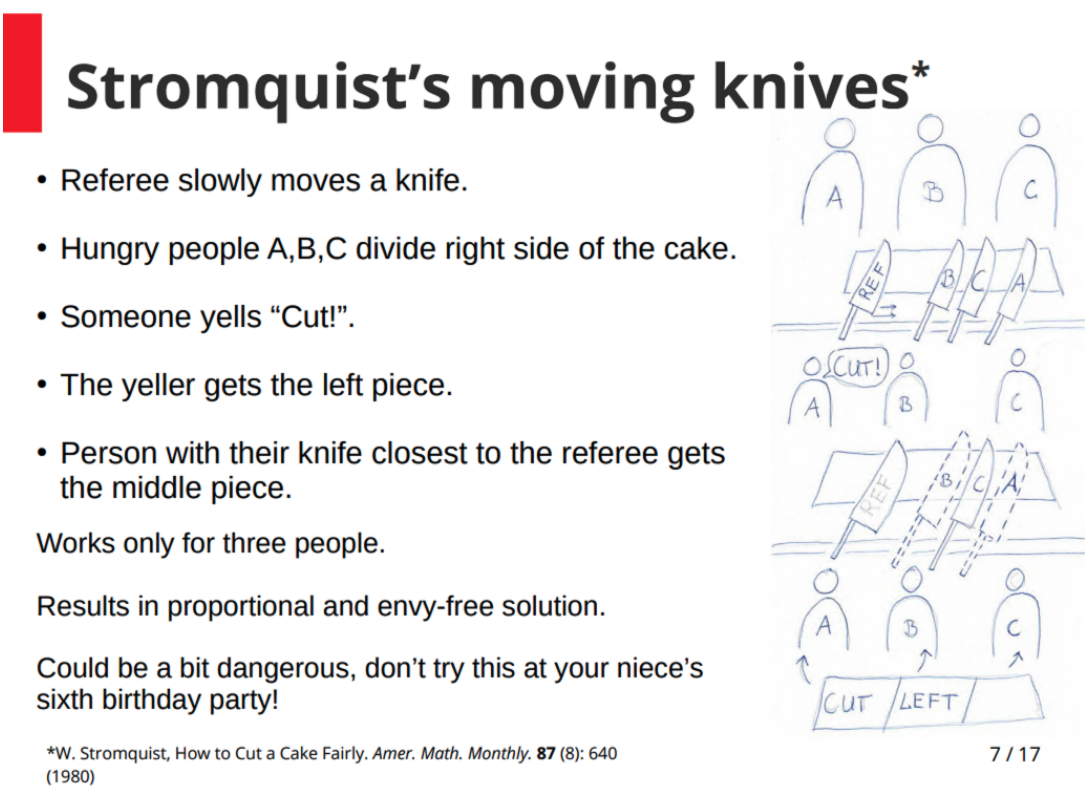
We are now accepting proposals for PIMS network-wide graduate courses to take place in the 2021-2022 academic year. Students taking these courses at PIMS member universities are typically eligible for credit through the Western Deans Agreement. The closing date for

applications is **April 16th**, if you are interested in sharing a course with the rest of the PIMS network, please complete the instructor application form.

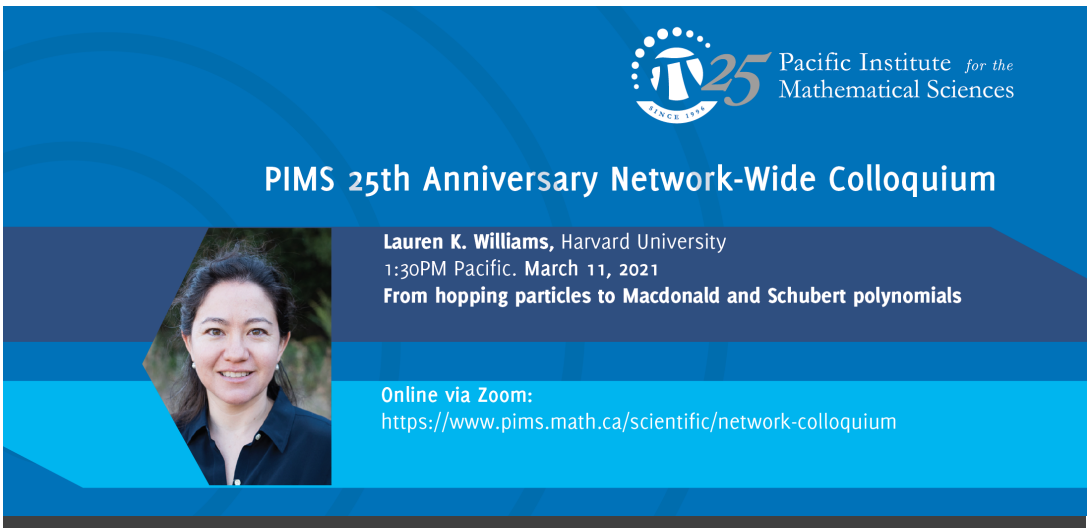
Changing the Culture: Registration Open.

Registration is now open for the annual Changing the Culture Conference, organized and sponsored by the Pacific Institute for the Mathematical Sciences. This conference brings together mathematicians, mathematics educators and school teachers from all levels to work together towards narrowing the gap between mathematicians and teachers of mathematics, and between those who do and enjoy mathematics and those who think they don't. This year's meeting will take place on **Friday May 14, 2021**, with a plenary lecture from Math educator, James Tanton. Registration is free and can be done here.

MEDIA



PIMS PDF Peter Kristel: On Quantum Field Theory, drinking coffee and cutting cake!



Watch it again! March 11, 2021- PIMS 25th Network Wide Colloquium with Lauren Williams

To view past lectures and other PIMS resources, please visit mathtube.org

PIMS COMMUNITY RECENT PUBLICATIONS

1. Z.S. Aygin and K.S. Williams. (2020) Why does a prime *p* divide a Fermat number? Math. Mag., 93(4), 288-294.
2. T. Budzinski, N.Curien and B. Petri. (2021). On the minimal diameter of closed hyperbolic surfaces. Duke Math. J. 170 (2) 365 - 377.

3. N. Ghoussoub, Y.-H. Kim, H. Lavenant and A. Palmer. (2021). Hidden convexity in a problem of nonlinear elasticity. SIAM J. Math. Anal., 53(1), 1070–1087.

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, Postdoctoral Fellowships, individual events, and competitive prizes in mathematics.

FOLLOW US!

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