



Pacific Institute *for the* Mathematical Sciences

PIMS MONTHLY CONNECTION | **February 2021**



Hello from PIMS

To celebrate the International Day of Women and Girls in Science, we interviewed PIMS PDF Debanjana Kundu. She will give a talk on February 3 at [Emergent Research: The PIMS Postdoctoral Fellow Seminar](#). Check out the Media section to learn more.

Nominations are now open for the 2021 PIMS Education Prize. Additionally, Callysto is accepting proposals to support classroom activities related to computational thinking, data science, and coding. More details on both of these initiatives can be found in the News and Announcements section.

To mark PIMS 25th year, we have launched a special colloquium to celebrate this occasion. The [PIMS 25th Anniversary Network-Wide Colloquium](#) will feature a lecture from Ben Green on February 11.

We have created a [PIMS-engagement](#) Slack channel. As many of our researchers work remotely, we hope this will be a mechanism to further build on the PIMS network and establish a strong sense of community amongst researchers while supporting new collaborations.

PIMS is looking forward to another year of mathematical excellence as we celebrate our 25th anniversary with our community!

Sincerely,
The PIMS Team

FEATURE EVENTS



[Emergent Research: The PIMS Postdoctoral Fellow Seminar](#)
February 3: Hosted Virtually by PIMS
Debanjana Kundu, The University of British Columbia
Iwasawa Theory of (Fine) Selmer Groups

numbers? Though this question is easy to frame, it is related to a Clay millennium problem, the Birch and Swinnerton-Dyer (BSD) conjecture for elliptic curves. This conjecture is known in a few special cases, and Iwasawa theory provides a framework for attacking this conjecture in a systematic way. Though we are still very far off from resolving the BSD conjecture, Iwasawa theory itself has been growing as a subject.

In my talk, I will introduce the broad subject of Iwasawa theory; and spend considerable time discussing the Iwasawa theory of elliptic curves. Towards the end, I will briefly talk about my research on growth of fine Selmer groups in towers of number fields.



[PIMS 25th Anniversary Network-Wide Colloquium](#)

February 11: Hosted Virtually by PIMS

Ben Green, University of Oxford

New lower bounds for van der Waerden numbers

Colour $\{1, \dots, N\}$ red and blue, in such a manner that no three of the blue elements are in arithmetic progression. How long an arithmetic progression of red elements must there be? It had been speculated based on numerical evidence that there must always be a red progression of length about \sqrt{N} . I will describe a construction which shows that this is not the case - in fact, there is a colouring with no red progression of length more than about $\exp((\log N)^{3/4})$, and in particular less than any fixed power of N .

I will give a general overview of this kind of problem (which can be formulated in terms of finding lower bounds for so-called van der Waerden numbers), and an overview of the construction and some of the ingredients which enter into the proof. The collection of techniques brought to bear on the problem is quite extensive and includes tools from diophantine approximation, additive number theory and, at one point, random matrix theory.



[Emergent Research: The PIMS Postdoctoral Fellow Seminar](#)

February 24: Hosted Virtually by PIMS

Andrew Schopieray, University of Alberta

Fusion rings and their Categorifications

Fusion rings are a special class of associative unital rings with nonnegative integer structure constants and a notion of duality. For example, the group ring of a finite group is a fusion ring. We study fusion rings mainly because they arise as Grothendieck rings of categories associated to Hopf algebras, semisimple Lie algebras, vertex operator algebras, etc. In turn, these categories have application to topological quantum field theory, invariants of knots and links, and quantum computation, to name a few. In this talk we will discuss the brief history of the classification of categorifiable fusion rings and how number-theoretic properties of fusion rings dictate the existence of, or properties of, their categorifications.

2021 PRIMA Congress

Dec 5-10, 2021



Isaben Hubard
Universidad Nacional Autónoma
de México



Kathryn Mann
Cornell University



Ciprian Manolescu
Stanford University



Ozawa Narutaka
Kyoto University



Andres Navas
Universidad de Santiago de Chile



Sylvia Serfaty
New York University



Tatiana Toro
University of Washington

[PRIMA Congress 2021](#)

Save the Date! December 5 - 10 2021: Hosted in Vancouver and Virtually by PIMS

The Pacific Rim Mathematical Association Congress 2021 will take place in Vancouver, Canada between December 5-10, 2021. Mathematicians from around the Pacific Rim will converge to discuss the latest developments in Mathematics. Stay tuned for more details!

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

Click below for all events | February 2021

Scientific

NEWS & ANNOUNCEMENTS

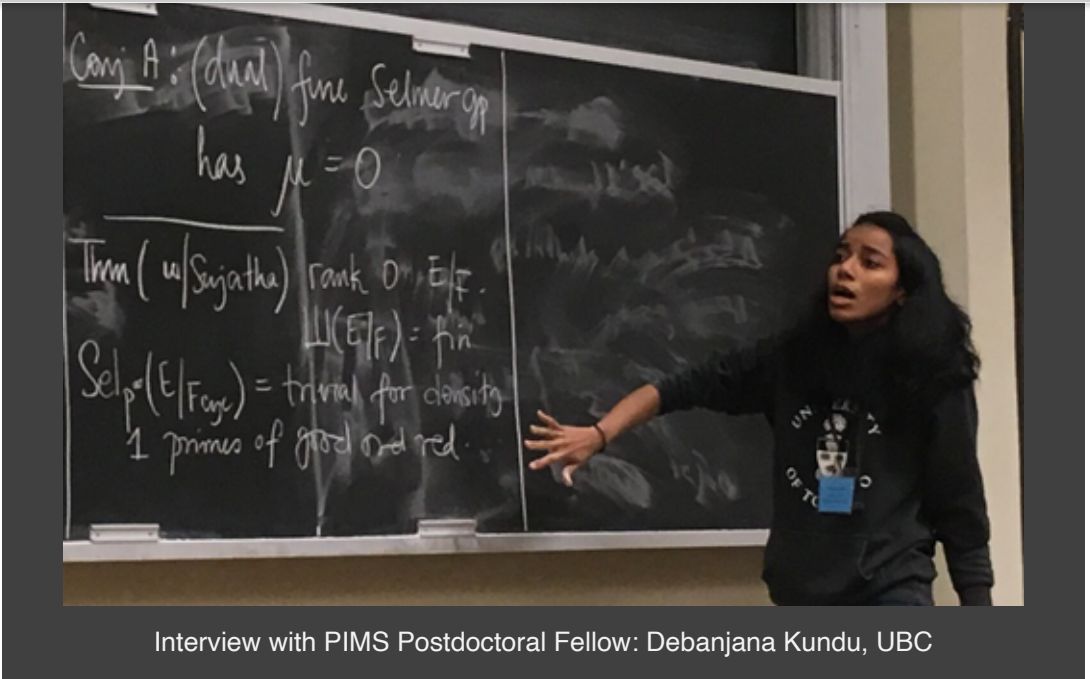
2021 PIMS Education Prize: Call for Nominations

A prize of \$1,000 will be awarded to a member of the PIMS community who has made a significant contribution to education in the mathematical sciences. This prize is intended to recognize individuals from the PIMS universities, or other educational institutions in Alberta, British Columbia, Manitoba, Saskatchewan and Washington who have played a major role in encouraging activities which have enhanced public awareness and appreciation of mathematics, as well as fostering communication among various groups and organizations concerned with mathematical training at all levels. **The nomination deadline is March 15, 2021.** More details can be found [here](#).

Callysto: Call for Proposals for Classroom Activities

Supported by PIMS and Cybera, Callysto is a free, interactive, curriculum-based learning and skills development tool that supports computational thinking in grades 5-12. **The deadline to apply is February 22, 2021.** Click [here](#) to learn more.

MEDIA



Interview with PIMS Postdoctoral Fellow: Debanjana Kundu, UBC

PIMS COMMUNITY RECENT PUBLICATIONS

1. Laca, M., & Li, B. (2020). [Amenability and functoriality of right-LCM semigroup \$C^*\$ -algebras](#). *Proceedings of the American Mathematical Society*, 148(12), 5209-5224.
2. Bramburger, J. J., Dylewsky, D., & Kutz, J. N. (2020). [Sparse identification of slow timescale dynamics](#). *Physical Review E*, 102(2), 022204.
3. Wong, P. J. (2020). [Bombieri-Vinogradov theorems for modular forms and applications](#). *Mathematika*, 66(1), 200-229.

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!



Mailing address:

Pacific Institute for the Mathematical Sciences
 The University of British Columbia
 4176-2207 Main Mall
 Vancouver, BC V6T 1Z4
 Canada

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