MATH-IMS Joint Pure Mathematics Colloquium Series
The Chinese University of Hong Kong

This Colloquium Series in Pure Mathematics is organized by the Department of Mathematics and the Institute of Mathematical Sciences (IMS) at The Chinese University of Hong Kong. The series focuses on all areas of pure mathematics together with theoretical developments and applications.

Date: October 28, 2021 (Thursday)
Time: 10:00-11:00 (Hong Kong Time)
Zoom Link: https://cuhk.zoom.us/j/98846779826

From Grassmannians to Catalan numbers

Speaker: Professor Thomas Lam
University of Michigan

Abstract: The binomial coefficients have a well-studied q-analogue known as Gaussian polynomials. These polynomials appear as Poincare polynomials (or point counts) of the Grassmannian of k-planes in C^n (or F_q^n).

Another family of important combinatorial numbers is the Catalan numbers, and they have two well-studied q-analogues from the 1900s, due to Carlitz and Riordan, and to MacMahon respectively. I will explain how these q-analogues appear as the Poincare polynomial and point count, respectively, of an open (non-compact) subvariety of the Grassmannian known as the top positroid variety. The story involves connections to knot homology and to the geometry of flag varieties.

The talk is based on joint work with Pavel Galashin.

Bio: Prof. Lam is a Professor of Mathematics at the University of Michigan. He received his B.S. at the University of South Wales in 2001, and his Ph.D. at MIT in 2005 under the supervision of Prof. Richard Stanley. After graduation, Prof. Lam was a Benjamin Peirce Assistant Professor at Harvard University. Prof. Lam's field of research is algebraic combinatorics and he is broadly in interested in the interactions of combinatorics with representation theory, algebraic geometry, and theoretical physics. Prof. Lam was awarded IMO Gold Medal in 1997, the Clay Liftoff Fellowship in 2005 and the Sloan Fellowship in 2009. He also serves as editors for Algebraic Combinatorics and the Journal of the American Mathematical Society.