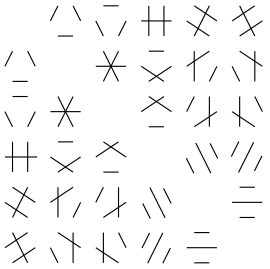
Mathematics Seminar



Rocky Mountain Algebraic Combinatorics Seminar

Möbius Inversions and Simplicial Cosheaf Homology

Amit Patel
Colorado State University

The pre-talk will be an introduction to two seemingly unrelated topics: Möbius inversions and simplicial cosheaf homology. The Möbius inversion is a counting technique in algebraic combinatorics. It has its roots in number theory and can be interpreted as a generalization of the inclusion-exclusion principle. The first half of this pre-talk will be an introduction to the classical theory of Möbius inversions along with a few of its many applications. A simplicial cosheaf is an algebraic-topological object that assigns abelian data to a simplicial complex. Simplicial cosheaves have a homology theory that generalizes ordinary simplicial homology. The second half will be an introduction to simplicial cosheaf homology.

Möbius Homology

Amit Patel
Colorado State University

I this talk, I will introduce Möbius homology, a homology theory for representations of finite posets into abelian categories. While the connection between poset topology and Möbius functions is classical, I will establish a direct connection between poset topology and Möbius inversions. More precisely, the Euler characteristic of Möbius homology is equal to the Möbius inversion of the dimension function of the representation. Thus, Möbius homology categorifies the Möbius inversion. If time permits, I will also introduce a homological version of Rota's Galois Connection Theorem which relates the Möbius homology over two posets connected by a Galois connection. Our main application is to persistent homology over general posets, but there will be no time for this.

Weber 223
4–6 pm, Friday, October 10, 2023
(Refreshments 3:30–4 pm)
Colorado State University
4 pm, Friday, October 10, 2023

This is a joint Denver U / UC Boulder / U of Wyoming / CSU seminar that meets biweekly.
Anyone interested is welcome to join us at a local restaurant for dinner after the talks.

Colorado State University

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