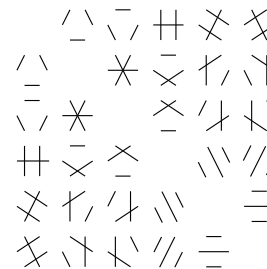# Mathematics Seminar

Rocky Mountain Algebraic Combinatorics Seminar

The algebra and geometry of ordered set partitions

Brendon Rhoades
University of California, San Diego

An *ordered set partition* is a set partition with a total order on its blocks. In particular, an n-block ordered set partition of $\{1, 2, \ldots, n\}$ may be viewed as a permutation in the s ymmetric group S_n. We will describe some algebraic and geometric properties of ordered set partitions which extend classical properties of permutations. Joint with Jim Haglund, Brendan Pawlowski, Mark Shimozono, and Andy Wilson.

The Frobenius-Schreier-Sims Algorithm: the beginnings of black-box rings.

James Wilson
CSU

We prove a condition on **unfaithful** representations $\rho : A \to M_d(K)$ of algebras that implies $\dim A \leq d!$. This allows us to test if elements are contained in subalgebras and if so to express them as words in a compact generating set, even when $\dim A$ is exponentially large. This opens the door to efficient computation with large black-box rings. It is the "categorification" of the classic Schreier-Sims algorithm.

    The discovery came from a CSU reading group on functional programming. We will highlight a few ways that abstract algebra is being used in modern computing and how on occasion it teaches us things about algebra to which we aren't paying attention.

    Reports on joint work with I. Kessler, H. Kvinge.

Weber 223
4–6 pm, Friday, Dec 6, 2019
(Refreshments in Weber 117, 3:30–4 pm)
Colorado State University

This is a joint Denver U / UC Boulder / UC Denver / 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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