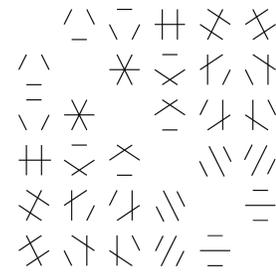


Mathematics Seminar



Rocky Mountain Algebraic Combinatorics Seminar

Large Erdős-Ko-Rado Sets in Polar Spaces

Ferdinand Ihringer
University of Regina

An *Erdős-Ko-Rado set* (EKR set) Y of $\{1, \dots, n\}$ is a family of k -sets, which pairwise intersect non-trivially. A non-trivial problem is to provide tight upper bounds on $|Y|$ and classify all examples, which obtain that bound. Erdős, Ko and Rado proved $|Y| \leq \binom{n-1}{k-1}$ for $n \geq 2k$. Equality holds for $n \geq 2k + 1$ if and only if Y is the family of all k -sets, which contain one fixed element.

If we equip the vector space \mathbb{F}_q^n with a reflexive, non-degenerate sesquilinear form, then the subspaces that vanish on that form are a polar space, so-called *isotropic subspaces*. The largest isotropic subspaces of a polar space are called generators. We say that two generators intersect trivially if the dimension of their intersection is 0. An *EKR set of a polar space* is a set of pairwise non-trivially intersecting generators. We present various results on EKR sets for polar spaces, in particular we will discuss some recent so-called weak Hilton-Milner type results.

Searching for Balanced Sets

Gavin King
University of Wyoming

Let X be a finite set of unit vectors in some Euclidean space. Define $R_{\alpha,\beta}(x, y)$ for $\alpha, \beta \in \mathbb{R}$ and $x, y \in X$ as $R_{\alpha,\beta}(x, y) = |\{z \in X : \langle z, x \rangle = \alpha, \langle z, y \rangle = \beta\}|$ satisfying:

- For each x, y , $|R_{\alpha,\beta}(x, y)| = |R_{\alpha,\beta}(y, x)|$.
- For any α , there is a constant p_α such that for all x , $\sum R_{\alpha,\alpha}(x, x) = p_\alpha x$.
- For each α, β, γ there exists a constant $m_{\beta,\gamma}^\alpha$ such that for any pair of vectors v_i, v_j with $\langle v_i, v_j \rangle = \alpha$, we have $\sum R_{\beta,\gamma}(v_i, v_j) - \sum R_{\gamma,\beta}(v_i, v_j) = m_{\beta,\gamma}^\alpha (v_i - v_j)$, regardless of our choice of v_i and v_j .

Balanced sets are a notion intricately tied to the concept of association schemes, and especially to the association schemes with the Q -polynomial property. I will be discussing the existing work on balanced sets as well as my own, such as a classification of balanced sets with small numbers of inner products, and ways to search for balanced sets connected to permutation groups.

Weber 223
4-6 pm
Friday, May 5, 2017
(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.



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