Difference sets for higher-dimensional symmetric designs

Lucija Relić

University of Zagreb (Croatia)

(Joint work with A. Bahmaniam, V. Krčadinac, M.O. Pavčević, S. Suda)

An n-dimensional symmetric (v, k, λ) design of propriety d is a $v \times \cdots \times v$ array over $\{0, 1\}$ such that every $(d-1)$-dimensional subarray contains exactly k ones, and scalar products of all pairs of parallel $(d-1)$-subarrays are λ. Cubes of symmetric designs and projection cubes, recently studied in [1], [2], and [3], arise as special cases with propriety 2 and with $\lambda = 0$, respectively. In this talk we restrict to 3-dimensional symmetric designs of propriety 3, studied in [4], and their associated difference sets. We define (v, k, λ) difference sets of propriety 3 as subsets $D \subseteq G^2$ satisfying three difference conditions involving left and right differences. We present the relationships between different types of cubes and their corresponding difference set properties.

References

[1] V. Krčadinac, M.O. Pavčević, K. Tabak *Cubes of symmetric designs*, Ars Math. Contemp. 25 (2025), no. 1, Paper No. 10, 16 pp.

[2] V. Krčadinac, L. Relić, *Projection cubes of symmetric designs*, to appear in Math. Comput. Sci. (2025). https://arxiv.org/abs/2411.06936

[3] V. Krčadinac, M.O. Pavčević, *On higher-dimensional symmetric designs*, to appear in Exp. Math. (2025). https://arxiv.org/abs/2412.09067

[4] A. Bahmanian, V. Krčadinac, L. Relić, S. Suda, *Three-dimensional symmetric designs of propriety 3*, preprint, 2025.