Constructing magic objects

M.A. Pellegrini[(1)]

[(1)] Università Cattolica del Sacro Cuore, Brescia, Italy

In this talk I will describe some techniques that can be used to construct different magic objects such as signed magic arrays $\mathrm{SMA}(m,n;s,k)$, magic rectangle sets $\mathrm{MRS}(m,n;s,k;c)$ and integer Heffter arrays $\mathrm{H}(m,n;s,k)$. In the first two cases, we have determined necessary and sufficient conditions for their existence (see [1, 2]), while for integer Heffter arrays the problem is still open for some small values of k (see [4]). Also, I will describe some constructions of Γ-magic rectangle sets $\mathrm{MRS}_\Gamma(m,n;s,k;c)$, where Γ is a finite abelian group (see [3]).

References

[1] F. Morini, M.A. Pellegrini, Magic partially filled arrays on abelian groups, *J. Combin. Des.* 2023(31) pp. 347-367.

[2] F. Morini, M.A. Pellegrini, Signed magic arrays: existence and constructions, *Preprint.*

[3] F. Morini, M.A. Pellegrini, S. Sora, On a conjecture by Sylwia Cichacz and Tomasz Hinc, and a related problem, *Discrete Appl. Math.* 2025(367) pp. 53-67.

[4] M.A. Pellegrini, T. Traetta, Towards a solution of Archdeacon's conjecture on integer Heffter arrays, *J. Combin. Des.* 2025(33) pp. 310-323.