Further constructions of square integer relative Heffter arrays

Diane Donovan[(1)], Sarah Lawson[(1)], James Lefevre[(1)]

[(1)] The University of Queensland, Brisbane, Australia

Heffter arrays are a fascinating combinatorial object introduced by Archdeacon in 2015 [1] and later generalized to *relative* Heffter arrays by Costa et al. in 2019 [2]. In this talk, I will focus on *square integer relative Heffter arrays*, which are $n \times n$ arrays where each row and column contains the same number of entries, the sum of each row and column is zero and where, given the subgroup J of size t, every nonzero element of $\mathbb{Z}_{2nk+t} \setminus J$ appears exactly once up to sign. There are many open problems regarding the existence of these arrays. I will focus on arrays that contain *a primary transversal*, a transversal of the set $\{1, \ldots, n\}$ up to sign. I will present a new family of square integer relative Heffter arrays along with complete results for their existence for n prime and $k = 3$[3].

References

[1] D.Archdeacon, Heffter arrays and biembedding graphs on surfaces, *The Electronic Journal of Combinatorics, 22(1)* 2015 P1.74.

[2] S.Costa, F.Morini, A.Pasotti, M.Pellegrini, A generalization of Heffter arrays *Journal of Combinatorial Designs, 28(3)* 2019 P171-206.

[3] D.Donovan, S.Lawson, J.Lefevre, Further constructions of square integer relative Heffter arrays, *in preparation.*