Design Theory - Part II
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MARCO BURATTI, Università degli Studi di Perugia
Cyclic designs: some selected topics

I will choose a couple of topics related to some recent progress on the construction of $cyclic$ combinatorial designs.

SAAD EL-ZANATI, Illinois State University
On edge orbits and hypergraph designs

Let $\mathbb{Z}_n$ denote the group of integers modulo n and let $\mathcal{E}_n^{(k)}$ be the set of all k-element subsets of $\mathbb{Z}_n$ where $1 \leq k < n$. If $E \in \mathcal{E}_n^{(k)}$, let $[E] = \{E + r : r \in \mathbb{Z}_n\}$. Then $[E]$ is the orbit of E where $\mathbb{Z}_n$ acts on $\mathcal{E}_n^{(k)}$ via $(r, E) \mapsto E + r$. Furthermore, $\{[E] : E \in \mathcal{E}_n^{(k)}\}$ is a partition of $\mathcal{E}_n^{(k)}$ into $\mathbb{Z}_n$-orbits. We count the number of $\mathbb{Z}_n$-orbits in $\mathcal{E}_n^{(k)}$ and give the corresponding results when fixed points are introduced. We also give applications to cyclic and r-pyramidal decompositions of certain classes of uniform hypergraphs into isomorphic subgraphs.

FRANCESCA MEROLA, Università Roma Tre
Cycle systems of the complete multipartite graph

An *ℓ-cycle system* of a graph Γ is a set of ℓ-cycles of Γ whose edges partition the edge set of Γ; is it *regular* if there is an automorphism group G of Γ acting regularly on the vertices of Γ and permuting the cycles, *cyclic* if G is cyclic.

When Γ is $K_m[n]$, the complete multipartite graph with m parts each of size n, the existence problem for ℓ-cycle systems is not completely solved, and little is known on regular systems. We discuss new existence results for cycle systems of $K_m[n]$, concentrating mostly on cyclic systems.

SIBEL OZKAN, Gebze Technical University
On The Hamilton-Waterloo Problem and its Generalizations

A $\{C_m^r, C_n^s\}$-factorization asks for a 2-factorization of K_v (or $K_v - I$), where r of the 2-factors consists of m-cycles and s of the 2-factors consists of n-cycles. This is the Hamilton-Waterloo Problem(the HWP) with uniform cycle sizes m and n. The HWP is an extension of the Oberwolfach problem which asks for isomorphic 2-factors. We will focus on the HWP with uniform cycle sizes; results on the various lengths of cycles as well as some generalizations to multipartite graphs and also having more non-isomorphic 2-factors will be presented.

Results are from the joint works with Keranen, Odabasi, and Ozbay.

MATEJA SAJNA, University of Ottawa
On the Honeymoon Oberwolfach Problem

The Honeymoon Oberwolfach Problem HOP$(2m_1, \ldots, 2m_t)$ asks whether is it possible to arrange $n = m_1 + \ldots + m_t$ couples at a conference at t round tables of sizes $2m_1, \ldots, 2m_t$ for $2n - 2$ meals so that each participant sits next to their spouse at every meal, and sits next to every other participant exactly once. A solution to HOP$(2m_1, \ldots, 2m_t)$ is a decomposition of $K_{2n} + (2n-3)I$ into 2-factors, each consisting of disjoint I-alternating cycles of lengths $2m_1, \ldots, 2m_t$. It is also equivalent to a semi-uniform 1-factorization of K_{2n} of type $(2m_1, \ldots, 2m_t)$. We present several results, most notably, a complete solution to the case with uniform cycle lengths.