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On the directed Oberwolfach problem for complete symmetric equipartite digraphs

The celebrated Oberwolfach problem, over 50 years old and in general still open, asks whether n participants at a conference can be seated at k round tables of sizes $t_1, t_2, \ldots, t_k$ for several meals so that each participant sits next to every other participant at exactly one meal, assuming that $t_1 + t_2 + \ldots + t_k = n$. This problem can be modeled as a decomposition of the complete graph K_n into 2-factors, each consisting of k disjoint cycles of lengths $t_1, t_2, \ldots, t_k$.

In this talk, we discuss the directed version for complete symmetric equipartite digraphs. Thus, we are interested in decomposing $K^*_{n[m]}$, the complete symmetric equipartite digraph with n parts of size m, into spanning subdigraphs, each a disjoint union of k directed cycles of lengths $t_1, t_2, \ldots, t_k$ (where $t_1 + t_2 + \ldots + t_k = mn$). Such a decomposition models a seating arrangement of mn participants, consisting of n delegations of m participants each, at k tables of sizes $t_1, t_2, \ldots, t_k$ so that each participant sits *to the right of each participant from a different delegation* exactly once. Recent solutions to extensive cases of this problem for uniform cycle lengths will be presented.

This is joint work with Nevena Francetić.