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On a generalization of set-wise intersection of perfect matchings

Two perfect matchings P and Q of a graph on $2k$ vertices are said to be set-wise t-intersecting if there exist edges $P_1, \cdots, P_t$ in P and $Q_1, \cdots, Q_t$ in Q such that the union of edges $P_1, \cdots, P_t$ has the same set of vertices as the union of $Q_1, \cdots, Q_t$ has. In this talk I will present an extension of the famous Erdős-Ko-Rado (EKR) Theorem to set-wise t-intersecting families of perfect matching for $t = 2$ and $t = 3$. In particular I will prove the following:

The size of the largest set of set-wise 2 and 3-intersecting perfect matchings in K_{2k} with $k \geq 6$ is $(2k-5)!!$, and $(2k-7)!!$, respectively.