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EKR on Graphs and Lattices

The classic theorem of Erdős, Ko, and Rado has generated a lot of activity in recent years. One new idea explores the structure of intersecting families of maximum size under the restriction that certain pairs of elements cannot be in the same set. This corresponds to investigating the largest intersecting family of independent sets of a graph. If some such family forms a star – some element is in every set – the graph is said to have the EKR property. A second consideration studies intersection of other objects, such as permutations and partitions (defined by sharing the same coordinate or block, respectively), and asking the usual Erdős-Ko-Rado and Hilton-Milner type questions. A third notion defines the intersection of elements of a lattice by to the rank of their meet. Here, a lattice is said to be EKR if a largest intersecting family of elements forms a star; that is, it is the upset of an atom. We discuss current advances in these areas, including joint work with Bekmetjev, Brightwell, Czygrinow, Fishel, Kamat, and Meagher.