Partial covering arrays and a generalized Erdős-Ko-Rado property.

The classical Erdős-Ko-Rado theorem states that if $k \leq \lfloor n/2 \rfloor$ then the largest family of pairwise intersecting $k$-subsets of $[n] = \{0, 1, \ldots, n\}$ is of size $\binom{n-1}{k-1}$. A family of $k$ subsets satisfying this pairwise intersecting property is called an EKR family. We generalize the EKR property and provide asymptotic lower bounds on the size of the largest family $\mathcal{A}$ of $k$-subsets of $[n]$ that satisfies the following property: For each $A, B, C \in \mathcal{A}$, each of the four sets $A \cap B \cap C; A \cap B \cap C^c; A \cap B^c \cap C; A^c \cap B \cap C$ are non-empty. This generalized EKR (GEKR) property is motivated, generalizations are suggested, and a comparison is made with fixed weight 3-covering arrays. Our techniques are mainly probabilistic. (Received September 27, 2005)