Doubly resolvable Steiner triple systems

Charles Colbourn
University of Vermont

A Kirkman square with index λ, latinicity μ, block size k, and v points, $KS_k(v;\mu,\lambda)$, is a $t \times t$ array ($t = \lambda(v-1)/\mu(k-1)$) defined on a v-set V such that (1) every point of V is contained in precisely μ cells of each row and column, (2) each cell of the array is either empty or contains a k-subset of V, and (3) the collection of blocks obtained from the non-empty cells of the array is a $(v,k,\lambda)-BIBD$. For $\mu = 1$, the existence of a $KS_k(v;\mu,\lambda)$ is equivalent to the existence of a doubly resolvable $(v,k,\lambda)-BIBD$. The spectrum of $KS_2(v;1,1)$ or Room squares was completed by Mullin and Wallis in 1975. In this talk, we determine the spectrum for a second class of doubly resolvable designs with $\lambda = 1$. We show that there exist $KS_3(v;1,1)$ for $v \equiv 3 \pmod 6$, $v = 3$ and $v \geq 27$ with at most 23 possible exceptions for v. This is joint work with Alan Ling, Esther Lamken, and Bill Mills.