The triangle intersection problem for subgraphs of K_4

Curt Lindner (Auburn)

In 1975 Curt Lindner and Alex Rosa solved the intersection problem for Steiner triple systems: How many triangles can a pair of Steiner triple systems have in common? A similar question can be asked for Kite systems (a triangle with a tail), $K_4\backslash e$ systems (K_4 minus an edge), and K_4 systems (= block designs with block size 4): How many triangles can they have in commmon? In the case of Kite systems we cut off the tails, for $K_4\backslash e$ systems we pull apart each copy of $K_4\backslash e$ into two triangles, and in the case of K_4 systems we pull apart each copy of K_4 into four triangles. The combined work of Elizabeth Billington, Curt Lindner, and Sule Yazici resulted in the complete solution of this problem for Kite and $K_4\backslash e$ systems. The problem for K_4 systems remains open. This is an elementary survey of the work on these problems (including the solution for Steiner triple systems).