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Cops and robbers on graphs based on designs

In the game of cops and robbers, a set of cops and a single robber occupy vertices of a graph, with cops and robber playing alternately, in each turn moving to an adjacent vertex or passing. The cops win if one of them occupies the same vertex as the robber, and the robber wins if he evades capture indefinitely. The *cop number* $c(G)$ is the smallest number of cops which guarantee that the cops win on the graph G.

Meyniel's conjecture states that for a connected graph G on n vertices, $c(G) = O(\sqrt{n})$; families of graphs which attain the conjectured asymptotically largest cop number are known as *Meyniel extremal*. Known Meyniel extremal families arise from incidence graphs of projective and affine geometries. Motivated by such results, we investigate the cop number of various graphs based on combinatorial designs, such as incidence graphs, point graphs and block intersection graphs. We give bounds on the cop number of such graphs, and in some cases find new Meyniel extremal families.

This is joint work with Anthony Bonato.