Combinatorics Seminar

Friday Nov 14th, 2014
2:00 pm-2:50 pm in Hume 331

The Robber Locating Game

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ABSTRACT

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In 2012 Seager introduced a new variant of the Cops and Robbers game, in which a cop searches for a moving robber on a graph using distance probes. The robber on his turn can either remain still or move to an adjacent vertex, while the cop on her turn probes any vertex and learns the robbers distance from the probed vertex. The game ends if after some probe the cop knows the robbers location exactly, in which case she wins. If the robber can always ensure some ambiguity in his position then the game continues forever, in which case we say the robber wins. Some basic results about a graph being cop-win or robber-win are known, but in general the question of classifying graphs remains open.

Carraher, Choi, Delcourt, Erickson and West later showed that for any fixed graph G there is a winning strategy for the cop on the graph $G^{1/m}$, obtained by replacing each edge of G by a path of length m, if m is sufficiently large. They conjectured that the cop does not have a winning strategy on $K_n^{1/m}$ if $m < n$; we show that in fact the cop wins if and only if $m > n/2$, for all but a few small values of n. We also give a complete answer to the question of when the cop has a winning strategy on $K_{a,b}^{1/m}$. If time permits we may also comment on recently developments in this approach for infinite graphs.

This is joint work with John Haslegrave in University of Sheffield and Sebastian Koch at University of Cambridge.

Keywords: cops and robbers, distance query, subdivision