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*Ultimately, How Independent is the 5-Wheel?*

The ultimate independence ratio of a graph $G$ is defined as $\mathcal{I}(G) = \lim_{k\to\infty} \frac{\alpha(G^{\Box k})}{|V(G)|^k}$, where $\alpha(G^{\Box k})$ is the independence number of the Cartesian product of $k$ copies of $G$. For all graphs $G$, Hahn, Hell, and Poljak (1995) proved that $\frac{1}{\chi(G)} \leq \mathcal{I}(G) \leq \frac{1}{\omega(G)}$ where $\chi(G)$ is the chromatic number, and $\omega(G)$ is the clique number of $G$. Motivated by this, the same authors conjectured that for all odd wheels $\mathcal{I}(W_{2t+1}) = \frac{1}{4}$. By combine counting arguments, novel recursive bounds on $\alpha(G^{\Box k})$ which yield generalized inequalities for $\mathcal{I}(G)$, and computer-assisted calculation in the $W_5$ case we provide the first progress on this conjecture in three decades.

This is joint work with Hitesh Kumar and Shivaramakrishna Pragada.