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The Ramsey number of
a long even cycle versus a star

Given two graphs, G and H, the Ramsey number $R(G, H)$ is the smallest integer N such that any 2-coloring of the edges of the complete graph on N vertices K_N leads to a monochromatic copy of either G or H. We find the exact value of $R(C_{2\ell}, K_{1,n})$, when ℓ and $n = O(\ell^{10/9})$ are large.

Theorem. *For every $t \geq 2$, $\ell \geq (19.1t)^9$, and n such that $(t-1)(2\ell - 1) \leq n - 1 < t(2\ell - 1)$, we have*

$$R(C_{2\ell}, K_{1,n}) = f_t(\ell, n) + 1,$$

where
$$f_t(\ell, n) = \max\{t(2\ell - 1), n + \lfloor (n-1)/t \rfloor\}.$$

Our result is closely related to the behaviour of Turán number $\mathrm{ex}(n, C_{2\ell})$ for an even cycle whose length grows quickly with n.

This is joint work with Tomasz Łuczak and Yanbo Zhang.