6TH DIAGONAL RAMSEY NUMBER IS AT MOST 147

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The diagonal Ramsey number $R(k)$ is the smallest order of a complete graph such that any 2-coloring of its edges contain a monchromatic complete subgraph of order k. It is well known that

$$a \cdot k2^{k/2} < R(k) < (4-b)^k$$

for some absolute constants $a > 0$ and $b > 0$. On the other extreme, we know that $R(3) = 6$ and $R(4) = 18$, but already the exact value of $R(5)$ is not known.

Determining the exact value of $R(k)$ for small values of $k \geq 5$ is a challenging problem, and a well known quote of Erdős says that if aliens invade the Earth and demand within a year the exact value of $R(6)$, then we should rather attempt to destroy the aliens than determine $R(6)$. In this talk, we use the flag algebra method to show $R(6)$ is at most 147 improving on the previous upper bound $R(6) \leq 161$.

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