

THEMATIC SESSION: Discrete Mathematics

Unavoidable patterns in 2-edge colorings of the complete graph

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We study the color patterns that, for n sufficiently large, are unavoidable in 2-colorings of the edges of a complete graph K_n with respect to $\min\{e(R), e(B)\}$, where $e(R)$ and $e(B)$ are the numbers of red and, respectively, blue edges. More precisely, we completely characterize which patterns are unavoidable depending on the order of magnitude of $\min\{e(R), e(B)\}$ (in terms of n), and show how these patterns evolve from the case without restriction in the coloring, namely that $\min\{e(R), e(B)\} \geq 0$ (given by Ramsey's theorem), to the highest possible restriction, namely that $|e(R) - e(B)| \leq 1$.