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Upper bounds on the chromatic number of low dimensional spaces

Let $\chi(\mathbb{E}^n)$ denote the chromatic number of the Euclidean space $\mathbb{E}^n$, i.e., the smallest number of colors needed to color points of $\mathbb{E}^n$ so that no two points unit distance apart are of the same color.

In this talk I will present explicit constructions of colorings of $\mathbb{E}^n$ based on sublattice coloring schemes and establish some new upper bounds. For example, I will provide the construction for the following bounds: $\chi(\mathbb{E}^5) \leq 140$, $\chi(\mathbb{E}^n) \leq 7^{n/2}$ for $n \in \{6, 8, 24\}$, and $\chi(\mathbb{E}^n) \leq 3^n$ for all $n \leq 38$ and $n = 48, 49$.

This talk is based on a joint work with Andriy Bondarenko, Andriy Prymak, and Danylo Radchenko.