Rainbow Numbers of $[n]$ for Linear Equations

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Consider the set $\{1, 2, \ldots, n\} = [n]$ and an equation eq. The rainbow number of $[n]$ for eq, denoted $\mathrm{rb}([n], eq)$, is the smallest number of colors such that for every exact $\mathrm{rb}([n], eq)$-coloring of $[n]$, there exists a solution to eq with every member of the solution set assigned a distinct color. This talk focuses on linear equations and, in particular, we establish the rainbow number for the equations $x_1 + x_2 = x_3$ and $x_1 + x_2 + x_3 = x_4$, and a general lower bound for $x_1 + x_2 + \cdots + x_{k-1} = x_k$ for $k \geq 5$. Joint work with Hunter Rehm, Simon Wagner, and Nathan Warnberg.

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