Highly constrained edge-colorings of complete graphs, part II.

In this continuation of Part I, we discuss recent progress on several problems.

Let $C = \{r, b_1, \ldots, b_n\}$ and let $T = C^3 \setminus \{b_1, \ldots, b_n\}^3$. Thus $r$ is a flexible color in $T$. Alm, Maddux, and Manske showed in 2007 that $T$ was realizable for all $n$ using probabilistic methods. Recently, Alm and Sexton showed that for $n = 2$, $T$ is realizable on $K_{8192}$.

For $T_1$, it was known until recently only that $T_1$ was realizable for $1 \leq n \leq 7$. The authors showed in 2013-14 that $T_1$ is realizable for all $n \leq 400$, except possibly $n = 8$ and $n = 13$. Finally, the authors solved one of the two remaining minimal cases of the flexible color conjecture, where there are two colors, red and directed blue, and the only triangle that is forbidden is the “cycle” $(\vec{b}, \vec{b}, \vec{b})$.

All of these recent results were obtained using computational methods on finite groups. (Received July 28, 2014)