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Octahedral Designs

An octahedral design of order v, or $\mathrm{oc}\,v$, is a decomposition of all oriented triples on v points into oriented octahedra. Hanani settled the existence of these designs in the unoriented case. We show that an $\mathrm{oc}\,v$ exists if and only if $v \equiv 1, 2, 6 \pmod 8$ (the admissible numbers), and moreover the constructed $\mathrm{oc}\,v$ are indecomposble, i.e., the octahedra cannot be paired into mirror images. We show that an $\mathrm{oc}\,v$ with a subdesign $\mathrm{oc}\,u$ exists if and only if v and u are admissible and $v \geq u + 4$.

This is joint work with Prof. V. Linek.