

ALGEBRA
SEMINAR

*Torsion subgroups of rational elliptic curves over the
compositum of all cubic fields.*

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Abstract: Let E/\mathbb{Q} be an elliptic curve and let $\mathbb{Q}(3^\infty)$ denote the compositum of all cubic extensions of \mathbb{Q} . While the group $E(3^\infty)$ is not finitely generated, one can show that its torsion subgroup is finite; this holds more generally for any Galois extension of \mathbb{Q} that contains only finitely many roots of unity. I will describe joint work with Daniels, Lozano-Robledo, and Najman, in which we obtain a complete classification of the 20 torsion subgroups that can and do occur, along with an explicit description of the elliptic curves E/\mathbb{Q} that realize each possibility (up to twists). This is achieved by determining the rational points on a corresponding set of modular curves and relies on several recent results related to the mod- n Galois representations attached to elliptic curves over \mathbb{Q} .

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MATHEMATICS AND COMPUTER SCIENCE
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