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Minimal Torsion Curves in Geometric Isogeny Classes

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Abstract: Let E/\mathbb{Q} be a non-CM elliptic curve and let \mathcal{E} denote the collection of all elliptic curves geometrically isogenous to E . That is, for every $E' \in \mathcal{E}$, there exists an isogeny $\varphi : E \rightarrow E'$ defined over $\overline{\mathbb{Q}}$. We will discuss the problem of identifying minimal torsion curves in \mathcal{E} , which are elliptic curves $E' \in \mathcal{E}$ attaining a point of prime-power order in least possible degree. Using recent classification results of Rouse, Sutherland, and Zureick-Brown, we obtain an answer to this question in many cases, including a complete characterization for points of odd degree.

This is joint work with Nina Ryalls and Lori Watson.

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