



**Speaker:** Benjamin Bakker  
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Friday, November 8, 2013  
3:30 PM  
258 Hurley Hall

**Title:** On the Frey-Mazur conjecture over low genus curves

**Abstract:**

A crucial step in the proof of Fermat's last theorem was Frey's insight that a nontrivial solution would yield an elliptic curve with modular  $p$ -torsion but which was itself not modular. The connection between an elliptic curve and its  $p$ -torsion is very deep: a conjecture of Frey and Mazur stating that  $p$ -torsion actually determines the elliptic curve up to isogeny (at least when  $p > 13$ ) implies an asymptotic generalization of Fermat's last theorem. We study a geometric analog of this conjecture, and show that the map from isogeny classes of "fake elliptic curves"---abelian surfaces with quaternionic multiplication---to their  $p$ -torsion Galois representations is at most two-to-one, and one-to-one in special cases. Our proof fundamentally uses the interaction between the hyperbolic and algebraic properties of Shimura varieties. This is joint work with Jacob Tsimerman.