

Mathematics Department Colloquium

Organizer: Maciej Zworski

Thursdays, 4:10–5:00pm, 60 Evans

January 27 **William Stein**, Harvard University

Visibility of Shafarevich-Tate Groups of Modular Abelian Varieties at Higher Level

I will begin by introducing the Birch and Swinnerton-Dyer conjecture in the context of abelian varieties attached to modular forms, and discuss some of the main results about it. I will then introduce Mazur's notion of visibility of Shafarevich-Tate groups and explain some of the basic facts and theorems. Cremona, Mazur, Agashe, and myself carried out large computations about visibility for modular abelian varieties of level N in $J_0(N)$. These computations addressed the following question: If A is a modular abelian variety of level N , how much of the Shafarevich-Tate group of A is modular of level N , i.e., visible in $J_0(N)$. The results of these computations suggest that often much of the Shafarevich-Tate group is not modular of level N . This suggests asking if every element is modular of level $N * m$, for some auxiliary integer m , and if so, what can one say about the set of such m ? I will finish the talk with some new data and thoughts about this last question, which is still very much open.