Philadelphia Area Number Theory Seminar

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A modular construction of unramified p-extensions of $\mathbb{Q}(N^{1/p})$

Abstract: In Mazur's seminal work on the Eisenstein ideal, he showed that when N and $p > 3$ are primes, there is a weight 2 cusp form of level N congruent to the unique weight 2 Eisenstein series of level N if and only $N \equiv 1 \bmod p$. Calegari–Emerton, Merel, Lecouturier, and Wake–Wang-Erickson have work that relates these cuspidal-Eisenstein congruences to the p-part of the class group of $\mathbb{Q}(N^{1/p})$. Calegari observed that when $N \equiv -1 \bmod p$, one can use Galois cohomology and some ideas of Wake–Wang-Erickson to show that p divides the class number of $\mathbb{Q}(N^{1/p})$. He asked whether there is a way to directly construct the relevant degree p everywhere unramified extension of $\mathbb{Q}(N^{1/p})$ in this case. After discussing some of this background, I will report of work with Preston Wake in which we give a positive answer to this question using cuspidal-Eisenstein congruences at prime-square level.

Thursday, October 28, 2021
3:25 – 4:45 PM

Swarthmore College
Department of Mathematics and Statistics
Science Center **149**

Informal refreshments at 3:10PM