Math 209 - Number Theory Seminar

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An application of (harmonic (families of))
automorphic forms to Galois theory

Abstract:

A number of questions in Galois theory can be phrased in the following way: how large (in various senses) can the Galois group \( G \) of an extension of the rational numbers be, if the extension is only allowed to ramify at a small set of primes? If we assume that \( G \) is abelian, class field theory provides a complete answer, but the question is open is almost every nonabelian case, since there is no known way to systematically and explicitly construct such extensions in full generality.

However, there have been some programs that are gaining ground on this front. While the problem above is natural and the objects are classical, we will see that to answer certain questions about the largeness of this Galois group, it seems necessary to use techniques involving automorphic forms and their representation-theoretic avatars. In particular, it will turn out that some recent results on harmonic families of automorphic forms translate to the fact that such number fields, despite not being explicitly constructible by known methods, turn out to exist in abundance and allow us to find bounds on the sizes of such Galois groups.

Special Note:

There will be a pre-talk from 1:15 - 1:45 for graduate students and postdocs.

Host: Kiran Kedlaya

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