

2013-2014 Distinguished Lecture Series

UCLA Department of Mathematics

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Institute for Advanced Study

Lecture 1: Reciprocity laws

Abstract: Reciprocity laws provide a rule to count the number of solutions to a fixed polynomial equation, or system of polynomial equations, modulo a variable prime number. The rule will involve very different objects: automorphic forms and discrete subgroups of Lie groups. The prototypical example is Gauss' law of quadratic reciprocity, which concerns a quadratic equation in one variable. Another celebrated example is the Shimura-Taniyama conjecture which concerns a cubic equation in two variables. I will start with Gauss' law and work my way up to somewhat more complicated examples. At the end of the talk I hope to indicate the current state of our knowledge

Lecture 2: Galois theory and locally symmetric manifolds

Abstract: I will describe recent results showing that one can attach Galois representations to classes in the cohomology of the certain locally symmetric (real) manifolds, namely the quotients of the space of totally positive real symmetric matrices by congruence subgroups of $GL(n, \mathbb{Z})$. I will discuss both my joint work with Harris, Lan and Thorne concerning cohomology with rational coefficients and the work of Scholze on cohomology with coefficients in a finite field. If time permits I will give some indication of the proofs.

Lecture 3: Reciprocity laws for regular, self-dual motives

Abstract: I will discuss recent work with Stefan Patrikis proving the automorphy of regular self-dual motives over the rational numbers. In previous work with Barnet-Lamb, Gee, and Geraghty this was shown modulo an irreducibility hypothesis on the corresponding l -adic representations. The innovation in the more recent work is a simple trick that allows us to by-pass this irreducibility hypothesis that can be hard to check in practice



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Lecture 1

Thursday, October 31, 2013
3:00 - 3:50 pm
MS 6627

Lecture 2

Tuesday, November 5, 2013
3:00 - 3:50 pm
MS 6627

Lecture 3

Wednesday, November 6, 2013
3:00 - 3:50 pm
MS 6627