



Thematic Program on Galois Representations and Automorphic Forms

# COXETER

## LECTURE SERIES



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**February 29–March 2, 2012 • Fields Institute**

## Open Questions about Motives Attached to Automorphic Forms

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FEBRUARY 29, 2012

### Public Lecture

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Ngô Bảo Châu's proof of the Fundamental Lemma has led to confirmation of an important prediction of the Langlands program, namely the existence of a correspondence between certain kinds of representations of Galois groups of number fields and certain classes of automorphic representations. Combined with the methods introduced by Wiles, this correspondence has been applied to solve traditional problems in algebraic number theory, including the Sato-Tate conjecture. The lecture will review some of these results and situate them in the general framework of the Langlands program.

MARCH 1–2, 2012

### Specialized Lectures

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The Galois representations attached to an automorphic representation are, in most cases, realized on the  $l$ -adic cohomology of a Shimura variety. Other cohomology theories give rise to different kinds of arithmetic structures, and each such structure can be interpreted as a realization of the motive attached to the automorphic representation. Relations among Galois representations are expected to reflect relations among the corresponding motives, which in turn imply explicit relations among integrals attached to automorphic forms on different groups, a vast generalization of Shimura's theory of CM periods for arithmetic holomorphic automorphic forms.

In these lectures, some of the motivating conjectures will be outlined. A few of these will be described in detail, especially those connected to conjectures of Ichino and Ikeda on special values of  $L$ -functions.



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