

**Tata Institute of Fundamental Research
is pleased to present**

Some connections between representation theory and number theory

**Mathematical Panorama Lectures
(A National Mathematics Year Event)**

Professor Benedict Gross, George Vasmer Leverett Professor of Mathematics, Harvard University will give a course of lectures (Panorama lectures) at the

**Tata Institute of Fundamental Research, Mumbai,
January 7-10, 2013.**

About the Speaker: Professor Gross is a distinguished number theorist who has made fundamental contributions to many aspects of the subject. His most famous result is the Gross-Zagier formula, whose generalisations and higher dimensional analogues continue to fascinate mathematicians.

Professor Gross received his PhD from Harvard University in 1978. He joined Harvard University as a full professor in 1985 and since then has served as the Chair of Mathematics Department and as the Dean of Harvard College. In 1986 he was awarded a MacArthur Fellowship. He was awarded the Cole Prize of the American Mathematical Society in 1987 and was elected a member of the National Academy of Science in 2004.



The timing of the lectures will be 11:30 AM – 1:00 PM on 7 – 10 January, 2013.

1. ***Zeta functions for \mathbb{Q} and quadratic fields. Dirichlet L -functions.***

In this talk, I will recall the high points of Euler's work on the zeta function, including his proof that the values at negative integers were rational numbers. I will introduce Dirichlet L -functions, and discuss Dirichlet's analytic interpretation of quadratic reciprocity.

2. ***Artin L -functions.***

In this talk, I will give an introduction to Artin's L -functions, associated to a complex representation of the Galois group of a number field. After some basic number theory needed to define these functions, I will discuss the rationality and integrality results known for their values at negative integers.

3. ***Reductive groups G and their cohomology.***

In this talk, I will give an introduction to the structure of reductive groups over a field k , and attach to each group a Galois representation which describes its cohomology. I will also consider the value of the Artin L -function of this representation at $s = 0$, and relate it to the ratio of two Haar measures on the group, when k is a finite, or local, or global field.

4. ***The dimension of spaces of automorphic forms.***

The trace formula gives a method to calculate the dimension of certain vector spaces of automorphic forms, in terms of orbital integrals over conjugacy classes in a reductive group. I will show how the results in the previous talk allow us to evaluate the terms corresponding to central classes, using Artin L -functions at negative integers.

All are welcome