

General Mathematics Seminar
of the
University of Luxembourg
in cooperation with the
Luxembourg Mathematical Society

March, 2012

Tuesday, March 13 , 2012, at 17:00

Campus Kirchberg, Room B02

Christian Kappen
(University Duisburg-Essen)

Base change conductors of abelian varieties

Abstract:

I will briefly discuss Néron models of smooth varieties over local fields. I will then introduce base change conductors; they provide a measure of the growth of Néron models under ramified base change. I will explain how to compute the base change conductor $c(A)$ of an abelian variety A over a local field with positive residue characteristic p in the case where A has potentially ordinary reduction. To this end, I will introduce a refinement of the Artin distribution, and I will sketch a proof of the fact that $c(A)$ coincides with the resulting refined Artin conductor of a \mathbb{Q}_p -rational Galois representation that is naturally attached to A . This is work in progress with Ching-Li Chai.

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Tuesday, March 20, 2012, at 17:00

Campus Kirchberg, Room B02

Yuri Bilu
(University of Bordeaux)

Uniformity in Galois Representations

Abstract:

Let p be a prime number and E an elliptic curve over \mathbb{Q} without complex multiplication. We consider the representation of the absolute Galois group $G_{\mathbb{Q}} \rightarrow GL_2(\mathbb{F}_p)$ arising from its action on the p -torsion points of E . Serre (1972) investigated the image of this representation; in particular, he proved that for sufficiently large p this representation is surjective. Here "sufficiently large" depends on the curve E , and Serre asked whether the same statement holds true uniformly in E , for p exceeding some absolute constant. One can even conjecture that $p > 37$ would do.

To answer this question affirmatively, one needs to show that the image of the the Galois representation is not contained in one of the following maximal subgroups of $GL_2(\mathbb{F}_p)$: Borel subgroup; normalizer of a split Cartan subgroup; normalizer of a non-split Cartan subgroup. The Borel case for $p > 37$ follows from Mazur's celebrated work (1978) on rational isogenies. In the present talk I will speak on a recent joint work with Pierre Parent and Marusia Rebolledo, where we settle the split Cartan case: for $p > 13$ the image of the Galois representation is not contained in the normalizer of a split Cartan subgroup. This is a part of a more general result on modular curves.

Thus, only the non-split Cartan case remains unsolved.

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Tuesday, March 27, 2012, at 17:00

Campus Kirchberg, Room B02

Christian Pauly
(University of Nice)

Conformal Blocks: old and new

Abstract:

Conformal Blocks are finite-dimensional vector spaces, which naturally arise in Conformal Field Theory, a two-dimensional Quantum Field Theory defined over Riemann surfaces. The Wess-Zumino-Witten model of Conformal Blocks, using representation theory of affine Lie algebras, was constructed and studied around 1988, mainly by Tsuchiya, Ueno and Yamada. In the first part of this talk I will briefly sketch some (old) important results like the Verlinde formula, giving the dimension of the Conformal Blocks, the existence of a projectively flat connection on the sheaf of Conformal Blocks, and its relation to the theory of vector bundles over algebraic curves. I then will survey a series of more recent results establishing a rank-level duality between the Conformal Blocks for the Lie algebras $\mathfrak{sl}(r)$ and $\mathfrak{sl}(l)$. Finally, if time permits, I will report on recent progress made by Ramadas and Belkale on the unitarity of the connection on the sheaf of Conformal Blocks.