School of Mathematics
Tata Institute of Fundamental Research

03 October, 2023

Ph.D. Thesis Defense

Speaker	:	*Anand U. Chitrao*
Title	:	*Reductions mod p of semi-stable representations*
Date & Time	:	*Wednesday, 11 October, 2023 at 2:30 p.m.*
Venue	:	**Lecture Room (AG-77)** *as well as Via Zoom*

Abstract

We compute the reductions mod p of irreducible two-dimensional semi-stable representations of the absolute Galois group $\mathrm{Gal}(\overline{\mathbb{Q}}_p/\mathbb{Q}_p)$. We discuss two approaches.

In the first approach, we present an explicit sequence of irreducible two-dimensional crystalline representations converging to a given irreducible two-dimensional semi-stable representation. This convergence happens in a rigid analytic blow-up space parameterizing two-dimensional semi-stable representations of $\mathrm{Gal}(\overline{\mathbb{Q}}_p/\mathbb{Q}_p)$. Using a local constancy result of Chenevier, we see that the reduction mod p of a semi-stable representation is the same as that of a close enough crystalline representation. Further using the zig-zag conjecture of Ghate for crystalline representations, we are able to compute the reduction mod p of irreducible two-dimensional semi-stable representations of small weights.

In the second approach, we present a new method to directly compute the reductions mod p of irreducible two-dimensional semi-stable representations. We use the compatibility with respect to reduction mod p between the p-adic Local Langlands correspondence and an Iwahori version of the mod p Local Langlands correspondence. By estimating certain logarithmic functions on $\mathbb{Q}_p$ by polynomials on open subsets of $\mathbb{Z}_p$, we compute the reductions mod p completely for weights at most $p+1$. In passing, we extend some results on Iwahori induction to the case of non-commutative Hecke algebras.

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