

NUMBER THEORY
SEMINAR

*Some Galois cohomology classes arising from the fundamental
group of a curve*

Padmavathi Srinivasan
University of Georgia

Abstract: We will first talk about the Ceresa class, which is the image under a cycle class map of a canonical algebraic cycle associated to a curve in its Jacobian. This class vanishes for all hyperelliptic curves and was expected to be nonvanishing for non-hyperelliptic curves. In joint work with Dean Bisogno, Wanlin Li and Daniel Litt, we construct a non-hyperelliptic genus 3 quotient of the Fricke–Macbeath curve with vanishing Ceresa class, using the character theory of the automorphism group of the curve, namely, $\mathrm{PSL}_2(\mathbf{F}_8)$. This will also include the tale of another genus 3 curve by Schoen that was lost and then found again!

Time permitting, we will also talk about some Galois cohomology classes that obstruct the existence of rational points on curves, by obstructing splittings to natural exact sequences coming from the fundamental group of a curve. In joint work with Wanlin Li, Daniel Litt and Nick Salter, we use these obstruction classes to give a new proof of Grothendieck’s section conjecture for the generic curve of genus $g > 2$. An analysis of the degeneration of these classes at the boundary of the moduli space of curves, combined with a specialization argument lets us prove the existence of infinitely many curves of each genus over p -adic fields and number fields that satisfy the section conjecture.

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