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*Joint Athens–Atlanta Number Theory Seminar*

David Harbater and Jacob Tsimerman

**Abstract:** Talks will be at the University of Georgia

**David Harbater** (University of Pennsylvania), 4:00  
Local-global principles for zero-cycles over semi-global fields

Classical local-global principles are given over global fields. This talk will discuss such principles over semi-global fields, which are function fields of curves defined over a complete discretely valued field. Paralleling a result that Y. Liang proved over number fields, we prove a local-global principle for zero-cycles on varieties over semi-global fields. This builds on earlier work about local-global principles for rational points. (Joint work with J.-L. Colliot-Thlène, J. Hartmann, D. Krashen, R. Parimala, J. Suresh.)

**Jacob Tsimerman** (U. Toronto), 5:15  
Cohen-Lenstra heuristics in the Presence of Roots of Unity

The class group is a natural abelian group one can associate to a number field, and it is natural to ask how it varies in families. Cohen and Lenstra famously proposed a model for families of quadratic fields based on random matrices of large rank, and this was later generalized by Cohen-Martinet to general number fields. However, their model was observed by Malle to have issues when the base field contains roots of unity. We explain that in this setting there are naturally defined additional invariants on the class group, and based on this we propose a refined model in the number field setting rooted in random matrix theory. Our conjecture is based on keeping track not only of the underlying group structure, but also certain natural pairings one can define in the presence of roots of unity. Specifically, if the base field contains roots of unity, we keep track of the class group  $G$  together with a naturally defined homomorphism  $G^*[n] \rightarrow G$  from the  $n$ -torsion of the Pontryagin dual of  $G$  to  $G$ . Using methods of Ellenberg-Venkatesh-Westerland, we can prove some of our conjecture in the function field setting.

Tuesday, February 20, 2018, 4:00 pm

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