Stanford Department of Mathematics Number Theory Seminar

October 28, 2019

2:30–3:30pm, 383N

Explicit Motivic Chabuaty–Kim

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Abstract

Minhyong Kim's non-abelian Chabauty's method provides a formalism for proving that curves have finitely many integral points, using bounds on the Galois cohomology of their fundamental groups. Dan-Cohen and Wewers, building on work of Hadian, showed how to upgrade this construction to a motivic one, replacing Bloch-Kato Selmer groups by algebraic K-theory.

The computations themselves mostly involve manipulations of "motivic polylogarithms", formal versions of special values of polylogarithms that conjecturally satisfy all of the same relations as the actual values but come with an extra rich algebraic structure (graded Hopf algebra). The values of these polylogarithms at integral points (as opposed to rational or p-adic points) are related to algebraic K-theory via this algebraic structure, which provides extra relations. Taking the p-adic realization of these relations then allows one to p-adically approximate the set of integral points.

We will review the work of Dan-Cohen and Wewers and then explain subsequent work of Dan-Cohen and the speaker in this direction. We also hope to indicate some work in progress by the speaker and others to do computations for elliptic curves (with a view toward higher genus curves in general). The latter involves some extra complications, partly due to the fact that one must use some form of the Beilinson-Bloch-Kato conjectures to understand the relevant algebraic K-theory.