Name: Shane Kelly

Number theory, Algebraic geometry

Keywords: motivic cohomology; motivic homotopy theory, K-theory, algebraic cycles; modular representation theory; differential forms; ramification theory; derived geometry

Current research: Most of my research is connected to Voevodsky's theory of motives in some way or another. The motive of an algebraic variety is, philosophically, an object which encodes information common to multiple cohomology theories (such as ℓ-adic cohomology, de Rham cohomology, or crystalline cohomology) at once. Voevodsky developed an approach to motives based on techniques from homotopy theory. In this approach one defines homotopy equivalence of varieties using the affine line instead of the unit interval which is used for topological spaces. In recent years I have become interested in applying such frameworks to questions in representation theory.

Notice for the students: Familiarity with basics of algebraic geometry, for example the level of Chapter 2 and Chapter 3 of Hartshorne, is required. I tend to work on questions quite heavy in homotopical algebra so it would be important to enjoy things such as ∞-categories, triangulated categories, dg-categories, etc.

I also have interests in persistent homology and elliptic curve cryptography and I'd be happy to supervise a masters thesis on such things for students not intending to pursue a research career.