Title: Selmer averages in families of elliptic curves and applications

Abstract: Orbits of many coregular representations of algebraic groups are closely linked to moduli spaces of genus one curves with extra data. We may use these orbit parametrizations to compute the average size of Selmer groups of elliptic curves in certain families, e.g., with marked points, thus obtaining upper bounds for the average ranks of the elliptic curves in these families. (This is joint work with Manjul Bhargava.) We will also describe multiple other applications and related work (some joint with collaborators, including Levent Alpöge, Manjul Bhargava, Tom Fisher, Jennifer Park).