SPEAKER: John Voight

TITLE: Computing Belyi maps, with arithmetic applications

ABSTRACT: In the first half of the talk, we survey the role of computation in Grothendieck's program of dessins d'enfants, or three-point branched covers of the projective line. We exhibit a uniform, numerical method that works explicitly with power series expansions of modular forms on finite index subgroups of Fuchsian triangle groups. This is joint work with Jeroen Sijsling and with Michael Klug, Michael Musty, and Sam Schiavone. In the second half, we discuss an arithmetic application of the ideas and methods presented in the first half. We present a method for constructing algebraic points on certain elliptic curves defined over number fields, combining the theory of Belyi maps and quaternionic Shimura varieties; our method generalizes the construction of Heegner points arising from classical modular curves. We report on some computational investigations of these points. This is partly joint work with Pete L. Clark.

RTG Title: *On Belyi maps*

RTG Abstract: *There is a marvelous and deep connection between four categories that look quite different: covers of the projective line minus three points (Belyi maps), triples of permutations whose product is the identity, finite index subgroups of triangle groups, and bicolored graphs equipped with a cyclic orientation. The consequences of these equivalences are myriad for geometry, arithmetic, combinatorics, and group theory. In this talk, we introduce these bijections, with many examples.*