Abstract

Let \( k \) be an algebraically closed field and \( \mathcal{M}_d \) the moduli space of rational maps on \( \mathbb{P}^1 \) of degree \( d \) over \( k \). This talk will describe the automorphism loci \( A \subset \text{Rat}_d \) and \( A \subset \mathcal{M}_d \) and the singular locus \( S \subset \mathcal{M}_d \).

In particular, we determine the possible orders of any automorphism of some \( \langle \phi \rangle \in \mathcal{M}_d \) in terms of \( d \), calculate the codimension \( \text{codim}(S, \mathcal{M}_d) \), and strengthen a known uniform bound on the automorphism group of any rational map in terms of \( d \). Next, we prove an analogous theorem to the Rauch-Popp-Oort characterization of singular points on the moduli scheme for curves. The results concerning these distinguished loci are used to compute the Picard and class groups of \( \mathcal{M}_d \), the moduli space of stable rational maps \( \mathcal{M}'_d \), and semi-stable rational maps \( \mathcal{M}^s_d \). This work is joint with Nikita Miasnikov (City University of New York) and Phillip Williams (The King’s College).