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 $A \subset \mathrm{Rat_d}$ and $\mathcal{A} \subset \mathcal{M}_d$ and the singular locus $\mathcal{S} \subset \mathcal{M}_d$. 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 $\mathrm{codim}(\mathcal{S}, \mathcal{M}_d)$, 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 $\mathcal{M}_d^s$, and semi-stable rational maps $\mathcal{M}_d^{ss}$. This work is joint with Nikita Miasnikov (City University of New York) and Phillip Williams (The King's College).