MONODROMY OF SMOOTH QUARTIC PLANE CURVES

Fudan Topology Seminar

Speaker: Reid Monroe Harris

The Chinese University of Hong Kong, Shenzhen

Time: Thursday 1:30pm – 3:30pm, Nov. 24 2022

Meeting Zoom ID: 853 0188 1524 Password: Fudan2022

Abstract: We consider the parameter space U_d of smooth plane curves of degree d. The universal smooth plane curve of degree d is a fiber bundle $\mathcal{E}_d \longrightarrow U_d$ with fiber diffeomorphic to a surface Σ_g. This bundle gives rise to a monodromy homomorphism $\rho_d: \pi_1(U_d) \longrightarrow Mod(\Sigma_g)$, where $Mod(\Sigma_g) \coloneqq \pi_1(Diff^+(\Sigma_g))$ is the mapping class group of Σ_g.The main result of this talk is that the kernel of $\rho_4: \pi_1(U_4) \longrightarrow Mod(\Sigma_3)$ is isomorphic to $F_\infty \times \mathbb{Z}/3\mathbb{Z}$, where F_∞ is a free group of countably infinite rank. In the process of proving this theorem, we show that the complement $T_g \backslash H_g$ of the hyperelliptic locus H_g in Teichmüller space T_g has the homotopy type of an infinite wedge of spheres. As a corollary, we obtain that the moduli space of plane quartic curves is aspherical. The proofs use results from the Weil-Petersson geometry of Teichmüller space together with results from algebraic geometry.