JAMES RICKARDS, McGill

Number theoretic intersection numbers on Riemann surfaces

Consider a Riemann surface R, which is given as the quotient of the hyperbolic upper half plane $\mathcal{H}$ by G, a discrete subgroup of $\mathsf{PSL}(2,\mathbb{R})$. A classical construction of closed geodesics on R comes from taking the (real) fixed points of a hyperbolic matrix in G, and forming the hyperbolic geodesic between them. We ask the question: "given two such geodesics, how many times do they intersect on R?" We will focus on the case of $G=\mathsf{PSL}(2,\mathbb{Z})$, in which these geodesics correspond to indefinite binary quadratic forms. We will also touch upon the case where R is a Shimura curve; this case relates to the work on explicit class field theory for real quadratic number fields by Darmon and Vonk.