Speaker: Anshul Adve

Title: Algebraic equations characterizing hyperbolic surface spectra

Abstract: Given a compact hyperbolic surface of fixed genus, together with a suitable choice of orthonormal basis of automorphic forms, one can consider two natural spectral invariants: 1) the Laplace spectrum Lambda, and 2) the 3-tensor C_{ijk} representing pointwise multiplication (as a densely defined map $L^2 \times L^2 \to L^2$) in the given basis. Which pairs (Lambda, C) arise this way? Both Lambda and C are highly transcendental objects. Nevertheless, we will give a concrete and almost completely algebraic answer to this question, by writing down necessary and sufficient conditions in the form of equations satisfied by the Laplace eigenvalues and the C_{ijk}. This answer was conjectured by physicists Kravchuk, Mazac, and Pal, who introduced these equations (in an equivalent form) as a rigorous model for the crossing equations in conformal field theory.