Representation Theory, Geometry & Combinatorics Seminar

Organizer: M. Haiman and K. Reshetikhin

Monday, 1:00–3:00pm, 939 Evans

April 20 **Ajay Ramadoss**, Cornell

A Hirzebruch-Riemann-Roch theorem for differential operators

Let E be a holomorphic vector bundle over a compact complex manifold X. The Hirzebruch Riemann-Roch theorem computes the Euler characteristic of E in terms of its Chern character and the Todd class of the tangent bundle of X. To be precise,

$$\chi(X, E) = \int_X \mathrm{ch}(E).\mathrm{td}(T_X).$$

Every holomorphic differential operator D on E induces endomorphisms on each cohomology of X with coefficients in E. The alternating sum of the traces of these endomorphisms yields the supertrace (or Lefschetz number) of D. Note that the supertrace of the identity on E is precisely the Euler characteristic of E. In recent times, a Hirzebruch Riemann-Roch theorem for differential operators has been proven by at least two different approaches. This result says that the Lefschetz number of D is the integral over X of a class in the top cohomology of X constructed out of D. In this talk, I shall sketch one of the approaches to this result. This result provides a direct bridge between the algebraic index theorem of Bressler, Nest and Tsygan and the Hirzebruch Riemann-Roch theorem.