

Berkeley-Stanford Algebraic Geometry Colloquium

Tuesday, January 22, at Stanford

Lothar Göttsche (ICTP - Trieste) 3:45-4:45, Room 383-N

Instanton counting and K-theoretic Donaldson invariants

Abstract: This is an overview talk of joint work with H. Nakajima and K. Yoshioka. The Donaldson invariants can be computed in Algebraic Geometry as intersection numbers on moduli spaces of vector bundles on compact algebraic surfaces. K-theoretic refinement of the Donaldson invariants is given by the holomorphic Euler characteristics of line bundles on these moduli spaces. We expect that these K-theoretic Donaldson invariants have properties very similar to those of the usual Donaldson invariants.

The Nekrasov partition function (which has also a K-theoretic version) is the generating function of equivariant Donaldson invariants of \mathbb{R}^4 . By the Nekrasov conjecture (proved by several authors) it has nice regularity properties and is related to modular forms.

We express the (K-theoretic) Donaldson invariants of rational algebraic surfaces in terms of the Nekrasov partition function, and use this to give a generating function for these invariants in terms of elliptic functions. I will also talk about applications and generalizations of these results.

Jacob Lurie (MIT) 5:15-6:15, Room 380-C

Elliptic cohomology

Abstract: This talk will be an introduction to the theory of elliptic cohomology, aimed at an audience of algebraic geometers. I'll begin by briefly reviewing what a cohomology theory is, and will then describe some of Quillen's ideas relating cohomology theories with formal groups. Cohomology theories which are associated to formal groups of elliptic curves turn out to be particularly interesting, and can be studied using ideas from many areas of mathematics (number theory, algebraic topology, representation theory of loop groups, mathematical physics, etc.). The main goal of this talk will be to explain the Hopkins-Miller theory of "topological modular forms" (which can be regarded as a "universal" elliptic cohomology theory). If time permits, I will explain how elliptic cohomology relates to the theory of the Witten genus.

The Berkeley-Stanford Algebraic Geometry Colloquium covers the full range of topics in algebraic geometry, and is intended for a broader audience than a typical research seminar. Graduate students and researchers in nearby fields are particularly welcome. Each meeting features two speakers chosen for their contributions to the field and their expository ability.

There will be a dinner afterward.

To organize transportation from Berkeley to Stanford, please contact David Eisenbud, Dagan Karp, Martin Olsson, or Mauricio Velasco.