Title: Virtual topological invariants of moduli spaces of sheaves on surfaces.

Abstract: Using arguments from theoretical physics, Vafa and Witten gave a generating function for the Euler numbers of moduli spaces of rank 2 coherent sheaves on algebraic surfaces.

These moduli spaces are in general very singular, but they carry a perfect obstruction theory. We conjecture that the Vafa-Witten formula is true for the virtual Euler numbers. We confirm this conjecture in many examples.
Then we give refinements of the conjecture.
Our approach is based on Mochizuki's formula which reduces virtual intersection numbers on moduli spaces of sheaves to intersection numbers on Hilbert schemes of points.
If time permits we will also talk about other applications in particular to the analogue of a Verlinde formula for algebraic surfaces.