



# GEOMETRY, TOPOLOGY, AND PHYSICS SEMINAR

## Introduction to Wall-Crossing Formulas

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Friday, October 3rd, 2008, 4:00 p.m.  
Room 6635 South Hall

**Abstract:** Wall-crossing formulas first arose in the celebrated work of Seiberg & Witten, where they related the count of “BPS quantum states” in one part of the moduli space (of certain quantum field theories) to the count in another part of the moduli space: this led directly to a new method for computing Donaldson invariants of 4-manifolds, and the rest is history.

We will introduce this area of study, aiming at the dramatic recent progress in understanding this kind of formula in other contexts, including cases where the curves on a Calabi–Yau manifold are being counted. The ingredients for this progress include considerations of symplectic geometry and a study of “Stokes factors” in differential equations. There is also a beautiful physics argument for the wall-crossing formulas (in some cases), involving a study of the 4-dimensional physical theory on  $\mathbb{R}^3 \times S^1$ .

Our study will also be related to an interesting theme in algebraic geometry during the past several years: how a moduli space changes when the “stability condition” used to define that moduli space changes.