



GEOMETRY, TOPOLOGY, AND PHYSICS SEMINAR

Organizational Meeting

Friday, September 26, 2008, 4:00 p.m.
Room 6635 South Hall

Abstract: This quarter, we will devote a large portion of the Geometry, Topology, and Physics seminar to the study of so-called “wall-crossing formulas.” Such formulas first arose in the celebrated work of Seiberg and 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. There has been some 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 $\mathbb{R}^3 \times S^1$.

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We will spend a number of weeks exploring some of these background topics before arriving at the wall-crossing formulae themselves. Here is a reading list to get us started:

D. Joyce: Holomorphic generating functions for invariants counting coherent sheaves on Calabi-Yau 3-folds. <http://arxiv.org/abs/hep-th/0607039>

T. Bridgeland, V. Toledano-Laredo: Stability conditions and Stokes factors.
<http://arxiv.org/abs/0801.3974>

D. Gaiotto, G. Moore, A. Neitzke: Four-dimensional wall-crossing via three-dimensional field theory. <http://arxiv.org/abs/0807.4723>

M. Kontsevich, K. Soibelman: to appear.