Stanford Algebraic Geometry Seminar

TOPOLOGICAL QUANTUM FIELD THEORY AND THE GROMOV-WITTEN THEORY OF CURVES IN CALABI-YAU THREEFOLDS

JIM BRYAN
University of British Columbia

Abstract:

Topological Quantum Field Theory, as formulated by Atiyah, has provided a general framework for understanding invariants of manifolds. The structure of TQFTs in dimension 1+1 (i.e. surfaces with boundaries) is completely understood by elementary means — yet they can still yield surprising results. For each positive integer d, we define a one-parameter family of 1+1 dimensional TQFTs $Z_d(t)$ which specializes at $t = 0$ to the famous Witten-Dijgraaf-Freed-Quinn TQFT for gauge theory with finite gauge group S_d (the dth symmetric group). Our family of TQFTs completely encodes all the degree d local Gromov-Witten invariants of a curve (of arbitrary genus) in a Calabi-Yau threefold. This provides us with a "structure theorem" for these local invariants (a.k.a. multiple cover formulas). As an application we use our theorem in combination with a conjecture from physics (the Gopakumar-Vafa conjecture) to completely determine the local invariants for $d = 1$, 2, and 3.

Friday, November 22
3:30 pm
Room 383–N

http://math.stanford.edu/~vakil/seminar.html