Topology, Algebraic Geometry, & Dynamics Seminar

Chern-Simons theory on cylinders and generalized Hamilton-Jacobi actions

Pavel Mnev, Notre Dame

We study the perturbative path integral of Chern-Simons theory on a cylinder [0,1]x Sigma with a holomorphic polarization on the boundaries, in the context of Batalin-Vilkovisky quantization (or rather its variant compatible with cutting-gluing, the "BV-BFV quantization"). We find that, in the case of non-abelian 3D Chern-Simons, the fiber BV integral for the system produces the gauged WZW model on Sigma. Classically, the result corresponds to computing a "generalized Hamilton-Jacobi action" for Chern-Simons theory on a cylinder — a generating function (in an appropriate sense) for the evolution relation induced on the boundary conditions by the equations of motion. A similar setup applied to 7D abelian Chern-Simons on a cylinder [0,1] x Sigma, with Sigma a Calabi-Yau of (real) dimension 6, with a linear polarization on one side and a nonlinear (Hitchin) polarization on the other side, is related to the Kodaira-Spencer (a.k.a. BCOV) theory. In the talk, I will introduce the concept of generalized Hamilton-Jacobi functions in the example of classical mechanics with constraints described by an equivariant moment map and proceed to discuss the examples above. This is a report on a joint work with Alberto S. Cattaneo and Konstantin Wernli.

Date: Friday, December 4, 2020
Time: 1:30-2:30 pm
Place: 4106 Exploratory Hall

For special accommodations, please contact David Carchedi via email at dcarched@gmu.edu.