THE UNIVERSITY OF HONG KONG

Institute of Mathematical Research
Department of Mathematics

REVISED

GEOMETRY SEMINAR

Cohomology in the Batalin-Vilkovisky approach to field theories

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Abstract

Batalin and Vilkovisky have introduced a very powerful formalism for describing generalized gauge symmetries in field theory. This consists of three parts: a graded analogue of symplectic geometry; the description of gauge fixing via Lagrangian subspaces; and the identification of the resulting volume form on the Lagrangian submanifold as the functional integral of quantum field theory. In this talk, I will only discuss the first part, the graded analogue of symplectic geometry.

Felder and Kazhdan have suggested that the cohomology of the sheaf of functionals in this formalism should be bounded below: a more refined version of their principal suggests that the cohomology should vanish below degree $-d$, where d is the dimension of the worldsheet of the theory. (For example, $d = 1$ for classical mechanics, and $d = 4$ for Yang-Mills theory.) This is known to be the case in many purely bosonic field theories. In this talk, I examine two toy models of superstring theory, with $d = 1$ instead of $d = 2$. One of these, the spinning particle, is a toy model for the usual formalism of the superstring, while the other, the superpartice, is a toy model for the Green-Schwartz superstring. It turns out that the first of these exhibits serious pathologies in its cohomology, while the second does not. (The results on the superparticle are due to my student Sean Pohorenz.)

Date:	January 29, 2018 (Monday)
Time:	2:30 – 3:30pm
Venue:	Room 210, Run Run Shaw Bldg., HKU

All are welcome