Symposium on Higher Gauge Theory

ZEIT:
8.5.2007, 10:00 Uhr - 18:15 Uhr

ORT:
Albert-Einstein-Institut, Seminarraum
Am Mühlenberg 1
D-14476 Potsdam-Golm

PROGRAMM:

10:00 - 11:00 **Iskander Taimanov (Novosibirsk)**

Closed magnetic geodesics
We give a survey of the periodic problem for magnetic geodesics.

11:30 - 12:30 **Dennis Koh (Potsdam)**

String action and Generalized Harmonic Maps
In this talk we will introduce the notion of generalized harmonic maps appearing as critical points of a functional that is also considered in string theory. If (M,g) and (N,h) are two closed Riemannian manifolds, the functional is basically given by the energy of a map plus something involving the so-called B-field (Kalb-Ramond field). It turns out that in two special cases the associated Euler-Lagrange equation has interesting interpretations:
a) In dim(M)=1 we recover as generalized harmonic maps what is known in physics as magnetic geodesics (Lorentz force).
b) If dim(M)<dim(N), restricting the variation of the functional from the class of smooth maps to the class of isometric immersions from M to N has the meaning of prescribing the mean curvature vector field of M in N as a vector field determined by the H-field H=dB (curvature of a gerbe).
The idea is to show the existence of generalized harmonic maps with the heat flow method of Eells and Sampson. Short time existence is guaranteed, but long time existence is still a problem.

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12:30 - 14:00 Lunch Break

14:00 - 15:00 **Christian Becker (Potsdam)**

Sections and fibre integration in Deligne cohomology
In classical U(1) gauge theories, the potentials are local 1-forms, which transform naturally under gauge transformations, whereas the field strength is a globally defined 2-form. In geometric terms, those data are described as connections and curvature in principal U(1)-bundles.
Deligne cohomology classes generalize isomorphism classes of U(1) bundles with connection to objects, which are given locally as differential forms of higher degree. Those forms appear in string theory, e.g. as the B-field or even higher form fields. We discuss a notion of sections in Deligne cohomology classes.

In the talk we discuss a notion of sections for Deligne cohomology classes. We further discuss different approaches to a notion of intergration along the fibre for Deligne cohomology classes. This is of interest for the construction of transgression maps (which yield line isomorphism classes of line bundles on loop space from degree 2 Deligne cohomology classes) and topological quantum field theories in the sense of Atiyah.

15:00 - 16:00 Coffee Break

16:00 - 17:00 **Johan Dupont (Aarhus)**

Gerbes, simplicial forms and Deligne cohomology
This reports on some joint work with Franz W. Kamber.
The notion of smooth Deligne cohomology is conveniently reformulated in terms of the simplicial deRham complex. In particular the usual Chern-Weil and Chern-Simons theory is well adapted to this framework and rather easily gives rise to characteristic Deligne cohomology classes associated to families of bundles and connections. The construction provides representing cocycles in the usual Cech-deRham model for smooth Deligne cohomology called "gerbes with connectionäs they generalize usual Hermitian line bundles with connection. Another application is an extension of the notion of linear equivalence of divisors on a Riemann surface to cycles in a Riemannian manifold.

17:15 - 18:15 **Christoph Schweigert (Hamburg)**

Gerbe modules and gerbe bimodules
Gerbe modules have recently attracted as twisted twisted vector

bundles much attention. Considerations from conformal field theory suggest the notion of a gerbe bimodule. We explain how to define a notion of holonomy in the presence of gerbe modules and gerbe bimodules.
Gerbe bimodules should admit a notion of a tensor product; we indicate how the Verlinde algebra should arise in the tensor product of gerbe bimodules on compact connected and simply connected Lie groups.

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