



## Seminar des SFB 647

### ZEIT:

11.5.2009, 15:00 Uhr - 18:00 Uhr

### ORT:

Konrad-Zuse-Zentrum für Informationstechnik Berlin (ZIB)  
Takustrasse 7  
14195 Berlin-Dahlem

### PROGRAMM:

15:00 - 16:00 **Prof. Stefan Müller-Stach (Mainz)**

#### **Higgsbündel und Verschwindungssätze**

Given a family of smooth algebraic varieties the associated variation of cohomological invariants gives rise to a Higgs bundle. It turns out that this gadget is related to many geometric and arithmetic invariants of the underlying varieties. We introduce Higgs bundles in this setup and give applications to Arakelov inequalities, i.e., detection of totally geodesic subvarieties of locally symmetric varieties, and computations of L2-cohomologies over locally symmetric varieties. This is joint work with Viehweg and Zuo.

16:00 - 16:30 Kaffeepause

16:30 - 17:30 **Dr. Joakim Arnlind (MPI Golm)**

#### **Membrane equations and matrix regularization**

Membrane theory is a theory aimed at describing the quantum nature of fundamental particles and gravitational forces. Just as String Theory is based on the principle that a moving string should sweep out a minimal area in space-time, Membrane Theory demands that a

### Kontakt:

Humboldt-Universität zu Berlin . Institut für Mathematik  
SFB 647 . Unter den Linden 6 . 10099 Berlin  
Tel. +49 30 2093 1804 . Fax. +49 30 2093 2727  
sfb647@math.hu-berlin.de

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membrane should sweep out a minimal volume.

In String theory, one has by now access to a large amount of information about the classical and quantum system derived from this principle. In comparison, almost nothing is known for membranes; even the classical equations of motion are not easy to handle. So far, the only path to the corresponding quantum system has gone through a ``matrix regularization''. More specifically, functions are replaced by sequences of matrices (of increasing dimension) in such a way that the physically important Poisson bracket corresponds to commutators of matrices. It turns out that this procedure is not only directly relevant for physics, but is also of separate interest from a purely mathematical point of view.

In this talk I will give an introduction to this way of regularizing by matrices, as well as point out some difficulties and open questions that are addressed within this project.

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