

# **SFB Colloquium**

TIME:

12 May 2009, 16:00 - 19:00

## **LOCATION:**

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

## **PROGRAM:**

### 16:00 - 17:00 Prof. Stefan Müller-Stach (Mainz)

### Higgs bundles and vanishing theorems

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.

17:00 - 17:30 Coffee Break

## 17:30 - 18:30 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 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.