$$D_A\,\psi = 0$$
$$F_A^+(X,Y) = -\tfrac{i}{4}(\langle X\cdot Y\cdot\psi,\psi\rangle + g(X,Y)\,|\psi|^2)$$

WORKSHOP ON SEIBERG–WITTEN THEORY
02.12.2006 FU BERLIN

Speakers:

Frederik Witt (FU Berlin)

Damien Gayet (ICJ, Lyon)

Florian Gmeiner (NIKHEF, Amsterdam)

Location:

FU Berlin
Takustrasse 7, 14195 Berlin
Hörsaal ZIB

Organisation:

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$$D_A^2\psi = \Delta_A\psi + \tfrac{s}{4}\psi + \tfrac{1}{2}F_A^+\cdot\psi$$

$$\tilde{Q}([\alpha],[\beta]) = \int_M \alpha\wedge\beta$$

$$\tilde{Q}: H^2(M,\mathbb{R})\times H^2(M,\mathbb{R}) \to \mathbb{R}$$

Programme: Seiberg–Witten theory is one of the most striking applications of physical intuition to mathematical problems and combines various areas such as algebraic topology, gauge theory and non–linear analysis. This workshop aims to give a comprehensive introduction at advanced students' level.

10.00–11.00 **Frederik Witt**

Vector bundles, Clifford algebras and Spin groups

I will lay the algebraic fundament of gauge theory, which describes vector bundles in terms of group actions, and introduce Clifford algebras and $Spin^{\mathbb{C}}$ groups.

11.15–12.15 **Frederik Witt**

Spin$^{\mathbb{C}}$–structures and their Dirac operator

This lecture is devoted to the differential–geometric aspects of gauge theory. This involves Spin$^{\mathbb{C}}$–structures and a canonical differential operator associated with it, the Dirac operator.

13.00–14.00 **Damien Gayet**

Seiberg–Witten theory I

On a compact Riemannian 4–manifold, we introduce a pair of non–linear PDE's, the Seiberg-Witten equations. We show that the moduli space of solutions is smooth and compact. Finally, we define the Seiberg-Witten invariants in some easy cases.

14.15–15.15 **Damien Gayet**

Seiberg–Witten theory II

We discuss two applications of Seiberg–Witten theory. The first concerns the topology of 4-manifolds. The second will prove Thom's conjecture: smooth holomorphic curves in $\mathbb{C}P^2$ are genus minimizing.

16.00-17.00 **Florian Gmeiner**

Physical background of Seiberg-Witten theory

We talk about the original physical motivation of Seiberg–Witten theory. In particular, we introduce super Yang–Mills theories and discuss their connection to string theory.

$$\begin{array}{ccc} & & Spin^{\mathbb{C}}(2m) \\ & \nearrow & \downarrow \\ U(m) & \longrightarrow & SO(2m)\times U(1) \end{array}$$

Freie Universität Berlin

This meeting is supported by the SFB 647 „Raum Zeit Materie. Analytische und Geometrische Strukturen“ of the DFG.