SFB-Seminar

ZEIT:
8.5.2012, 16:00 Uhr - 19:00 Uhr

ORT:
Freie Universität Berlin
Institut für Informatik
Informatikhörsaal
Takustrasse 9
14195 Berlin

PROGRAMM:

16:00 - 17:00 **Christian Okonek**

Intrinsic Signs and Lower Bounds in Real Algebraic Geometry
A classical result in complex algebraic geometry states that any smooth cubic surface in P3(C) contains precisely 27 lines. It is natural to investigate the analogous problem in real algebraic geometry: how many real lines contains a real cubic surface in P3(R). It is well known that a smooth real cubic surface in P3(R) contains 27, 15, 7 or 3 real lines. A less known result -due to Segre- states that on real cubic surfaces there exists two kinds of real lines: elliptic and hyperbolic lines. These two kinds of real lines are defined in an intrinsic way, i.e., their definition does not depend on any choice of orientation data. Two important facts can be noticed:
(1) There exists a non-trivial lower bound 3 for the total number of real lines on a smooth real cubic surface.
(2) The existence of two kinds of real lines, the definition of the two kinds being intrinsic, i.e., independent of any choice of orientation data.
Starting from these remarks and inspired by the classical problem mentioned above, my talk -based on a joint paper with Andrei Teleman- has the following goals:
(1) explain a general principle which leads to lower bounds in real algebraic geometry,

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(2) explain the reason for the appearance of intrinsic signs in the classical problem treated by Segre, showing that the same phenomenon occurs in a large class of enumerative problems in real algebraic geometry.
(3) illustrate these two principles with the enumerative problem of counting real lines in smooth real hypersurfaces of degree 2m-3 in P^m(R).

17:30 - 18:30 **Sergei Gukov**

Geometry and Quantization
We all know Quantum Mechanics works. Almost everything in our everyday life is based on principles of Quantum Mechanics one way or another: from cellular phones to stability of atoms and, therefore, to the very existence of our Universe. Yet, every time the word "Quantum" is mentioned, it brings mystery and uncertainty. Ever since the discovery of Quantum Mechanics 100 years ago, it baffled the greatest minds of the 20th century. In this talk, I will review our quest for elusive mathematical framework that is supposed to describe "quantization" which, at various stages of its development, influenced many areas of physics and pure mathematics, including geometry and representation theory. As a result, some of the most sophisticated and esoteric
math problems, such as knot homology and Langlands duality, can be formulated in terms of ... Quantum Mechanics!

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