Hong Kong Geometry Colloquium

November 1, 2003 (Saturday)
Room 517, Meng Wah Complex, HKU

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Algebraic heat operators associated to the determinant bundle

Abstract

The following arises from a joint work with Xiaotao Sun. Consider the family S of moduli spaces of stable bundles of fixed rank and determinant over the moduli stack M of smooth curves of genus at least two. Form the vector bundle V on M, whose fiber are generalized theta functions, i.e. global sections associated to the theta line bundle on the fiber of S. A heat operator H associates a certain 2nd order operator on S with value in the theta line bundle to any given tangent vector on M. As an immediate consequence, H induces a (projective) connection on V, constructed previously by Hitchin. Motivated by Beilinson-Schechtman's theory for 1st order differential operators on determinant bundle, we develop a purely algebraic geometric construction of Hitchin's connection. This approach extends to the situation involving singular curves, and leads to a partial clarification of the degeneration problem for Hitchin's connection, which did not seem reachable by Hitchin's original approach.

Professor Viktor Ginzburg
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Existence and non-existence of periodic orbits of Hamiltonian systems

Abstract

Hamiltonian systems include a broad class of dynamical systems such as geodesic flows and the motion of a particle in a magnetic field or a conservative force field. In this talk we will discuss the question whether or not a given Hamiltonian syst em with compact energy levels must have periodic orbits on all energy levels and, if not, how large the set of energy values with, or without, periodic orbits can be. This question is closely related to the Arnold and Weinstein conjectures − the fundamental problems in symplectic topology. We will also briefly touch upon some of the tools required to tackle the question in its most general form. Among these tools are Floer homology and pseudo-holomorphic curves in symplectic manifolds.