Analytische und Geometrische Strukturen
RAUM.ZEIT.MATERIE
SFB 647

SFB Colloquium

TIME:
1 Feb 2011, 15:45 - 19:00

LOCATION:
ACHTUNG, ANDERER VERANSTALTUNGSORT!
Konrad-Zuse-Zentrum für Informationstechnik Berlin
Takustr. 7
14195 Berlin

PROGRAM:

15:45 - 16:45 **Prof. Jean-Michel Bismut (Orsay)**

The hypoelliptic Laplacian

On a Riemannian manifold, the hypoelliptic Laplacian is a canonical second order operator acting on the total space of the tangent bundle, which is supposed to interpolate between the classical Laplacian and the generator of the geodesic flow. By Laplacian, we mean here the Hodge de Rham Laplacian, the Hodge Dolbeault Laplacian, and more generally the square of any geometrically defined Dirac operator.

Up to lower order terms, the hypoelliptic Laplacian is a scaled sum of the harmonic oscillator along the fibre and of the generator of the geodesic flow. On Euclidean vector spaces, a version of this operator is known as the Kolmogorov operator, the model of the hypoelliptic operators studied by Hörmander.

On locally symmetric spaces, the hypoelliptic deformation is essentially isospectral. It leads to a geometric proof of the evaluation of semisimple orbital integrals, by a method unifying index theory and the trace formula. More generally, because the hypoelliptic deformation gives new degree of freedom unavailable in the elliptic theory, it leads to new results in index theory, unaccessible in the classical elliptic world.

16:45 - 17:30 COFFEE BREAK

Contact:
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

www.raumzeitmaterie.de

17:30 - 18:30 **Prof. Ricardo Garcia Lopez**

Sums of roots of unity and polynomials

Exponential sums are a type of sums of roots of unity which are of importance in number theory, they were already considered by Gauss and Jacobi and appear in many contexts. One of the most relevant problems is to fi□nd upper bounds for their complex norm, in the fi rst part of the talk we will survey some results about this problem, arising from a cohomological interpretation of them and Deligne's solution of the Weil conjecture.

In the second part we will focus on the study of their p-adic norm, which is related to the Hodge theory of polynomial maps.

Contact:
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