

MATHEMATISCHES INSTITUT
UNIVERSITÄT ZU KÖLN



Köln, den 1. April 2015

Einladung zum Kolloquiumsvortrag des Mathematischen Instituts der Universität zu Köln

Prof. Jean-Michel Bismut

(Université Paris-Orsay)

„The hypoelliptic Laplacian“

**am 8. April 2015, 16:30 – 17:30 Uhr
im großen Hörsaal**

Um **16:00 Uhr** wird in dem Zeitschriftenleseraum der Bibliothek des Mathematischen Instituts zum Kolloquiumstee geladen. Alle Interessenten sind herzlich eingeladen. Studenten sind besonders willkommen.

Abstract:

If X is a Riemannian manifold, the Laplacian is a second order elliptic operator on X . The hypoelliptic Laplacian \mathcal{L}_b is a family of operators acting on the total space \mathcal{X} of the tangent bundle of X , that interpolates between the elliptic Laplacian (when $b \rightarrow 0$) and the geodesic flow (when $b \rightarrow +\infty$). Up to lower order terms, \mathcal{L}_b is the weighted sum of the harmonic oscillator along the fibre TX and of the generator of the geodesic flow.

The dynamics of the stochastic process corresponding to the hypoelliptic Laplacian is a Langevin process, that interpolates between classical Brownian motion and the geodesic flow.

In certain cases, the spectrum of the original elliptic Laplacian remains rigidly embedded in the spectrum of the hypoelliptic deformation.

In the talk, I will explain the construction of the hypoelliptic Laplacian, illustrate its properties in the case of the circle, describe its connections with probability theory, and also explain its applications to Selberg trace formula.