

## **abstract**

Joint IAS-PU Symplectic Geometry Seminar  
Topic:

Speaker:

Affiliation:

Date:

Time/Room:

---

If  $X$  is a Riemannian manifold, the Laplacian is a second order elliptic operator on  $X$ . The hypoelliptic Laplacian  $L_b$  is an operator acting on the total space  $TX$  of the tangent bundle of  $X$ , that is supposed to interpolate between the elliptic Laplacian (when  $b \rightarrow 0$ ) and the geodesic flow (when  $b \rightarrow \infty$ ). Up to lower order terms,  $L_b$  is the weighted sum of the harmonic oscillator along the fibre  $TX$  and of the generator of the geodesic flow. One expects that, in this deformation, there are conserved spectral quantities.

In the talk, I will explain the construction of the hypoelliptic Laplacian in de Rham theory as a natural interpolation between the Hodge Laplacian and a symplectic Laplacian. In the case of locally symmetric spaces, the spectrum of the elliptic Laplacian is essentially preserved by the deformation. Finally, we will show how to use the hypoelliptic Laplacian to evaluate orbital integrals