Kolloquium über Reine Mathematik

Einladung zu einem Vortrag

Dienstag, 27. November 2018
17 Uhr s.t., Geom H4

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From subriemannian geometry to the analysis of hypoelliptic operators

Abstract:

The notion of subriemannian geometry or Carnot-Carathéodory geometry goes back up to C. Caratheodory and his fundamental contributions to the foundations of thermodynamics (1909). Such a geometric structure provides a mathematical model of a motion under non-holonomic constraints. During the last decades a number of new applications of the underlying concepts have been found in mathematics and physics. These geometric ideas play a role in control theory, robotics or image reconstruction.

From an analytic point of view hypo-elliptic differential operators naturally induced by a subriemannian structure are of interest. Generalizing the Beltrami-Laplace operator in Riemannian geometry the sub-Laplacian is the most prominent example. As a typical problem one studies relations between geometry and analysis. Extending the famous question by Mark Kac's *Can one hear the shape of a drum?* one asks "how much geometry" one can see from the spectrum of such typically non-elliptic operators. An important tool is the sub-elliptic heat flow. When passing from Riemannian to subriemannian geometry a loss of degrees of freedom in the equations generates new effects which have analytic counterparts.

In this talk we present results on the spectral theory of sub-elliptic model operators on nilpotent Lie groups and their quotients by a lattice (compact nilmanifolds). Important tools are explicit expressions of the sub-elliptic heat kernel and the spectral zeta function.

Vor dem Vortrag (ab 16.30 Uhr) stehen im Raum 327 Kaffee und Tee bereit.