Dr. Norbert Peyerimhoff
Pompeiu's Problem on Damek-Ricci spaces

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In 1929, the Rumanian mathematician Dimitrie Pompeiu asked the following question: given a continuous function f on R2 and a compact set K. Assume that the integral of f over all images of K under rigid motions vanishes. Does this imply that the function f itself is zero? The answer is negative in the case that K is a disk. But it can be shown that the conclusion holds in the case that f vanishes on all disks of radius r_1 and of radius r_2, as long as r_1 and r_2 avoid a certain countable set of radii. It is natural to ask similar questions in more general geometries. In this talk we discuss the same (two radius) problem in Damek-Ricci spaces. These spaces became famous as counterexamples of the Lichnerowitch conjecture,
namely that every harmonic space should be a rank one symmetric space.

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