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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.

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