

Speaker: Carlos Olmos

Title: The Nullity of Homogeneous Riemannian manifolds

Abstract:

The nullity distribution of the curvature tensor of a Riemannian space was defined by Chern and Kuiper in 1952. This distribution turns out to be autoparallel, around the points where the dimension is locally constant. Nevertheless, nothing was known about the nullity distribution in homogeneous spaces. In this talk we will mainly refer to some recent results obtained jointly with Antonio J. Di Scala and Francisco Vittono, that will motivate the presentation of some interesting points of view in homogeneous geometry.

Let M be a locally irreducible homogeneous Riemannian manifold. We prove that if $\pi_1(M)$ is either compact, or Kahler, or more generally nearly Kahler, then the distribution of nullity is trivial. We will present also a general structure theory for homogeneous manifolds with non-trivial nullity that predicts the existence of a transvection (i.e. a Killing field which is parallel at some point) with null Jacobi operator and not in the nullity. With the aid of this result we are able to find a one parameter family irreducible homogeneous spaces of dimension 4 with non-trivial distribution of nullity (as far as we know these are the first known examples). By making use of the above mentioned structure theorem, we also show that any homogeneous space with a transitive semisimple subgroup of isometries, has trivial nullity distribution.