LEZIONE LAGRANGIANA
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Einstein manifolds from matrix groups

14 Settembre 2023 alle 14.30-15.30
Aula A, Palazzo Campana, Via Carlo Alberto 10, Torino

ABSTRACT: Remarkably, any closed subgroup of real matrices G is a differentiable manifold, called a Lie group, as well as any quotient $M = G/K$, called a homogeneous space, where K is a closed subgroup contained in G. Moreover, any inner product on the tangent space at the origin of M which is invariant by the corresponding K-action defines a Riemannian metric containing G as a subgroup of isometries, called a G-invariant metric. The peculiar mixture of this natural and simple construction promises a rich interplay between algebra, geometry and topology, which has indeed been very fruitful in the last hundred years. In this talk, we will give an overview on the following longstanding open problems:

1) Which homogeneous spaces $M = G/K$ admit an Einstein (i.e., of constant Ricci curvature) G-invariant metric?

2) Is such a existence weak or strong?

3) Can a given $M = G/K$ admit infinitely many?

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