

Paul Schwahn M.Sc.

Universität Stuttgart

Stability and rigidity of homogeneous Einstein manifolds

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Abstract: The question of rigidity of a given Einstein metric, i.e. whether it can be deformed through a curve of Einstein metrics on the same manifold, is closely related to its stability under the Einstein-Hilbert action by the fact that Einstein metrics are critical points of the (normalized) total scalar curvature functional. In fact, the stability question reduces to an eigenvalue problem of the Lichnerowicz Laplacian with certain constraints. Furthermore, rigidity is determined by the non-vanishing of certain obstruction polynomials.

On a homogeneous Einstein manifold, the question of stability can be attacked using methods from harmonic analysis. I review the particularly nice case of irreducible symmetric spaces, which has only recently been settled, present novel results on the stability and rigidity of certain non-symmetric homogeneous spaces, and give an outlook on how to tackle these problems on general compact homogeneous spaces.

