SEMINARIO DI GEOMETRIA E ALGEBRA

UNIBA - POLIBA

Giovedì 7 Novembre 2024 - Ore 16:00

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Some remarks on the Bismut Hermitian Einstein condition

Abstract. An Hermitian metric is said to be *Calabi-Yau with torsion* (CYT in short) if it has vanishing first Bismut–Ricci curvature, namely a natural Ricci-type curvature which coincides with the usual Ricci form when the metric is Kähler. When a Hermitian structure is SKT and CYT, then it is a static point of the puriclosed flow, motivating a huge interest in finding explicit non-trivial examples, where by non trivial we mean not diffeomorphic to a global product of a Kähler-Ricci flat manifold and a Bismut flat space. Moreover, up to now, no non-trivial examples are known. In a joint work with A. Fino and G. Grantcharov, we investigate SKT and CYT structures with parallel Bismut torsion. We first characterize the universal cover of such manifolds in the compact case and we use this characterization to construct the first known non-trivial example of CYT and SKT manifold. Such an example can be described as a mapping torus of a product of a compact Kähler Ricci flat manifold with the 3-sphere or, alternatively, as a total space of a holomorphic fibration with Kähler fibre over the Hopf Surface.