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Harmonic forms on the Chen-Teo gravitational instanton

The famous no-hair theorem in general relativity asserts that Kerr blackholes are the only non-trivial, stationary, axisymmetric, asymptotically flat solutions to the vacuum Einstein equations. A Riemannian/Euclidean version the no-hair theorem was conjectured in the 70s. Namely, that the Euclidean Kerr metrics are the only non-trivial asymptotically flat gravitational instantons admitting a 2-torus symmetry.

A surprising counterexample to this conjecture was discovered in 2011 by Chen and Teo. First constructed using the inverse scatter method, the metric has recently been proven to be conformal to a Kaehler metric on a toric variety (thus fitting with the theme of this session). In this talk I will survey some of these recent developments and discuss my work with Kunduri classifying L2-harmonic forms on the Chen-Teo gravitational instanton.