Abstract Week 2

Speaker: Ronan Conlon

Abstract: The Ricci flow, introduced by Richard Hamilton in the 1980's, is a powerful geometric evolution equation that deforms the metric of a Riemannian manifold in a way analogous to heat diffusion. It has proven instrumental in understanding the geometry and topology of manifolds. A rigorous analysis of its behavior at finite time singularities has been key to these applications.

In this talk, I will present joint work with Cifarelli-Deruelle and Hallgren-Ma on the behavior of the Ricci flow on a compact Kahler surface at a non-collapsed finite time singularity.

Speaker: Lorenzo Foscolo

Abstract: ALF anti-self-dual gravitational instantons, of which the Taub–NUT and Atiyah–Hitchin metrics are prototypes, are the complete non-compact hyperkähler 4-manifolds with cubic volume growth. Examples have been known since the 1970's, but a complete classification was only given around 10 years ago. In this talk, I will present joint work with Haskins and Nordström where we extend some of these results to complete non-compact 7-manifolds with holonomy G2 and an asymptotic geometry, called ALC (asymptotically locally conical), that generalises to higher dimension the asymptotic geometry of ALF spaces. In previous joint work we produced infinitely many examples of such ALC G2–manifolds. The more recent results I will discuss in the talk include the existence of a G2–analogue of the Atiyah–Hitchin metric and rigidity results for ALC G2–metrics in terms of the symmetries of their asymptotic model.

Speakers: Paul Tod and Lionel Mason

Abstract: There is a well-known coincidence that the 4-dimensional Einstein vacuum equations for toric metrics are a particular case of the self-dual Yang-Mills (SDYM) equations. It's a result of Ward that SDYM in turn can be solved by vector bundles on twistor space. This construction can be reduced by the toric symmetry so that the toric gravitational instantons are characterised by a single patching matrix on the symmetry axis. In the first talk we present examples of this construction, and in the second more detail of the theory that justifies the assertions.