G_2-instantons over twisted connected sums

Henrique N. Sá Earp[*], Thomas Walpuski,
Marcos Jardim, Daniela Prata

[*]Unicamp, SP

Resumo

I will describe a method to construct G_2–instantons over compact G_2–manifolds arising as the twisted connected sum of a matching pair of asymptotically cylindrical Calabi-Yau 'building blocks', proposed by Kovalev and Corti-Haskins-Nordström-Pacini. It consists on gluing G_2–instantons obtained from holomorphic bundles over the building blocks via the gradient flow method, under boundary conditions 'at infinity' given by a certain notion of 'asymptotic stability'. One requires natural compatibility and transversality conditions which can be interpreted in terms of certain Lagrangian subspaces of a moduli space of stable bundles on a $K3$ surface.

Motivated by this construction, I will present techniques to produce such asymptotically stable bundles over building blocks. The most important tool is a generalisation of Hoppe's stability criterion to bundles over smooth projective varieties X with $\mathrm{Pic}(X) \simeq \mathbb{Z}^{\ell}$, a result which may be of independent interest.

Time allowing, I will show how linear monads can be used to produce a prototypical model of the curvature blow-up phenomenon along a sequence of asymptotically stable bundles degenerating into a torsion-free sheaf. This effect has been studied in full generality by Uhlenbeck-Yau over 4–manifolds and by Tian over higher dimensional manifolds with special holonomy.

The talk includes material from joint works with Thomas Walpuski (Imeprial College London) and Marcos Jardim and Daniela Prata (Unicamp).