HARI KUNDURI, McMaster University

A Comparison Theorem For the Mass of ALE and ALF Toric 4-Manifolds

I will outline the proof of sharp lower bounds for the mass of asymptotically locally Euclidean (ALE) and asymptotically locally flat (ALF) toric 4-manifolds with non-negative scalar curvature. These lower bounds can be written in terms of the mass of 'equilibrium' geometries consisting of gravitational instantons - complete Ricci flat manifolds - with the same weighted orbit space structure as the original manifold and an expression determined by the conical angle defects of totally geodesic 2-spheres within the instanton that serve as generators for its second homology. These results may be viewed in the context of positive mass theorems, providing an explanation of how positivity can fail in the ALE/ALF setting (the work is in collaboration with Aghil Alaee and Marcus Khuri).