GEOMETRIC ANALYSIS SEMINAR

"Almost Rigidity Theorems with Nonnegative Scalar Curvature"

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Abstract: Recall that in a Rigidity Theorem one assumes certain curvature and extremal conditions on a Riemannian manifold and then proves the Riemannian manifold is isometric to a specific manifold. In an Almost Rigidity Theorem, one proves that if a sequence of manifolds comes closer and closer to satisfying the hypothesis of the rigidity theorem then the sequence converges (in some sense) to that specific manifold. For sequences with nonnegative Ricci curvature, Colding and Cheeger-Colding proved various almost rigidity theorems using Gromov-Hausdorff convergence. With only an assumption of nonnegative scalar curvature, even assuming a uniform upper bound on diameter and volume, there need not be a GH limit. Gromov has conjectured that intrinsic flat convergence should be applied to prove almost rigidity of the Scalar Torus Rigidity Theorem. Lee and I have conjectured that intrinsic flat convergence should be applied to prove almost rigidity of the Positive Mass Theorem. I will present the definition of intrinsic flat convergence (which is joint work with Wenger building upon work of Ambrosio-Kirchheim) and partial results towards Almost Rigidity of the Positive Mass Theorem (in joint work with Lee, with Huang and Lee, with LeFloch, with Stavrov, and with Sakovich) as well as compactness theorems and arzela-ascoli theorems which are applied to prove these results (from joint work with Portegies, and work of Wenger, and work of Perales). I will close with some examples proven jointly with Basilio and Dodziuk which require one to add an hypothesis to Gromov's Conjecture. All papers on intrinsic flat convergence may be found at:
https://sites.google.com/site/intrinsicflatconvergence/

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