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Title: Harmonic functions, mass, and stability of the positive mass theorem

Abstract: In a previous work, we showed how to compute the ADM mass of of initial data sets (in 3 spatial dimensions) by studying harmonic functions and solutions to other elliptic problems. Now I'll use this formula to consider the question: How flat is an asymptotically flat manifold with very little total mass? We make progress on this problem and confirm special cases of conjectures made by Huisken-Ilmanen and Sormani. The main result asserts that in the class of reasonably behaved asymptotically flat manifolds satisfying a uniform lower bound on Ricci curvature, small mass implies Gromov-Hausdorff closeness to flat space.