THE UNIVERSITY
of NORTH CAROLINA
at CHAPEL HILL

Analysis and PDE Seminar

April 5, 2023
3:00 - 4:00 p.m.
PH 328

The geometry of scalar curvature and mass in general relativity

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Abstract. In general relativity, the space we inhabit is modeled by a Riemannian manifold. The fundamental restriction this theory places upon spatial geometry is a lower bound on this manifold's scalar curvature. It is an important problem in pure geometry to understand the geometric and topological features of this condition. For instance, if a manifold has positive scalar curvature, what may we conclude about the lengths of its curves, the areas of its surfaces, and the topology of the underlying manifold? I will explain classical results in this direction and describe new proofs by analyzing objects I call 'spacetime harmonic functions.' Leveraging these new ideas, I will also describe progress on a geometric version of the following question: How flat is a gravitational system with little total mass?