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Bartnik's quasi-local mass in general relativity

In general relativity, the quasi-local mass problem is to find a “good” definition for the amount of mass contained within a compact 3-dimensional spatial region, Ω . Bartnik’s definition considers all possible asymptotically flat extensions of Ω (subject to certain natural geometric conditions), and minimizes the total (ADM) mass among such spaces. He conjectured that this infimum is attained. In joint work with Michael Anderson, we show that for a large family of regions, the infimum is not achieved. I will discuss our recent results, including (time-permitting), further results pertaining to Bartnik mass minimizers and static vacuum solutions of Einstein’s equations.