

## **Foliation of Asymptotically Schwarzschild Manifolds by Generalized Willmore Surfaces**

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From the perspective of general relativity asymptotically Schwarzschild, or more generally asymptotically flat, manifolds represent isolated systems. Here the idea is that in the absence of classical energy the spacetime should resemble the Minkowski space. The Hawking energy is a quasi local energy of general relativity that has a strong relation to the Willmore functional. It was introduced by S.W. Hawking in order to measure the gravitational energy of spacetimes that are classically empty.

Starting from the Hawking energy we develop a notion of generalized Willmore functionals. Further, we construct a foliation of the asymptotically flat end of an asymptotically Schwarzschild manifold by large, area constrained spheres which are critical with respect to a generalized Willmore functional. This is achieved via a perturbation argument starting from round centered spheres in Schwarzschild space. These foliations can be interpreted as a center of mass as measured by the generalized Willmore functional.

Time permitting we will discuss the existence and regularity of critical points of generalized Willmore functionals in a more general setting.

The results presented are based on the corresponding analysis for the Willmore functional by T. Lamm, J. Metzger and F. Schulze, and are part of the authors Ph.D. thesis.