Publication:

Mathematical Physics

Intrinsic Spectral Geometry of the Kerr-Newman Event Horizon

Martin Engman, Ricardo Cordero Soto
(Submitted on 28 Sep 2005 (v1), last revised 16 Mar 2006 (this version, v2))

We uniquely and explicitly reconstruct the instantaneous intrinsic metric of the Kerr-Newman Event Horizon from the spectrum of its Laplacian. In the process we find that the angular momentum parameter, radius, area, and in the uncharged case, mass, can be written in terms of these eigenvalues. In the uncharged case this immediately leads to the unique and explicit determination of the Kerr metric in terms of the spectrum of the event horizon: Robinson's "no hair" theorem now yields the corollary: One can "hear the shape" of noncharged stationary axially symmetric black hole space-times by listening to the vibrational frequencies of its event horizon only.

Comments: Final version with improved abstract, updated references, corrected typos, and additional discussion
Subjects: Mathematical Physics (math-ph), General Relativity and Quantum Cosmology (gr-qc), Differential Geometry (math.DG)
MSC classes: 58J50 (Primary); 03C15, 03C57 (Secondary)
DOI: 10.1063/1.2174290
Cite as: arXiv:math-ph/0508067v2