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Echoes of the black hole microstructure

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The LIGO-VIRGO-KAGRA observations are so far compatible with the Kerr black hole paradigm, though they cannot rule out entirely the existence of black hole mimickers. These are ultra-compact objects that reproduce some observable properties of black holes, while possibly predicting characteristic signatures such as non-trivial tidal deformability and/or repeated gravitational wave echoes in the ringdown.

An interesting example is offered by "topological stars": regular and horizonless solutions to five-dimensional Einstein-Maxwell theory, which resemble static BHs upon reduction to four dimensions. Apart from providing a viable mimicker candidate that arises from a relatively simple theory, these compact objects can also be regarded as a classical toy model of quantum black hole microstates.

In this talk we will present our latest results concerning the linear response of topological stars, with a focus on their characteristic spectrum, gravitational wave echoes and (linear) stability.

Primary author: DIMA, Alexandru (Università Sapienza di Roma)

Co-authors: MELIS, Marco (Università Sapienza di Roma); PANI, Paolo (Sapienza University of Rome & INFN Roma1)

Presenter: DIMA, Alexandru (Università Sapienza di Roma)

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