The stochastic gravitational-wave background in the absence of horizons

Richard Brito[1]

[1]*Dipartimento di Fisica, "Sapienza" Università di Roma & Sezione INFN Roma1, P.A. Moro 5, 00185, Roma, Italy.*

Gravitational-wave astronomy has the potential to explore one of the deepest and most puzzling aspects of Einstein's theory: the existence of black holes. A plethora of ultracompact, horizonless objects have been proposed to arise in models inspired by quantum gravity. These objects may solve Hawking's information-loss paradox and the singularity problem associated with black holes, while mimicking almost all of their classical properties. They are, however, generically unstable on relatively short timescales. In this talk, I will describe how this "ergoregion instability" leads to a strong stochastic background of gravitational waves, at a level detectable by current and future gravitational-wave detectors. The absence of such background in the first observation run of Advanced LIGO already imposes the most stringent limits to date on black-hole alternatives, showing that certain models of "quantum-dressed" stellar black holes can be at most a small percentage of the total population.

[1] E. Barausse, R. Brito, V. Cardoso, I. Dvorkin and P. Pani, "The stochastic gravitational-wave background in the absence of horizons", *Class. Quantum Grav.* Volume 35, Number 20, 2018 ; arXiv:1805.08229 [gr-qc]