

The black hole ringdown and its quasinormal modes

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In the ringing of a black hole, the nonlinearity of Einstein's theory can appear in weak and subtle ways. The importance of these nonlinearities has only been appreciated in the past few years, thanks to accurate numerical relativity simulations, and in anticipation of the next generation of gravitational-wave detectors. I will review our current understanding of quasinormal modes, the characteristic modes of black hole ringing, and the current status of black hole perturbation theory for the ringdown, up to third order. Motivated by this and other problems in black hole physics, I will introduce new methods to tackle black-hole perturbation theory using quasinormal modes.

Primary author: Dr SBERNA, Laura (University of Nottingham)

Presenter: Dr SBERNA, Laura (University of Nottingham)

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