

Nonlinearities in black hole ringdown

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Nonlinear effects in black hole perturbation theory may be important for describing a black hole ringdown, as suggested by recent works. I will describe a new class of “quadratic” quasi-normal modes at second order in perturbation theory. Remarkably, not only their frequency but also their amplitude is completely determined by the linear modes themselves. I will present how one can compute them using Leaver’s algorithm. Quadratic modes could be used to improve ringdown models by adding nonlinear features without introducing any supplementary free parameter for data analysis purposes, or to test GR in the nonlinear regime.

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