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F. Duque: The elephant and the flea redux: Stability of the fundamental quasinormal mode in time-domain observations

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It was recently shown that small perturbations due, e.g., to environmental effects (the “flea”) to the effective potential governing gravitational-wave generation and propagation in black hole exteriors (the “elephant”) can lead to arbitrarily large changes in the black hole’s quasinormal spectrum. This raises an important question: is the black hole spectroscopy program robust against perturbations? In this talk, we clarify the physical behavior of time-domain signals under small perturbations in the potential, and we show that changes in the amplitude of the fundamental mode in the prompt ringdown signal are parametrically small. This implies that the fundamental quasinormal mode extracted from the observable time-domain signal is stable against small perturbations.

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