Contribution ID: **12**   Type: **ORAL**

Nonlinearities in black hole ringdown

Thursday, 24 October 2024 17:00 (20 minutes)

We study the quadratic quasi-normal modes of a Schwarzschild black hole, which are perturbations originating from the coupling of two linear quasi-normal modes. As recent studies suggest, nonlinear effects in black hole perturbation theory may be crucial for accurately describing a black hole ringdown. We present a new class of "quadratic" quasi-normal modes at second order in perturbation theory, where both the frequency and amplitude are entirely determined by the linear modes. Assuming the amplitude of the two linear modes is known, we compute the amplitude of the resulting quadratic mode across a wide range of possible angular momenta using Leaver's algorithm. Finally, we reconstruct the waveform in the radiation gauge. These quadratic modes could enhance black hole ringdown models by incorporating nonlinear features without adding extra free parameters for data analysis, or serve as a tool to test General Relativity in the nonlinear regime.

Primary authors: KUNTZ, Adrien Benoit (SISSA, Trieste); BUCCIOTTI, Bruno (Scuola Normale Superiore di Pisa); TRINCHERINI, Enrico (SNS); JULIANO, Leonardo (Istituto Nazionale di Fisica Nucleare)

Presenter: JULIANO, Leonardo (Istituto Nazionale di Fisica Nucleare)

Session Classification: Fundamental Interactions -Talks on specific topics

Track Classification: Fundamental interactions