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Type: **Contributed Talk (20 minutes)**

Implications of the quantum nature of the black hole horizon on the gravitational-wave ringdown

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Motivated by capturing putative quantum effects at the horizon scale, we model the black hole horizon as a membrane with fluctuations following a Gaussian profile. By extending the membrane paradigm at the semiclassical level, we show that the quantum nature of the black hole horizon implies partially reflective boundary conditions and a frequency-dependent reflectivity. This generically results into a modified quasinormal mode spectrum and the existence of echoes in the postmerger signal. On a similar note, we derive the horizon boundary condition for a braneworld black hole that could originate from quantum corrections on the brane. This scenario also leads to a modified gravitational-wave ringdown. We discuss general implications of these findings for scenarios predicting quantum corrections at the horizon scale.

Which topic best fits your talk?

GW Theory and Fundamental Physics

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