



# GRAVITY: CHALLENGES BEYOND GENERAL RELATIVITY

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## Ringdown of rotating black holes in higher-derivative gravity

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We computed the spectrum of linearized gravitational excitations of black holes with substantial angular momentum in the presence of higher-derivative corrections to general relativity. We do so perturbatively to leading order in the higher-derivative couplings and to more than sixteen orders in the black hole angular momentum. This allows us to accurately predict quasi-normal mode frequencies of black holes with spins up to about 0.8 of the extremal value. We find that sizeable rotation can enhance the frequency shifts relative to the static case. By implementing the leading effect of these higher-derivative corrections on the quasi-normal spectrum in the ringdown analysis package `pyRing` we constrain the coupling strength of these corrections based on GW observations. (Presentation based on 2304.02663, 2307.07431 and work in preparation.)

**Primary author:** MAENAUT, Simon (KU Leuven)

**Presenter:** MAENAUT, Simon (KU Leuven)

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