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QBHs in the Sky

Einstein's General Relativity (GR) is perfectly utilitarian but is considered not yet complete, mainly because of the presence of singularities and its general incompatibility with a quantum description. This had historically motivated a lot of attempts at quantising gravity. The (adiabatic invariant) area quantisation hypothesis by Beckenstein and Mukhanov in 1974 was the first step towards a heuristic description of quantum gravity. Beyond-GR theories received renewed interest since the first GW detection and the periodic upgrades in detector sensitivity have allowed us to constrain these models to better and better accuracies. In that spirit, the beyond-GR GW signatures from the model of QBHs have been investigated recently in the literature, (most notably by Agullo et.al. in 2020), which forms the basis for our work.

In our most recent work we demonstrate that the QBH models thus considered suffer from an ergoregion instability, which limits their probability of occurrence. Considering some of the aspects of BBH formation history, we demonstrate that most of the space of progenitors to BBHs are actually off limits to stable QBHs. We also show that progenitor physics predict that stable binary QBHs are bounded from above in both total mass (m) and mass ratio (q)

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