

Evolution of black hole shadows from superradiance

Summary

Black holes have turned into cosmic laboratories to search for ultralight scalars by virtue of the superradiant instability. In this poster we present a study of the impact of the superradiant evolution on the black hole shadow and investigate the exciting possibility to explore it with future observations of very long baseline interferometry. We simulated the superradiant evolution numerically, in the adiabatic regime, and derived analytic approximations modeling the process. Driven by superradiance, we evolve the black hole shadow diameter and (i) find that it can change by a few μas , just below the current resolution of the Event Horizon Telescope, albeit on timescales that are longer than realistic observation times; (ii) show that the shadow diameter can either shrink or grow; and (iii) explore in detail how the shadow's end state is determined by the initial parameters and coupling.

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