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Semiclassical effects on ultramassive spacetimes

by V. Boyanov, et al., (including L. J. Garay)

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Abstract

A recent work [Senovilla, Port. Math. 80 (2023)] has shown that accretion of matter by a Schwarzschild-de Sitter black hole can take this object beyond a critical limit where the event and cosmological horizons coalesce, transforming it into a collapsing universe resembling a Kantowski-Sachs cosmology. In these configurations, dubbed “ultramassive spacetimes”, future asymptotic infinity and the event horizon associated with the black hole cease to exist. In this work, we take the first steps toward exploring semiclassical gravity effects on such geometries. In particular, we examine the fate of Hawking radiation in these backgrounds and analyze the behavior of the renormalized stress-energy tensor within the Polyakov approximation. We also explore the effect of semiclassical backreaction on the evolution of the horizons, focusing on cases in the vicinity of the extremal limit, and on the subsequent universal collapse.



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