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# No static black hole horizons in the expanding universe

*Thursday 12 June 2025 14:00 (15 minutes)*

It is shown (in spherical symmetry) that an exactly static black hole horizon cannot exist in an expanding universe. If you try to make it static in any dynamical "background", it becomes a naked spacetime singularity. This fact is demonstrated by the incompleteness of radial null and timelike geodesics, by the divergence of curvature invariants, the energy-momentum of a test scalar field, and by inconsistencies with Hawking radiation. Black holes are somehow coupled to the cosmic expansion, which was suggested independently as the growth mechanism for supermassive black holes in galaxies, with tentative observational evidence reported in 2023.
[Based on V.F. & M. Rinaldi 2024, Phys. Rev D 110, 063553 (arXiv:2407.14549)]

## Keyword-1

black hole

## Keyword-2

cosmology

## Keyword-3

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