



General Relativity and Quantum Cosmology

# Genericity aspects in gravitational collapse to black holes and naked singularities

Pankaj S. Joshi, Daniele Malafarina, Ravindra V. Saraykar

(Submitted on 19 Jul 2011 (v1), last revised 4 Jul 2012 (this version, v2))

We investigate here the genericity and stability aspects for naked singularities and black holes that arise as the final states for a complete gravitational collapse of a spherical massive matter cloud. The form of the matter considered is a general Type I matter field, which includes most of the physically reasonable matter fields such as dust, perfect fluids and such other physically interesting forms of matter widely used in gravitation theory. We first study here in some detail the effects of small pressure perturbations in an otherwise pressure-free collapse scenario, and examine how a collapse evolution that was going to the black hole endstate would be modified and go to a naked singularity, once small pressures are introduced in the initial data. This allows us to understand the distribution of black holes and naked singularities in the initial data space. Collapse is examined in terms of the evolutions allowed by Einstein equations, under suitable physical conditions and as evolving from a regular initial data. We then show that both black holes and naked singularities are generic outcomes of a complete collapse, when genericity is defined in a suitable sense in an appropriate space.

Comments: 24 pages, 6 figures, some changes in text and figures to match the version accepted for publication by IJMPD

Subjects: **General Relativity and Quantum Cosmology (gr-qc)**; High Energy Astrophysical Phenomena (astro-ph.HE); High Energy Physics - Theory (hep-th)

DOI: [10.1142/S0218271812500666](https://doi.org/10.1142/S0218271812500666)

Cite as: [arXiv:1107.3749 \[gr-qc\]](https://arxiv.org/abs/1107.3749)  
(or [arXiv:1107.3749v2 \[gr-qc\]](https://arxiv.org/abs/1107.3749v2) for this version)

## Submission history

From: Daniele Malafarina [[view email](#)]

[v1] Tue, 19 Jul 2011 15:41:58 GMT (78kb)

[v2] Wed, 4 Jul 2012 13:36:06 GMT (202kb)

[Which authors of this paper are endorsers?](#)

## Download:

- [PDF](#)
- [PostScript](#)
- [Other formats](#)

Current browse context:

gr-qc

[< prev](#) | [next >](#)

[new](#) | [recent](#) | [1107](#)

Change to browse by:

[astro-ph](#)

[astro-ph.HE](#)

[hep-th](#)

## References & Citations

- [INSPIRE HEP](#)  
([refers to](#) | [cited by](#))
- [NASA ADS](#)

Bookmark([what is this?](#))



