

General Relativity and Quantum Cosmology

A Nonsingular Brans Wormhole: An Analogue to Naked Black Holes

Amrita Bhattacharya, Ramil Izmailov, Ettore Laserra, Kamal K. Nandi

(Submitted on 28 Jul 2011)

In a recent paper, we showed the Jordan frame vacuum Brans Class I solution provided a wormhole analogue to Horowitz-Ross naked black hole in the wormhole range $-3/2 < \omega < -4/3$. Thereafter, the solution has been criticized by some authors that, because of the presence of singularity in that solution within this range, a wormhole interpretation of it is untenable. While the criticism is correct, we show here that (i) a singularity-free wormhole can actually be obtained from Class I solution by performing a kind of Wick rotation on it, resulting into what Brans listed as his independent Class II solution (ii) the Class II solution has all the necessary properties of a regular wormhole in a revised range $-2 < \omega < -3/2$ and finally, (iii) naked black holes, as described by Horowitz and Ross, are spacetimes where the tidal forces attain their maxima above the black hole horizon. We show that in the non-singular Class II spacetime this maxima is attained above the throat and thus can be treated as a wormhole analogue. Some related issues are also addressed.

Comments: 20 pages, 4 figures

Subjects: **General Relativity and Quantum Cosmology (gr-qc)**; High Energy Physics - Theory (hep-th); Mathematical Physics (math-ph)

Journal reference: Class.Quant.Grav.28:155009,2011

DOI: [10.1088/0264-9381/28/15/155009](https://doi.org/10.1088/0264-9381/28/15/155009)Cite as: [arXiv:1107.5994 \[gr-qc\]](https://arxiv.org/abs/1107.5994)(or [arXiv:1107.5994v1 \[gr-qc\]](https://arxiv.org/abs/1107.5994v1) for this version)

Submission history

From: Kamal Nandi [[view email](#)]

[v1] Thu, 28 Jul 2011 18:29:40 GMT (64kb)

[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:

[hep-th](#)[math](#)[math-ph](#)

References & Citations:

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

Bookmark (what is this?)

