Comment on "Backreaction of Hawking radiation on a gravitationally collapsing star I: Black holes?"

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Abstract

I present objections against the statement of the popular press "Big Bang was not, and black holes do not exist – proved mathematically". Sadly, but this was deduced from Houghton paper, which has different value.©

PACS numbers:

Let me note following on Ref. [1]:

1) the authors use exotic matter ("negative energy flux"). But sadly, there is no emphasizes on issue of violation of the energy conditions (weak, strong or dominant ones: good review is in Wikipedia). So, such kind of articles would justify: faster than light travel, wormholes, time machines and what is most crucial here – the exotic matter can give the anti-gravitation, which can stabilize the collapsing star. These hypothetical exotics are usually with their paradoxes. So it is not surprising the result authors got: there are no black holes, only a temporary collapse.

2) Sadly, while talking about Oppenheimer Snyder (OS) model the Houghton missed mentioning the Marshall's article [2]. But I quote: "At this point OS made a fatal error by choosing an..." (Marshall). So it is sad to quote Houghton: "We use the matching of metrics at the surface of the star, illustrated in Section 2.2 for the OS model".

3) Houghton: "More explicitly, the surface gravity of the black hole is defined in terms of the 4-acceleration of an external observer. If κ were increasing with time, so would the acceleration of inertial relative to freely falling observers." My warning is following. On the finite, renormalized surface gravity $\kappa \equiv M/r^2$: on pages 332, 158 in Ref. [3] the κ gained presentation as not local, measurable for infinite long weightless string. So it is not local characteristic of localized surface! Therefore, the subject of your first sentence is surface gravity g, but subject of the second sentence is κ. Moreover, free falling observer, which happen to be commoving with a free falling particle (Houghton's "inertial") do not observe any acceleration of this particle.

4) Houghton: "We can equivalently deduce the bounce of the star and show that it is reached before the horizon forms, from the Einstein equations and the total energy conservation". Me: the energy topic is not lucid enough in General Relativity.

5) Houghton: "We conclude that the star never enters the Schwarzchild surfaces, meaning the bounce occurs before the formation of an event horizon. The reason behind this result lies on the fact that the inclusion of negative energy radiation in the interior of the star, violates the energy condition of the PenroseHawking singularity theorem". Me: from the very beginning there were no problem of forming the event horizon. According to conventional physics this surface forms in infinite distant coordinate time. Who can guarantee, that in actual infinity the Universe and matter are there? I kindly suggest to correct your word "Schwarzchild" into Schwarzschild.

Finally, there is always the mixture of ordinary and exotic matter in Houghton's contribution. I mean, even if in some point the total energy density is zero, it does not mean, that there are no matter present. But in real world there is some kind of annihilation of the opposites. So if the energy is zero, there is no ordinary and no exotic matter present.

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[1] Laura Mersini-Houghton, Backreaction of Hawking radiation on a gravitationally collapsing starI: Black holes?, Phys. Lett. B **738**, 6167 (2014) arXiv:1406.1525. See also the research continuation in arXiv:1409.1837.

[2] Trevor W. Marshall, Max K. Wallis, J. Cosmol. **6**, 1473-84 (2010) http://journalofcosmology.com/MarshallWallis.pdf

[3] R. M. Wald, General Relativity, (London, University Of Chicago Press), 1984. Available from: http://www.scribd.com/doc/19147267/General-Relativity-R-Wald