

Perception tensor and Hawking versus Unruh effect near a black hole

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ABSTRACT

We show that it is possible to define an objective, tensorial quantity corresponding to a seemingly subjective quantity, namely the particle perception by different observers in a black-hole spacetime [1]. The definition of such a PeRSET (Perception Renormalized Stress-Energy Tensor) allows for a clean separation between the Hawking and Unruh effects near a black hole. As a result, a detector with a generic horizon-crossing trajectory will suffer a buoyancy force. Surprisingly, when the horizon crossing is attempted at sufficiently low velocity, this buoyant effect could even be strong enough to prevent the horizon crossing altogether. [2].

References

- [1] L. C. Barbado, C. Barceló, L. J. Garay and G. Jannes, “A tensorial description of particle perception in black-hole physics,” *Phys. Rev. D* **94**, 064004 (2016)
- [2] L. C. Barbado, C. Barceló, L. J. Garay and G. Jannes, “Hawking versus Unruh effects, or the difficulty of slowly crossing a black hole horizon,” *JHEP* **1610**, 161 (2016)