

Hawking Radiation of Grumiller Black

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Abstract : In this paper, we consider the relativistic Hamilton-Jacobi (HJ) equation and study the Hawking radiation (HR) of scalar particles from uncharged Grumiller black hole (GBH) which is affordable for testing in astrophysics. GBH is also known as Rindler modified Schwarzschild BH. Our aim is not only to investigate the effect of the Rindler parameter A on the Hawking temperature (TH), but to examine whether there is any discrepancy between the computed horizon temperature and the standard TH as well. For this purpose, in addition to its naive coordinate system, we study on the three regular coordinate systems which are Painlevé-Gullstrand (PG), ingoing Eddington-Finkelstein (IEF) and Kruskal-Szekeres (KS) coordinates. In all coordinate systems, we calculate the tunneling probabilities of incoming and outgoing scalar particles from the event horizon by using the HJ equation. It has been shown in detail that the considered HJ method is concluded with the conventional TH in all these coordinate systems without giving rise to the famous factor-2 problem. Furthermore, in the PG coordinates Parikh-Wilczek's tunneling (PWT) method is employed in order to show how one can integrate the quantum gravity (QG) corrections to the semiclassical tunneling rate by including the effects of self-gravitation and back reaction. We then show how these corrections yield a modification in the TH.

Keywords : ingoing Eddington, Finkelstein, coordinates Parikh-Wilczek's, Hamilton-Jacobi equation

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