

New Form of Kerr-Newman Solution and Its Hawking Radiation via Tunneling

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Abstract: Parikh-Wilzcek's recent work, which treats the Hawking radiation as semi-classical tunneling process from the event horizon of static Schwarzschild and Reissner-Nordström black holes, indicates that the factually radiant spectrum deviates from the precisely thermal spectrum after taking the self-gravitation interaction into account. In this paper, we extend Parikh-Wilzcek's work to research the Hawking radiation via tunneling from new form of rotating Kerr-Newman solution and obtain a corrected radiant spectrum, which is related to the change of Bekenstein-Hawking entropy, and is not pure thermal, but is consistent with the underlying unitary theory. Meanwhile, we point out that the information conservation is only suitable for the reversible process and in highly unstable evaporating black hole (irreversible process) the information loss is possible.

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Key words: Kerr-Newman black hole, tunneling rate, Bekenstein-Hawking entropy

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