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Massive scalar wave packet emission by a charged Black Hole and Cosmic Censorship Conjecture violation

We study the tunneling probability of a massive (m_w) uncharged scalar packet out from a near-extremal, static charged black hole (with mass M and charge $Q \to M^+$). We show that there is indeed a \textit{net} probability that a massive uncharged particle tunnels out from the black hole so that the final state (with new mass $M' \equiv M - m_w < Q$) does violate the cosmic censorship conjecture. Nevertheless, the typical time for such a black hole to discharge (i.e, to absorb charge $-Q$ from its surroundings and then become neutral) is much smaller than the tunneling time; therefore, the violation is never attained in practice. Even for a completely isolated black hole (should it exist), the standard time dilation near the horizon stretches the typical violation time scale to unobservable values. In recen studies we will show that this method is in accordance with a recently publish result of exact tunneling solution.

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