

Asymptotic tails of massive scalar fields in black-hole spacetimes

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Abstract

We investigate the asymptotic tail behavior of massive scalar fields in black-hole spacetimes. It is shown that the oscillatory tail of the scalar field has the decay rate of $t^{5/6}$ at asymptotically late times, which is caused by a resonant backscattering due to the space-time curvature. Our conclusion is that this long-lived oscillating tail is generally observed at timelike infinity in black-hole spacetimes. We also discuss that such a remarkable backscattering effect is absent for the field near the null cone at larger spatial distances.