

1053-35-276

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*Decay Rate of the Linear Wave Equation on a Schwarzschild Black Hole.*

We prove that sufficiently regular solutions to the wave equation  $\square_g \phi = 0$  on the exterior of the Schwarzschild black hole obey the estimates  $|\phi| \leq C_\delta v_+^{-\frac{3}{2}+\delta}$  and  $|\partial_t \phi| \leq C_\delta v_+^{-2+\delta}$  on a compact region of  $r$  and along the event horizon. This is proved with the help of a new vector field commutator that is analogous to the scaling vector field on Minkowski spacetime. This result improves the known decay rates in the region of finite  $r$  and along the event horizon. (Received September 07, 2009)