

Black holes and particles with zero or negative energy

Grib A., Pavlov Y.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2017, Pleiades Publishing, Ltd. We study properties of particles with zero or negative energy and a nonzero orbital angular momentum in the ergosphere of a rotating black hole. We show that the sign of the particle energy is uniquely determined by the angular velocity of its rotation in the ergosphere. We give a simple proof of the fact that extreme black holes cannot exist. We investigate the question of the possibility of an unlimited energy increase in the center-of-mass system of two colliding particles, one or both of which have negative or zero energy.

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Keywords

black hole, geodesic, Kerr metric, negative-energy particle, particle collision

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