Contribution ID: **30**   Type: **Session Talk**

Zero and negative energy in Kerr spacetime

Thursday, 13 October 2022 17:10 (25 minutes)

According to the Penrose process there might be particles with negative energy in the ergosphere of a rotating black hole. Later, it was shown that there might be also particles with zero energy but with not zero angular momentum. In this work we consider properties of such particles. In particular, we investigate the question about the inertial forces for such particles in equatorial plane $\theta = \frac{\pi}{2}$ and in general case. Also we consider the movement along the angle θ. We show that inertial forces in the case of particles with zero energy in the equatorial plane is bigger than ones for particles with positive energy. It turns out that all forces in the zero energy case are proportional to the square of angular momentum L^2.

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Session Classification: Section D

Track Classification: Section D: Gravitation and cosmology