

Time-periodic solutions of the Dirac equation in the extreme Kerr geometry

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Abstract

We consider normalizable time-periodic solutions of the Dirac equation in the exterior region of an extreme Kerr black hole background with mass M and angular momentum J . It is shown that for particular values of J and given azimuthal quantum number k the Dirac equation has a bound state solution, and that the one-particle energy of this solution is given by

$$\omega = -\frac{kM}{2J}.$$

Moreover, an explicit expression for the radial eigenfunctions will be presented.