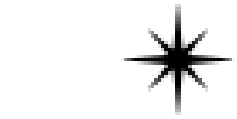

Contribution ID: **110** Type: **Poster (virtual)**

Scattering-state solutions to the Dirac spinors with negative-energy eignstates in a rotating spheroid

Based on our previous work of Fu et al.\,(2020), we derive the rest seven scattering-state ($\chi^{(0)}$, $\phi^{(1)}$, $\chi^{(1)}$, $\phi^{(2)}$, $\chi^{(2)}$, $\phi^{(3)}$ and $\chi^{(3)}$) solutions to the Dirac equation when $E = -im \pm ik \approx -im$, and establish a relation between differential scattering cross-section, $\sigma_{i*}(p, \theta, \varphi)$, and stellar matter density, μ, using the long-wave approximation. It is found that the sensitivity of average scattering cross-sections $\bar{\sigma}_i(p, \theta)$ to the change in μ is proportional to μ^2. We find that the average scattering amplitudes $\bar{f}_i(p, \theta)$, as well as average scattering cross-sections $\bar{\sigma}_i(p, \theta)$, are independent of the mass of particles, m, for four scattering-states\,$\chi^{(i)}$, i=0,1, 2 and 3, while $\bar{f}_i(p, \theta)$ and $\bar{\sigma}_{i*}(p, \theta)$ depend on m, for the rest four scattering states,$\phi^{(i)}$, i=0,1, 2 and 3.
This work will be useful in understanding the properties of anti-Dirac spinors and the physical effects in a rotating spheroid.

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