THE SPIN-TORSION COUPLING PRECESSION OF SPIN AND ITS EFFECTS ON SINGLE PULSES OF PULSARS

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According to the Gravitational Gauge Field Theories (GGFT), the spin $\vec{\mu}$ of elementary particles experiences a precession: $d\vec{\mu}/dt = -3\,\vec{\Omega}\times\vec{\mu}$ in a space-time with torsion tensor $\vec{\Omega}$. This allegation distinguishes the GGFT from the General Relativity. Choosing neutron star as a candidate to judge the theories, we assume an orderly spin alignement model footing on QCD considerations. From detailed calculations we obtained an internal solution for torsion $\vec{\Omega}$ in neutron stars : $|\vec{\Omega}| \sim (\frac{GM}{C^2 R})^2 \omega$, here M is the mass, R the radius and ω the angular velocity of neutron stars. Every neutron-like particles with spin in neutron stars will experience a spin-torsion coupling precession, which is shown to be a complex function of time variable and spatial coordinates inside the star. It is also shown that in a neutron star every spin magnetic moment has two kinds of precession: one is due to the rotation of the star, another arises from the spin-tortion coupling. These two precessions superpose each other, and give the mode of magnetic dipole radiation fields outside the star. Integrating the low-frequency radiation fields generated by every spin magnetic moment, we obtain the whole electromagnetic radiation field. Our radiation energy current looks like the Pacini-Gold simple rotating magnetic dipole model, except an additional factor $(0.354+1.02\cos 3|\vec{\Omega}|t)$ which is just the need to explain the data of pulses for some pulsars. The illustrations of current-time show a pretty good agreemnet with the observations of single pulses in some pulsars. The main features which could be interpreted with our model are: the periodical forward drifting and restoring of phase of single pulses, the existence of two subpulses (two peaks), and some irregular profiles of single pulses, all of which might be the way to tell the GGFT from the General Relativity.

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