Subject: Isotropic and anisotropic neutron star structure in 4D Einstein–Gauss–Bonnet Gravity

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Abstract: With regard to the coupling constant and the strong magnetic field of neutron stars, we have studied these stars in the 4D Einstein–Gauss–Bonnet (4D EGB) gravity model in order to grasp a better understanding of these objects. In this paper, we have shown that the neutron star properties are considerably affected by the coupling constant and magnetic field. We have found that as a consequence of the strong magnetic field and the coupling constant, the maximum mass and radius of a neutron star are increasing functions of the coupling constant, while Schwarzschild radius, compactness, surface gravitational redshift, and Kretschmann scalar are decreasing functions. Additionally, our study has shown that the physical properties of a magnetized neutron star are greatly influenced not only by the strong magnetic field, but also by the anisotropy. Moreover, we have shown that to obtain the hydrostatic equilibrium configuration of the magnetized material, both the local anisotropy effect and the anisotropy due to the magnetic field should be considered. Finally, we have found that in the anisotropic magnetized neutron stars, the maximum mass and radius do not always increase with increasing the internal magnetic field.