

Deformed Neutron Stars and the Photosphere

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The effect of deformation on compact stars, especially neutron stars, is widely known. This can happen for several reasons: intense magnetic fields and high rotation are the main ones. In this sense, taking into consideration influences both in the metric and in the matter structure, through deformed geometries, anisotropies in the energy-momentum tensor, or adequate equations of state, a more realistic analysis of stellar dynamics can be obtained. To this extent, the stars are studied using non-spherical models. Through the employment of a modified Tolman-Oppenheimer-Volkoff equation and selected equations of state, the deformation of neutron stars is investigated. Furthermore, the so-called ultracompact stars, considered in our larger study of neutron stars, can reach unusual levels of compactness, making it possible for a photosphere to appear outside the star. The present paper investigates the possibility of the manifestation of a new phenomenon, in which the deformation of the star allows the photosphere to manifest itself internally and externally, simultaneously.

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