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Spin polarized neutron star matter and core-crust transition in the neutron stars

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It is well known that the magnetars and the pulsars are neutron stars have strong surface magnetic field about 1015 [2] and 1013 [3] Gauss, respectively. The structural properties of these objects, such as its maximum mass and the location of core-crusts interface, is a subject that theoretical astrophysicists have desired to study. In order to determine the core-crust transition parameters, the equation of state (EOS) and the nuclear symmetry energy play a crucial role [1]. The EOS of the neutron star matter depend on spin polarized states which can be produce by super strong magnetic fields. Therefor the investigation of the neutron star properties at different spin state becomes important. In this work, we study the effect of the spin polarization on the core-crust transition parameters. In this work, we have used the spin polarized dependent nuclear symmetry energy that is computed in the lowest order constrained variational (LOCV) formalism as a microscopic approach [4]. The LOCV method is a powerful tool for determination of the properties of the nucleonic matter at zero and finite temperatures [5, 6]. Reference [1] Ch. C. Moustakidis, Phys. Rev. C 86 (2012) 015801. [2] F. Pacini, Nature (London) 216 (1967) 567. [3] C. Thompson and R. Duncan, Astrophsics J 473, (1996) 322. [4] M. Bigdeli, Int. J. Mod. phys. E 22 (2013) 1350054. [5] G. H. Bordbar and M. Modarres, Phys. Rev. C 57 (1998) 714. [6] M. Bigdeli, Phys. Rev. C 82 (2010) 054312.

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