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Neutrino emissivity under influence of strong magnetic field and its effects under cooling of neutron stars

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Direct Urca process is an extremely efficient mechanism for cooling a proto neutron star after its formation. It is believed to be the process responsible for the cooling of young neutron stars after the first 100 years of life. One of the most interesting kind of neutron stars are the pulsars, which are highly magnetized neutron stars, with fields up to 10ˆ14 G at the surface. It is natural then to inquiry about the modifications in the cooling due to Urca process in pulsars. In this work we investigate the influence of strong magnetic fields on the cooling of pulsars due to the neutrino emissivity coming from direct Urca process. The matter is described using a relativistic mean-field model at zero temperature. We calculate numerically the emissivity of neutrinos for different magnetic fields as a function of the baryon density and compare the results for the case without a magnetic field.

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