

Neutron Matter in Magnetar Crusts

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The role of a superstrong magnetic field on dense homogeneous neutron matter at densities relevant for the crust of magnetars is studied. Because the influence of the magnetic field decreases with increasing density, we have focused on the dilute neutron liquid present in the inner crust. We have assumed that the magnetic field is strong enough to destroy superfluidity, and we have therefore neglected neutron pairing. In the presence of a magnetic field, the neutron liquid becomes partially spin polarised. We have found that the dependence of the energy density on the magnetic field is significant for magnetic fields expected in magnetars and for densities lower than the nuclear saturation density.

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