MAGNETIC SUSCEPTIBILITIES OF DENSE SUPERFLUID NEUTRON MATTER WITH GENERALIZED SKYRME FORCES AND SPIN-TRIPLET PAIRING AT ZERO TEMPERATURE

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S u m m a r y

Magnetic properties of a dense superfluid neutron matter (relevant to the physics of neutron star cores) at subnuclear and supranuclear densities (in the range $0.5 \lesssim n/n_0 \lesssim 3.0$, where $n_0 = 0.17$ (fm^{-3}) is the saturation nuclear density) with the so-called generalized Skyrme effective forces BSk18, BSk19, BSk20, BSk21 (containing additional unconventional density-dependent terms) and with spin-triplet p-wave pairing (with spin $S = 1$ and orbital moment $L = 1$) in the presence of a strong magnetic field are studied within the framework of the non-relativistic generalized Fermi-liquid theory at zero temperature. The upper limit for the density range of a neutron matter is restricted by the magnitude $3n_0$ in order to avoid the account of relativistic corrections growing with density. The general formula obtained in [?] (valid for any parametrization of the Skyrme forces) for the magnetic susceptibility of a superfluid neutron matter at zero temperature is specified here for the new BSk18-BSk21 parametrizations of the Skyrme interaction. As is known, all previous conventional Skyrme interactions predict spin instabilities in a normal (nonsuperfluid) neutron matter beyond the saturation nuclear density. It is obtained in the present work that, for the model of superfluid neutron matter with new generalized BSk18-BSk21 parametrizations, such phase transition to the ferromagnetic state occurs neither at subnuclear nor at supranuclear densities. Thus, the high-density ferromagnetic instability is removed in the neutron matter with new generalized Skyrme forces BSk18-BSk21 not only in normal, but also in superfluid states with anisotropic spin-triplet pairing.