Abstract Submitted
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Effects of Magnetic Field and Rotation on $^3P_2$ Superfluidity in Neutron Stars[1] KOTA MASUDA, Department of Physics, The University of Tokyo and Theoretical Research Division, Nishina Center, RIKEN, MUNETO NITTA, Department of Physics at Hiyoshi, and Research and Education Center for Natural Sciences, Keio University — It is believed that an anisotropic $^3P_2$ superfluid state is realized in the core of neutron stars. Historically, a lot of works (Anderson et. al.(1961), Hoffberg et. al.(1970) and Tamagaki(1970)) discussed the properties of $^3P_2$ superfluid state. Ginzburg-Landau (GL) equation was derived by Fujita, Tsuneto (1972) and Richardson (1972). After that, Mermin (1974) solved the problem of minimizing GL free energy density for d-wave pairing and showed what ground states are realized. By using these results, Sauls and Serene (1978) concluded that the unitary phase is realized in BCS limit, and Sauls et. al. (1982) showed $^3P_2$ vortices have a spontaneous magnetization. In this presentation, we firstly introduce GL equation and show some analogy to that of spin2-BEC. In BCS limit, degenerate ground states are parameterized by one parameter. We show effects of gradient terms, magnetic field and rotation on ground states and half-quantized $^3P_2$ vortices are the most stable states under certain conditions. Next, by using an anisotropic GL equation, we discuss a spontaneous magnetization caused by half-quantized $^3P_2$ vortices and compare results with that of integer vortices. Finally, we comment on possible effects of $^3P_2$ superfluid state on neutron star observables.

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