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On the effect of the Bose-Einstein condensed dark matter for the magnetic field in neutron stars

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Nature of dark matter (DM) is not known in both particle physics and astrophysics perspectives. Recently, there are lots of arguments to give some constraints on the physical quantities of DM by using neutron stars (NSs) when it is assumed to be weakly interacting massive particle (WIMP). If DM is the WIMP, there exists a finite DM-nucleon cross section, which may result in DM capture in NSs. Once DM is captured, it could have various sizable effects on NSs. So from the NS observations, one can provide some constraints on DM properties such as the mass and the cross sections. Here we propose some new effect. If DM is a boson, it might be able to form a Bose-Einstein condensate (BEC). In this presentation, we discuss a possibility that such a BEC state of DM can influence the magnetic field or the magnetic field formation of NSs.

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