QUARK STAR IN A STRONG MAGNETIC FIELD

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The neutron star is one of the final forms of a massive star after it explodes as a supernova in the end of its life. Neutron stars which consist of quark matter may exist. They are referred to as quark stars, and considered to be denser than neutron stars. In the case that pressure is very high, the character of nucleons disappears so that quarks in the nucleon can move around a larger colorless region. Such a state is called quark matter. Also, the existence of neutron stars which have strong magnetic fields are known.

Our purpose is to study whether the maximum mass of compact stars can be more massive than twice the solar mass. We consider three kinds of pressures to support the gravitation. One is the Fermi pressure due to the neutral gas containing quarks and leptons coming from the beta stability condition. The second is the bag pressure of the MIT bag model, which originally explains hadron properties. The third comes from magnetic fields of the quark star. Here the magnetic fields include the contribution of quark anomalous magnetic moments and they are assumed to have the density dependence.

In this work, we study how mass of a quark star under a strong magnetic field changes in comparison with the mass in the case where magnetic fields are not taken into account. We also study influences of the bag pressure and the quark anomalous magnetic moment.