

Contribution ID : 28

## Effect of magnetic field on phase transition from neutron to quark star

### Content :

Phase transition, from normal nuclear matter to quark matter, can occur inside a neutron star whose density is 3-10 times normal nuclear matter saturation density. The transition is modeled to occur via a conversion front, converting the neutron star to quark star. The relativistic Rankine-Hugoniot jump condition provides the initial condition of the front propagation, while the hydrodynamical equations govern the front propagation through the star. Neutron stars are not only highly gravitating bodies but they are also observed to have huge magnetic fields on their surfaces. The magnetic field affects both the kinematics and the dynamics of the conversion front. The relativistic Rankine-Hugoniot condition gets modified due to the high magnetic field, resulting in a new initial condition for the front propagation. The hydrodynamical condition which governs the dynamics of the front also gets modified due to the strong magnetic field presence. We have included the effect of a strong magnetic field on the hydrodynamical equations through the Lorentz force generated due to the magnetic field in the energy-momentum tensor. We have considered both dipole and radial fields at the center of the star and studied their effects. The velocity of the conversion front gets modified by 10-15% by the strong magnetic field presence. We further find that the nature of the transition front also depends on the configuration of the magnetic field which we assume.

Primary authors : Dr. MALLICK, Ritam (Indian Institute of Science)

Co-authors :

Presenter : Dr. MALLICK, Ritam (Indian Institute of Science)

Session classification : --not yet classified--

Track classification : --not yet classified--

Type : --not specified--