Contribution ID: **95** Type: **Talk**

The electrical conductivity, magnetic parameter, plastic flow and toroidal magnetic field decay in magnetars

Wednesday 9 September 2020 14:26 (7 minutes)

Magnetars are a kind of pulsars powered mainly by superhigh magnetic fields. They are popular sources with many unsolved issues in themselves, but also linked to various high-energy phenomena, such as Quasi-periodic oscillation, giant flares, fast radio bursts and super-luminous supernovae. In this presentation, combining with the latest EoSs, we first introduce the eigen equations of Ohmic dissipation of high-order toroidal magnetic fields in general relativity, then calculate the electrical conductivity, give a specific relation between the magnetization parameter, defined as the ratio of Ohmic dissipation timescale to Hall drift timescale, and magnetic field in the crust, and apply this specific relation to the magnetic field evolution of high braking-index magnetars. Finally, using verified transition state theory and quantum plasticity theory, we investigate the temperature-dependent shear (strain) rates as well as temperature-dependent (shear) viscosity considering magnetically driven plastic flows in the crust of magnetars, the onset of the soft gamma repeater outburst maybe controlled by magnetospheric dissipation induced by the plastic motions of the crust, according to our results and analysis of relevant energy scales.

Authors: GAO, Zhi-Fu (Xinjiang Astronomical Observatory, Chinese Academy of Sciences); SHAN, Hao (.Xinjiang Astronomical Observatory, Chinese Academy of Sciences)

Presenter: GAO, Zhi-Fu (Xinjiang Astronomical Observatory, Chinese Academy of Sciences)

Session Classification: COMPACT STARS, DM, DE, GWs, ϒ RAYS, QGP, QCD, HIC, SNOVAE, BHs, PARTICLES, GALAXIES