Contribution ID : **720** Type : **Oral talk**

Strange Quark Matter with β-equilibrium condition

Tuesday, 6 October 2020 11:45 (15)

The present study explores the properties of strange quark matter (SQM) or strange quark star (SQS) within the Polyakov extended chiral SU(3) quark mean field (PCQMF) model. Using β- equilibrium condition in the PCQMF model, the analysis of effective quark masses, effective quark chemical potential, and equation of state for strange quark matter at different values of vector coupling constant is carried out. Three different conditions of Proto-Quark Star (PQS) along the star evolution ($S/n_B = 1, Y_l = 0.4$; $S/n_B = 2, Y_{\nu_l} = 0$; $S/n_B = 0, Y_{\nu_l} = 0$) are considered to performed the theoretical simulation. Providing a significant vector coupling constant, the change in effective quark masses with baryon density is found to be less as compared to zero vector interaction. Further, pressure density shows monotonically and smoothly increasing with the increase in energy density. The study thus carried out, anticipated to give a better insight into the role that the superdense matter created in heavy-ion collision experiments plays an important role in understanding the properties of matter inside the core of supermassive stars in the universe.

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Session Classification : HEP theory

Track Classification : HEP theory