2025 XQCD THE 21ST INTERNATIONAL CONFERENCE ON QCD IN EXTREME CONDITIONS

Contribution ID: **54** Type: **Talk**

Bulk viscous dissipation in strange quark stars and mergers

Thursday 3 July 2025 09:45 (20 minutes)

In the coalescence of neutron stars the bulk viscous dissipation offers a potential opportunity to infer properties of neutron star matter by estimating its effect on the gravitational wave emission. To this end, we compute the bulk viscosity in unpaired quark matter considering the electroweak processes allowed in the neutrino-transparent regime at low temperatures. Using the equations of state of bag models and perturbative QCD, we analyze the dependence of our results on the density, temperature and strange quark mass. Finally, we study relevant phenomena in the merger of binary compact stars where the bulk viscosity plays a significant role. First, the damping of baryon density oscillations in quark matter and its importance in the postmerger phase after the collision of two neutron stars if deconfined matter is achieved in the process. Further, the tidal heating induced by the companion in the binary inspiral of strange quark stars and its effect on the gravitational wave form.

References

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3. Tidal heating in binary inspiral of strange quark stars, Suprovo Ghosh; José Luis Hernández; Bikram Keshari Pradhan; Cristina Manuel; Debarati Chatterjee, Laura Tolos, arXiv:2504.07659, (2025)

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Track Classification: Nuclear astrophysics