

Abstract Submitted
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Universal I-Love-Q and Multipole-Love Relations KENT YAGI,
NICOLAS YUNES, Montana State University — One of largest uncertainties in nuclear physics is the equation of state (EoS) in nuclear and supra-nuclear densities. Neutron-star (NS) and quark-star (QS) observables such as the mass and radius depend strongly on the EoS. We find universal relations among the moment-of-inertia, quadrupole moment and various tidal deformabilities of a slowly-rotating NS and QS that are almost EoS-independent. Such unexpected relations have several interesting applications. On an observational astrophysical front, independent measurement of any two quantities automatically determines the others that are not easily accessible. On a gravitational-wave front, such relations allow us to break the degeneracy between the spins and quadrupole moment, or between various tidal deformabilities. On a fundamental physics front, any two independent measurements of the quantities allow for a model-independent and EoS-independent test of general relativity.

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