Abstract Submitted
for the APR16 Meeting of
The American Physical Society

Low-mass neutron stars: universal relations, the nuclear symmetry energy and gravitational radiation HECTOR O. SILVA, EMANUELE BERTI, The University of Mississippi, HAJIME SOTANI, National Astronomical Observatory of Japan — Compact objects such as neutron stars are ideal astrophysical laboratories to test our understanding of the fundamental interactions in the regime of supranuclear densities, unachievable by terrestrial experiments. Despite recent progress, the description of matter (i.e., the the equation of state) at such densities is still debatable. This translates into uncertainties in the bulk properties of neutron stars, masses and radii for instance. Here we will consider low-mass neutron stars. Such stars are expected to carry important information on nuclear matter near the nuclear saturation point. It has recently been shown that the masses and surface redshifts of low-mass neutron stars smoothly depend on simple functions of the central density and of a characteristic parameter η associated with the choice of equation of state. Here we extend these results to slowly-rotating and tidally deformed stars and obtain empirical relations for various quantities, such as the moment of inertia, quadrupole moment and ellipticity, tidal and rotational Love numbers, and rotational apsidal constants. We discuss how these relations might be used to constrain the equation of state by future observations in the electromagnetic and gravitational-wave spectra.

Hector O. Silva
The University of Mississippi

Date submitted: 07 Jan 2016 Electronic form version 1.4