DNP19-2019-000051

Abstract for an Invited Paper
for the DNP19 Meeting of
the American Physical Society

The significance of a neutron star's interior composition[1]

MADAPPA PRAKASH, Ohio University

The discovery of 2 solar mass neutron stars, detection of gravitational waves with the concomitant detection of electromagnetic radiation from the binary neutron star merger GW170787, recent reports of additional mergers involving neutron stars, and accumulating data on the cooling of neutron star crusts have all given much impetus to ongoing theoretical investigations of the dense matter equation of state. In this talk, I will highlight recent work on the role played by nuclei, nucleons and nonnucleonic degrees of freedom (hyperons, quarks, etc.) in understanding the many observable facets of a neutron star. Special emphasis will be placed on the composition of a neutron star at all layers from the surface to the core. The time is ripe now to achieve consistency between the global properties such as masses and radii with dynamical observables that include tidal deformations, rotational periods and their time derivatives, surface temperatures of isolated neutron stars and of those that undergo periodic accretion. While several puzzles await solutions, the need for updates of LIGO detectors to detect gravitational radiation from the remnants of post merger events will be emphasized.

[1]Research supported by DOE grant No. DE-FG02-93ER-40756