HAW14-2014-000504

Abstract for an Invited Paper
for the HAW14 Meeting of
the American Physical Society

Hadronic Stars versus Hybrid stars: how can we identify them?

MARK ALFORD, Washington University, St. Louis

The properties of high-density hadronic matter have been investigated for some time to predict properties of neutron stars including mass/radius and the maximum mass of a neutron star. Recent results indicate the properties of dense hadronic matter up to several times saturation density may be strongly constrained by properties of three-nucleon interactions and hyperon-nucleon interactions. We review some of these results and their comparison to observations. At high pressure, nuclear matter will undergo a transition to quark matter, so sufficiently heavy neutron stars may really be "hybrid stars" with quark matter cores. We will discuss the "Constant Sound Speed" (CSS) parameterization of the quark matter EoS, and show how it provides a generic way of understanding the topology of the mass-radius relation, as well as more specific features like the maximum mass and typical radius. CSS provides a fairly general framework or language for comparing different quark matter models with each other and with data, and for expressing experimental constraints in model-independent terms.