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Neutron Star Masses and Radii and the Equation of State of Dense Matter[1]

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The idea that neutron observations can be used to determine the equation of state of dense matter precedes the observation of the first neutron star by almost a decade. However, only in the past ten years have neutron star mass and radius measurements led to quantitative constraints on the equation of state over a range of densities. In this talk, we present a quantitative analysis of neutron star mass and radius measurements from quiescent low-mass X-ray binaries and photospheric radius expansion bursts. We combine this information with tidal deformability constraints from GW 170817 and recent constraints from NICER on the mass and radius of J0030+451 to obtain a probability distribution of mass-radius curves. We also obtain a probability distribution for the equation of state. Finally, we examine the impact of statistical and systematic uncertainties in these determinations.

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