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Measuring Neutron Star Radii and the Dense Matter Equation of State

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Normal stars – like our sun, which is $\approx 10^6$ km in radius – have their size governed by the gas equation of state, which is well understood. White dwarfs – $\approx$ 5000 km – have their size governed by electron degeneracy pressure, also well understood. Neutron stars – $\approx$ 10 km – have their size governed by the dense matter equation of state (dEOS), which is not well understood. Measuring neutron star radii can place important constraints on the dEOS. Precise measurements of neutron star radii have only recently been made possible, using X-ray spectroscopy from modern observatories: NASA's Chandra X-ray Observatory, and ESA's XMM-Newton Observatory. I will review the theoretical background which makes these measurements possible, the observational results to date, the resulting constraints on the dEOS, and future prospects for improved constraints.