



Contribution ID: 124

Type: 1st and 2nd weeks (Hadron structure and interactions)

Correlations and the Analytic Inversion of the TOV Equation

Wednesday, October 23, 2024 2:00 PM (1 hour)

There are many examples of correlations among neutron star properties and parameters of the dense matter equation of state near the saturation density. Motivated by the discovery of correlations among the neutron star maximum mass, its radius, central density and pressure, and perturbative expansions in radius of the mass, energy density and pressure near the centers of neutron stars, a nearly universal analytic inversion of the TOV structure equations is developed. It's accuracy in determining the underlying equation of state (i.e., the energy density - pressure relation), as well as the corresponding number density and chemical potential, is of order 0.5%. This treatment is extended to the general estimation of the central density and pressure of an arbitrary mass neutron star in terms of its radius and the inverse slope dR/dM of the M-R curve. The technique is applied to the determination of the equation of state from observations of masses and radii including their uncertainties.

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Session Classification: Seminar (1,2 week)