

January 24, 2025
4:10 – 5:00 PM
Roberts Hall Room 101

Exotic Stable Branches with Efficient TOV Sequences

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Abstract:

Modern inference schemes for the neutron star (NS) equation of state (EoS) require large numbers of stellar models constructed with different EoS, and these stellar models must capture all the behavior of stable stars. I introduce termination conditions for sequences of stellar models for cold nonrotating NSs that can identify all stable stellar configurations up to arbitrarily large central pressures and investigate in which regimes either gravity or nuclear physics dominates the allowed behavior of NS properties. Interestingly, I find that EoSs with monotonically increasing sound-speed can produce multiple stable branches (twin stars) and that large phase transitions at high densities can produce stable branches at nearly any mass scale, including sub-solar masses, while still supporting stars with $M > 2 M_{\text{sun}}$. I will conclude with some speculation about the astrophysical implications of this behavior.

Host: Hang Yu

** Refreshments served in the Barnard Hall second floor atrium at 3:45 PM **