

Colloquium Notice

Thomas Gomez

University of Colorado, Boulder

Determining Neutron Star Equations of State from Spectroscopy.

Thomas Gomez ^{1,2*}

¹University of Colorado

²National Solar Observatory

*Hale Fellow

The equation of state (EOS) is one of the outstanding challenges in neutron star (NS) astrophysics. Accurate determination of their masses and radii will constrain the EOS of nuclear matter. There are multiple efforts underway to determine mass and radius, such as using observations of hot spot radiation being gravitationally bent around the NS. This goal can also be accomplished by measuring the spectrum of the NS directly. In dense plasmas, the widths of spectral lines are dominated by pressure broadening and can therefore be used to determine a star's gravity. However, the high magnetic field in a NS atmosphere complicates the physics of line broadening creating competing broadening mechanisms. Theoretical developments of line broadening in high magnetic fields indicate that collisions with plasma particles exceed the broadening from the motional Stark effect from the magnetic field. Contrary to past results, this means that spectral lines from neutron star atmospheres can be used to directly determine mass and radius. Recent measurements from the Chandra X-ray telescope give us a clue as to the feasibility of this method.

Monday

March 24, 2025

Starts at 12:15 PM

Coffee at 12:00 PM

Physics Conference Room, SB B326