



Physics Colloquium



Thursday, April 7 at 3:30 pm in SC 234

Dr. William G. Newton

Department of Physics and Astronomy

Texas A&M University-Commerce

Neutron Stars and their Mantles: Probing Condensed Nuclear Matter under Extreme Conditions

Neutron stars, born in the collapse of massive stellar cores, offer a fascinating glimpse into physics under the most extreme conditions. All four fundamental forces play an important role in determining the structure and dynamics of neutron stars, giving rise to a rich phenomenology manifest in observations over the whole electromagnetic spectrum. Understanding observed behaviors of neutron stars requires a close interplay of astrophysical observation and modeling, and nuclear physics experiment and theory.

I will present how our current understanding of neutron star structure has arisen from this interplay. Neutron stars have a thin (~ 1 km) solid crust surrounding a core (~ 10 km in radius) of fluid nucleons. I will focus on the region where the crust transitions to the core, sometimes referred to as its mantle. This layer is expected to exhibit a number of fascinating material properties with strong analogies in soft condensed matter physics. I will detail the physics of the mantle, how we can go about testing our physical models observationally, and the fundamental nuclear physics questions that it helps us answer.

Refreshments 3:00-3:20 pm in SC 103