Abstract Submitted
for the TSS18 Meeting of
The American Physical Society

The Extent and Observable Properties of Nuclear Pasta in Neutron Star Crusts WILLIAM NEWTON, Texas AM University-Commerce, JIRINA RIKOVSKA STONE, University of Oxford, MARK KALTENBORN, George Washington University, SARAH CANTU, Texas AM University — A layer of nuclear soft condensed matter called nuclear pasta is predicted to mediate the crust-core transition in neutron stars. We present detailed 3D quantum calculations of nuclear pasta in neutron star crusts and proto-neutron stars. We find that nuclear pasta occurs at lower densities than predicted in semi-classical or classical models, and we predict that over 50We explore a number of consequences for observables. As a proto-neutron star cools, nuclear pasta tends to keep the outer layers of the star hotter for longer, resulting in an observable imprint on the late-time neutrino signal from supernovae. When the neutron star crust condenses, pasta likely forms microscopic domains characterized by different nuclear geometries, enhancing the disorder of the inner crust and contributing to an observable signal in the cooling of older accreting neutron stars in quiescence.

William Newton
Texas A
M University-Commerce

Date submitted: 09 Mar 2018 Electronic form version 1.4