Abstract Submitted
for the APR15 Meeting of
The American Physical Society

Pasta Elasticity: Molecular dynamics simulations of nuclear pasta deformations M.E. CAPLAN, C.J. HOROWITZ, Indiana University, D.K. BERRY, UITS, Indiana University — Nuclear pasta is expected in the inner crust of neutron stars at densities near the nuclear saturation density. In this work, the elastic properties of pasta are calculated from large scale molecular dynamics simulations by deforming the simulation volume. Our model uses a semi-classical two-nucleon potential that reproduces nuclear saturation. We report the shear modulus and breaking strain of a variety of pasta phases for different temperatures, densities, and proton fractions. The presence of pasta in neutron stars could have significant effects on crustal oscillations and could be inferred from observations of soft-gamma repeaters. Additionally, these elastic parameters will enable us to improve estimates of the maximum size and lifetime of "mountains" on the crust, which could efficiently radiate gravitational waves.

Matthew Caplan
Indiana Univ - Bloomington

Date submitted: 06 Jan 2015 Electronic form version 1.4