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Nuclear Pasta Properties from Molecular Dynamics Simulations ANDRE DA SILVA SCHNEIDER, JOE HUGHTO, CHARLES HOROWITZ, DON BERRY, Indiana University — The physics of matter at subnuclear densities, about 10^{13} to 10^{14} g/cm³, is relevant to understand some of the properties of neutron star crusts and supernovae explosions. At such high densities, because of competition between attractive short-range nuclear forces and repulsive long-range Coulomb forces, it is expected that nucleons arrange themselves in a variety of complex shapes known as *nuclear pasta*. We study *nuclear pasta* at a range of densities and proton fractions using large scale molecular dynamics simulations with a simple semiclassical model for the nucleon interactions. From our simulations we calculate the structure factor of different pasta configurations, which are relevant for neutrino opacities in supernovae. From these simulations we can also obtain some mechanical properties of the pasta, such as shear modulus, bulk viscosity and breaking strains. These can help determine the frequency of shear modes in neutron star crusts and the size of mountains the crust can support.

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