Large scale MD simulations of nuclear pasta formation: Nuclear reactions that make a neutron star

Objectives:
- Determine how core of massive star, during supernova, transforms from $10^{55}$ separate nuclei into a single large nucleus --- a newly formed neutron star.
- Study large-scale shape oscillations associated with formation of exotic nuclear pasta phases.

Impact:
- Determine time scales for large-scale nuclear shape changes.
- Guidance for multifragmentation and other heavy-ion reactions.
- Determine many transport properties important in astrophysics.

Accomplishments:
- Performed MD simulations with $\leq 300,000$ nucleons.
- Directly determined time scales for different nuclear pasta shape changes.

Reference: A. Schneider et al., to be published.
Contact: C. Horowitz horowit@indiana.edu