Abstract Submitted
for the APR12 Meeting of
The American Physical Society

Neutron star evolutions using tabulated equations of state with a new execution model MATTHEW ANDERSON, Indiana University, HARTMUT KAISER, Louisiana State University, DAVID NEILSEN, Brigham Young University, THOMAS STERLING, Indiana University — The addition of nuclear and neutrino physics to general relativistic fluid codes allows for a more realistic description of hot nuclear matter in neutron star and black hole systems. This additional microphysics requires that each processor have access to large tables of data, such as equations of state, and in large simulations the memory required to store these tables locally can become excessive unless an alternative execution model is used. In this talk we present neutron star evolution results obtained using a message driven multi-threaded execution model known as ParalleX as an alternative to using a hybrid MPI-OpenMP approach. ParalleX provides the user a new way of computation based on message-driven flow control coordinated by lightweight synchronization elements which improves scalability and simplifies code development. We present the spectrum of radial pulsation frequencies for a neutron star with the Shen equation of state using the ParalleX execution model. We present performance results for an open source, distributed, nonblocking ParalleX-based tabulated equation of state component capable of handling tables that may even be too large to read into the memory of a single node.

Matthew Anderson
Indiana University

Date submitted: 05 Jan 2012 Electronic form version 1.4