Abstract Submitted
for the APR11 Meeting of
The American Physical Society

Simulations of Astrophysical Black-Hole Formation using the Spectral Einstein Code (SpEC) JEFFREY KAPLAN, CHRISTIAN OTT, MARK SCHEEL, BELA SZILAGYI, Caltech — Since the first successful fully general-relativistic simulations of coalescing neutron-star binaries, researchers have steadily improved the quality of their neutron-star binary evolutions with the goal of drawing connections between neutron-star physics (such as the NS equation of state, magnetic fields, etc.) and astrophysical observables (in the form of gravitational waves and the electromagnetic signature of short gamma-ray bursts). In order to accomplish this goal, it is crucial to be able to robustly simulate the formation of black holes from collapsing nuclear matter described by a state of the art equations of state. We present the first simulations of black-hole formation from collapsing neutron-star configurations in the generalized harmonic formulation with pseudospectral methods. We employ a dual-grid approach, and solve the relativistic fluid equations using high-resolution shock-capturing techniques. In our presentation, we focus on results of long-term simulations of collapse and post-merger evolution of varied neutron star configurations.

Jeffrey Kaplan
Caltech

Date submitted: 16 Jan 2011 Electronic form version 1.4