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Simulations of Neutron-Star Binaries using the Spectral Einstein Code (SpEC) JEFFREY KAPLAN, CHRISTIAN OTT, California Institute of Technology, CURRAN MUHLBERGER, MATTHEW DUEZ, FRANCOIS FOUCART, Cornell University, MARK SCHEEL, California Institute of Technology — 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). We present the progress of the Caltech-Cornell numerical relativity collaboration in simulating the merger of neutron star binaries. Our simulations employ a two-grid approach: on one grid we evolve the Einstein equations in the generalized harmonic formulation using pseudospectral methods, and on the other we solve the relativistic fluid equations using high-resolution shock-capturing techniques. In our presentation, we focus on results of long-term simulations of the coalescence, merger, and post-merger evolution of equal mass neutron-star binaries using a simple gamma law equation of state and discuss preliminary results from work towards including a microphysical finite-temperature nuclear equation of state and neutrino cooling.

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