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Simulating Ejecta from Binary Neutron Star Coalescence using SPH HYUN LIM, Brigham Young University-Provo, NICOLAS DE BRYE, University of Valencia, Spain, DANIEL GEORGE, University of Illinois at Urbana-Champaign, GLEN HORDEMANN, Texas AM University, JULIEN LOISEAU, University of Reims Champagne-Ardenne, France, JONAH MILLER, Perimeter Institute and University of Guelph, JONATHAN SHARMAN, Rice University — Observational signatures of binary neutron star mergers include gravitational waves and faint supernova-like transients that are powered by the radioactive decay of freshly synthesized heavy elements. We use smoothed particle hydrodynamics (SPH), which is well suited for such problems, and adapt the highly scalable 2HOT code to simulate these events. Further, we augment 2HOT by incorporating tabulated equations of state to improve the physical content of the simulations. This additional physics input introduces overhead. To maintain good performance and scalability, we optimize the nearest-neighbor search algorithm intrinsic to the code. In particular, we experiment with different domain partitioning schemes and problem space representations. We comment on how retaining good performance while adding new physics has provided a unique opportunity to practice principles of co-design within a collaboration between physicists and computer scientists.

Hyun Lim
Brigham Young University-Provo

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