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Binary neutron star initial data: numerical methods and a public library[1] JOSHUA FABER, TANMAYEE GUPTE, GRACE FIACCO, Rochester Institute of Technology, TRUNG HA, University of Rochester — Binary neutron star mergers have long been known as a critical target for gravitational wave detection by the LIGO mission, and the recent coincident electromagnetic and gravitational wave observations of GW170817 have served to open up the dawn of the multimessenger age. To simulate such systems, it is critical to begin from relativistically self-consistent quasi-equilibrium binary configurations. Here, we describe advancements made to the publicly available Lorene code to allow for more robust generation of neutron star binaries with either high-mass components or very unequal mass components, for systems where physically motivated neutron star equation of state formulae are modeled as piecewise polytropes. We also describe the release of a publicly available binary neutron star initial data repository, intended for use by researchers using the Einstein Toolkit and other GR evolution codes.

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