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Modeling Kilonova Light Curves from Neutron Star Mergers: Dependence on Astrophysical Conditions and Nuclear Inputs YONGLIN ZHU, Department of Physics, North Carolina State University, JENNIFER BARNES, Department of Physics and Columbia Astrophysics Laboratory, Columbia University, KELSEY LUND, Department of Physics, North Carolina State University,, TREVOR SPROUSE, NICOLE VASSH, University of Notre Dame, MATTHEW MUMPOWER, Center for Theoretical As- trophysics, Los Alamos National Laboratory, GAIL MCLAUGHLIN, Department of Physics, North Carolina State University, REBECCA SURMAN, University of Notre Dame — The unprecedented observations of the gravitational wave event, GW170817, and its optical counterpart, AT2017gfo, suggest neutron star mergers as a production site of the heaviest elements. In order to create accurate estimates of these signals, we require nuclear models, astrophysical models of the site, as well as models of the radioactive transfer. We evaluate and provide a comprehensive estimate of the nuclear and astrophysical uncertainties with nucleosynthesis informed kilonova light curve modeling. We find that the combined nuclear and astrophysical uncertainties have a significant contribution to the uncertainty the light curves associated with neutron stars mergers (kilonova). We evaluate the role of fission decay rates and fission daughter product distributions in nuclear energy generation and the production of the lanthanides and actinides, both key quantities for setting the overall luminosity and the timescale for the decay of the optical counterpart.

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