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The Nuclear Physics Uncertainty on Kilonova Heating Rates and the Role of Fission

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The detection of an electromagnetic counterpart to GW170817[1] suggests that r-process elements are produced in neutron star mergers. This electromagnetic counterpart has been modeled as a kilonova, which is a light curve thought to be powered mainly from the radioactive decay of heavy elements formed. We investigate uncertainties in the nuclear physics inputs to kilonova calculations, 1nding that the uncertainty in the total nuclear heating rate is a factor of a few. We examine in particular the role of 1ssion in this heating, and 1nd that while much of the total nuclear heating is driven by beta decay, 1ssion has an important role to play. We identify the nuclei which make the largest contribution to the heating through 1ssion, and we also investigate the population of
beta decaying nuclei by way of 1ssion daughter products.

References
[1] B. P. Abbott et al. [LIGO Scienti1c and Virgo Collaborations], Phys. Rev. Lett. 119, no. 16, 161101 (2017)

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