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Emulator for the r-process and its energy generation in neutron-star merger remnants

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The rapid neutron-capture process (r-process), known to operate in neutron-star merger (NSM) remnants, produces heavy elements whose radioactive decay deposits energy into the ejecta and powers a distinctive thermal glow called kilonova. However, an online implementation of the r-process in simulations is challenging due to the associated large number of isotopes in a full nuclear network. In this talk, we will present a machine learning method to emulate the r-process and its energy generation that can be efficiently incorporated in hydrodynamic simulations. We use this method to study the effects of r-process heating on the properties of NSM ejecta and kilonova.

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