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3D Simulations of the Fast Flavor Instability[1] SHERWOOD RICHERS, University of California, Berkeley, DON WILLCOX, NICOLE FORD, ANDREW MYERS, Lawrence Berkeley National Laboratory — Neutrinos transport energy, drive outflows, and determine the ratio of electrons to protons in the ejecta from neutron star mergers that enriches the surrounding universe with heavy elements. Only electron flavor neutrinos and antineutrinos modify the composition of the ejecta and thus directly affect the synthesis of heavy elements. Instabilities that cause rapid mixing of neutrino flavor are likely ubiquitous in mergers, but are poorly understood and are absent from global simulations. I will present the first (local) three-dimensional simulations of this instability using the new open-source particle-in-cell neutrino quantum kinetics code Emu. I will demonstrate that the growth phase of the instability matches theoretical predictions, describe abundances of each neutrino species after the instability saturates, and discuss the implications for nucleosynthesis in neutron star mergers.

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