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Impact of ^{56}Ni production in neutrino-driven winds from long-lived binary neutron star merger remnants

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We investigate the nucleosynthesis and kilonova light curve based on recent long-term binary neutron star merger simulations that incorporate a two-moment neutrino-transport scheme. The ejecta are evolved for 30 days using axisymmetric radiation-hydrodynamics simulations coupled in-situ to a complete nuclear network. For the first time, we find that the neutrino-driven wind from the post-merger remnant is mostly proton-rich. The resulting nucleosynthesis products are predominantly ^{56}Ni and other iron-group elements. After a few days, the decay of ^{56}Ni and later ^{56}Co becomes the primary source of heating in the expanding matter, which significantly alters the time dependence of the kilonova light curve. The observation of this effect would be a smoking gun for the presence of a long-lived neutron-star remnant in future kilonova observations.

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