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Radiative transfer simulations for explosive transients

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We use the 3D radiative transfer code ARTIS to predict light curves and spectra for hydrodynamic explosion models. We first present radiative transfer simulations of the 'double detonation'scenario, which is a promising explosion mechanism to explain Type Ia supernovae from sub-Chandrasekhar mass white dwarfs. The synthetic spectra and light curves from our approximate non-LTE calculations (which use a nebular approximation) show a number of discrepancies with observations of SNe Ia, namely that the light curves show colours too red and spectra show strong absorption features due to heavy elements (Ti, Cr and Fe-group) produced during the He shell detonation in the outer layers. ARTIS has recently been extended with the capability to model radiative transfer in full non-LTE. This substantially improves the accuracy of predicted observables, and we discuss improvements in the agreement between models and observations.
We also present ARTIS calculations predicting the kilonova emission from neutron star merger simulations. Many previous kilonova simulations have assumed greatly simplified ejecta structures. We investigate in 3D how the simulated dynamical ejecta component (ejected on timescales of milliseconds) contributes to the resulting kilonova light curve.

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