The files in this directory are for the following helium shell double-detonation (He-shell DDet) models in Supplementary Figure 7 of Ni et al. (2022a) listed below, with the corresponding prefixes for the names of the files of each model in parentheses.
1.00+0.010 red solid curves (spectrum_1.0_0.01_doubledet*)
1.00+0.011 green dashed curves (spectrum_1.000_0.011_5050_doubledet*)
1.00+0.012 blue dashed curves (spectrum_1.0_0.012_5050_doubledet*)
1.05+0.010 magenta solid curves (spectrum_1.050_0.010_5050_doubledet*)
1.05+0.0111 brown dashed curves (spectrum_1.050_0.0111_5050_doubledet*)
1.05+0.0112 yellow dashed curves (spectrum_1.050_0.0112_5050_doubledet*)
1.10+0.010 cyan solid curves (spectrum_1.100_0.010_5050_doubledet*)

For each model in Ni et al. (2022a) there is **(1)** spectroscopic time series with *.h5 extension, **(2)** cleaned photometric time series with *_BVi.clean.mag extension.
For some models, **(3)** initial ejecta profiles are also provided with *.mod extension.

The contents of each file are described below.

(1) Spectroscopic time series (*.h5):
These are spectra produced by the Sedona radiation transfer code with the method described in Polin et al. (2019), used in Ni et al. (2022a) for Figure 4 and Supplementary Figure 7.
The input initial ejecta profiles for the Sedona runs are described in **(3)** below.

The ‘time’ column is the model time-step (seconds since explosion in the rest frame).
The ‘nu’ column contains the spectral frequency axis (Hz in the rest frame).
The ‘Lnu’ column contains spectral luminosity density (ergs/s/Hz).

Previously, the Sedona models from Polin et al. (2019) started MCMC calculations of photon propagation from 0.25 days.

We have set MCMC calculations of photon propagation to begin at the Sedona start time of 0.1 days in order to resolve behavior starting from as early as 0.25 days. Note that the spectra of the first few time-steps up until 0.25 days all have zero flux in every frequency bin since the time step size is shorter than the time needed for photon packets to diffuse out of the ejecta. The next few spectra may still have zero flux in most frequency bins, with a few scattered, non-zero bins, meaning that not enough photon packets have emerged yet to provide a statistically reliable spectrum. Thus, we caution against using those earliest few spectra even with extensive smoothing/binning. In our paper, we have only used the time-steps where the spectra have a sufficient density of non-zero bins, when the average “spectral resolution” of non-zero bins (i.e., lambda divided by delta-lambda between adjacent non-zero bins) is > half of the spectral resolution of all the bins in the band of interest (which is e.g., ~1000 in the B-band).

(2) Cleaned photometric time series (*_BVi.clean.mag):

These contain the model BVi light curves and B-V curve used in Ni et al. (2022a) Figure 2 and Supplementary Figure 7. The columns 1–5 are model time steps (days since explosion in the rest frame), BVi-band absolute magnitudes, and B-V colors, respectively.

As described above, some early timesteps contain unphysical spectra due to the Monte Carlo nature of the Sedona radiative transfer code. In the cleaned photometric time series, the artefacts have been removed by discarding those time-steps. (Note that we also provide the raw photometry from Sedona in the files with *_ugrizUBVRI.mag extensions for each model).

For the Figures shown in Ni et al. (2022a), we interpolate across these time-steps by assuming the BVi flux equals 0 ergs/s (and thus, the B-V color equals 0 mag) prior to emergence of MCMC photons at 0.25 days. This is highlighted with dotted curves in the Fig below. The same is done for the V-I color as in Ni et al. (2022b). We emphasize that the dotted curves are an approximation to the true evolution during those time periods.

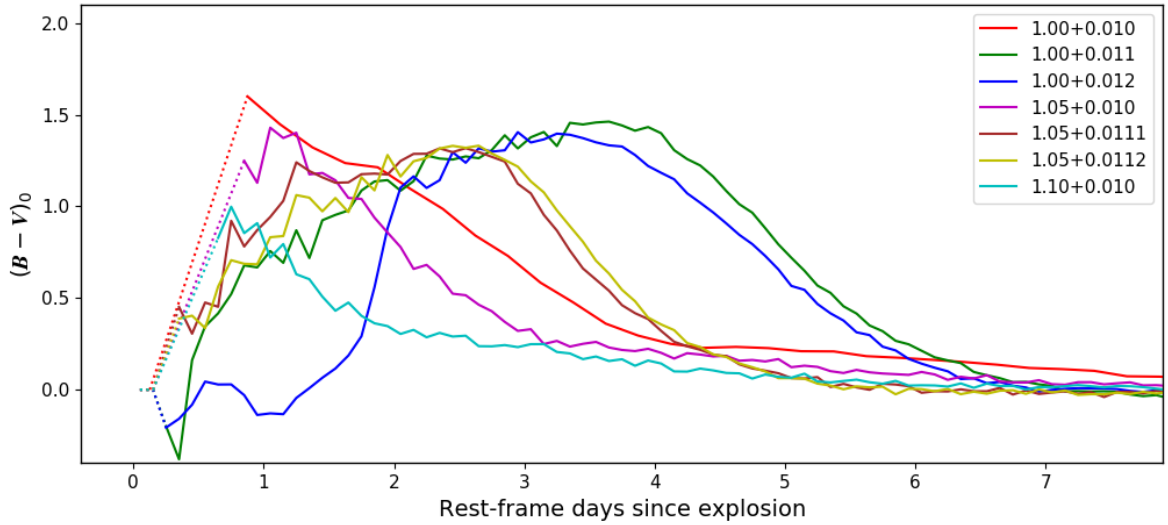

Figure: *The B-V color curves of each model (colored curves) as labelled in the legend. The dotted portions show the interpolated parts over the first few time-steps.*

(3) Initial ejecta profiles (*.mod):
These are initial SN ejecta profiles that are provided as input for Sedona. The third number in the second line of the header provides the time since the explosion (seconds in rest frame).

The 22 columns of the files are of the following:
Column 1 is velocity (cm/s at the outer cell edge).
Column 2 is density (g/cm^3 at the cell center).
Column 3 is temperature (K at the cell center).
Columns 4–22 provide the mass fractions at the cell center of elements in the order of the list of Z.A in the third line of the header (e.g., 2.4 is He4 and 28.56 is Ni56).