Plots for the M_{ej} correlations

December 18, 2015

This document has the plots for the ejecta mass calculations using the measured NIR light curves of CSP-I objects. It also includes a short discussion of the distributions in the literature or from complementary methods.

- ^{56}Ni mass using Arnett's rule and t_0 using the Jeffrey 1999 formalism
- ^{56}Ni mass from the nebular phase line and the ejecta mass from Scalzo et al 2014 relation (using the stretch values)
- Calculated from Richard's MCMC

Procedure

In this section, I describe the procedure used for calculating the M_{Ni} and M_{ej} values. I follow the steps in Stritzinger et al. 2006, but I have written down each part of the analysis so that it can be checked.

- I use an R_V value for each SN (in this case 1.7) to calculate A_V from the measured colour excess.
- The magnitudes are converted to dereddened fluxes and a bolometric light curve is calculated.
- ^{56}Ni mass is calculated from the bolometric peak using Arnett's rule
- t_0 is calculated by fitting a ^{5}6Co deposition function to the bolometric light curve between +40 and +100 d
- M_{ej} is calculated as in Jeffrey 1999 using the same assumptions for v_e, q and κ_γ as in Stritzinger et al. 2006.

Nickel mass calculations

For plots in this document, the Ni masses were calculated in the 'conventional' method, using multi-band data to construct a bolometric light curve. The sample of SNe for this calculation includes objects with significant (E(B-V) ¿

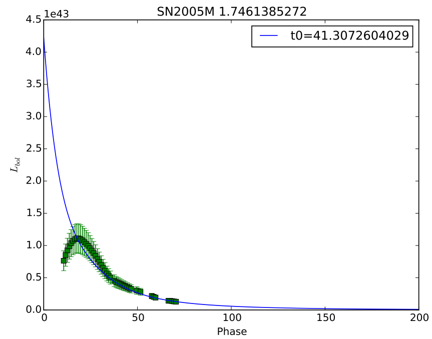

Figure 1: Fitting the deposition curve to the bolometric light curve of SN 2005M

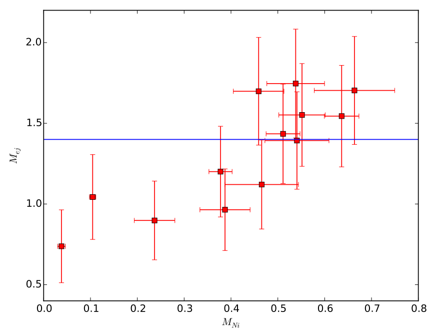

Figure 2: Using a variable rise time for the Nickel mass calculations, the relation between M_{ej}- ^{56}Ni mass

.1) reddening. For these objects, the Ni masses calculated from the bolometric light curve will be sensitive to the R_V value assumed.

The objects with a high ^{56}Ni mass are SN 2006et, SN 2007S, SN 2007le, SN 2008fp. These objects all have >0.25 mag of extinction. Comparing the ^{56}Ni mass from the second maximum to the estimate from the peak suggests that the R_V=1.7 fit is significantly better than R_V = 3.1. The measured R_V values for these 4 SNe (from Burns et al. 2014 using maximum light photometry) is $\sim$ 1.7 which agrees well with the inference from the ^{56}Ni mass. This may also be further proof that 91T-like objects occur in dustier environments.

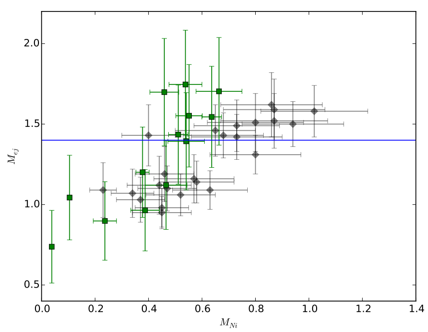

Figure 3: Comparing the SNe in Figure **??** to the calculations by Richard