

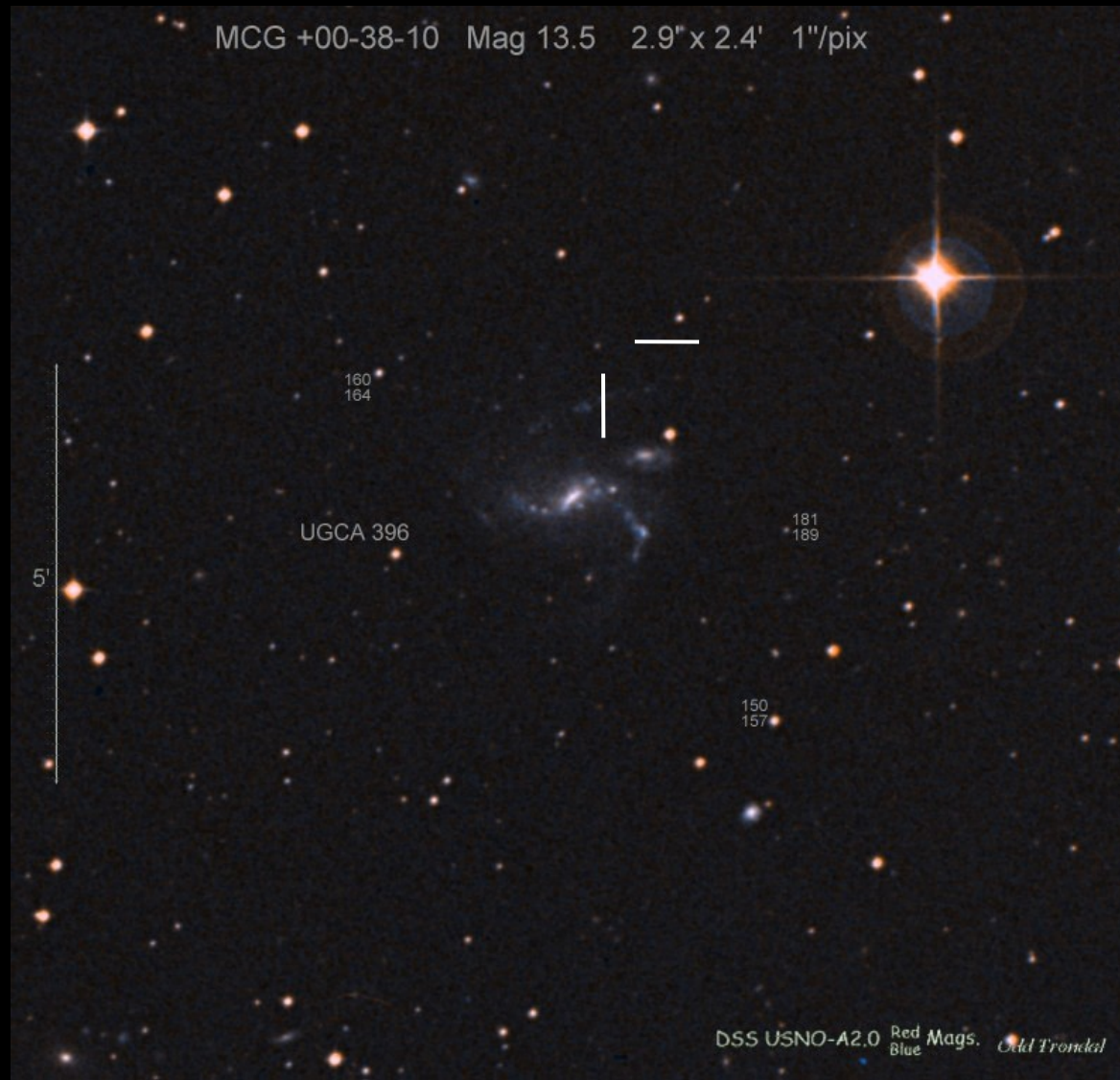
Luminous SN 2012aa: the optical follow-up of shock interaction with circumstellar medium

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The transient universe as seen by iPTF and ZTF
2 – 5 June, 2014
Stockholm

Supernova 2012aa

Discovered on 29 Jan, 2012

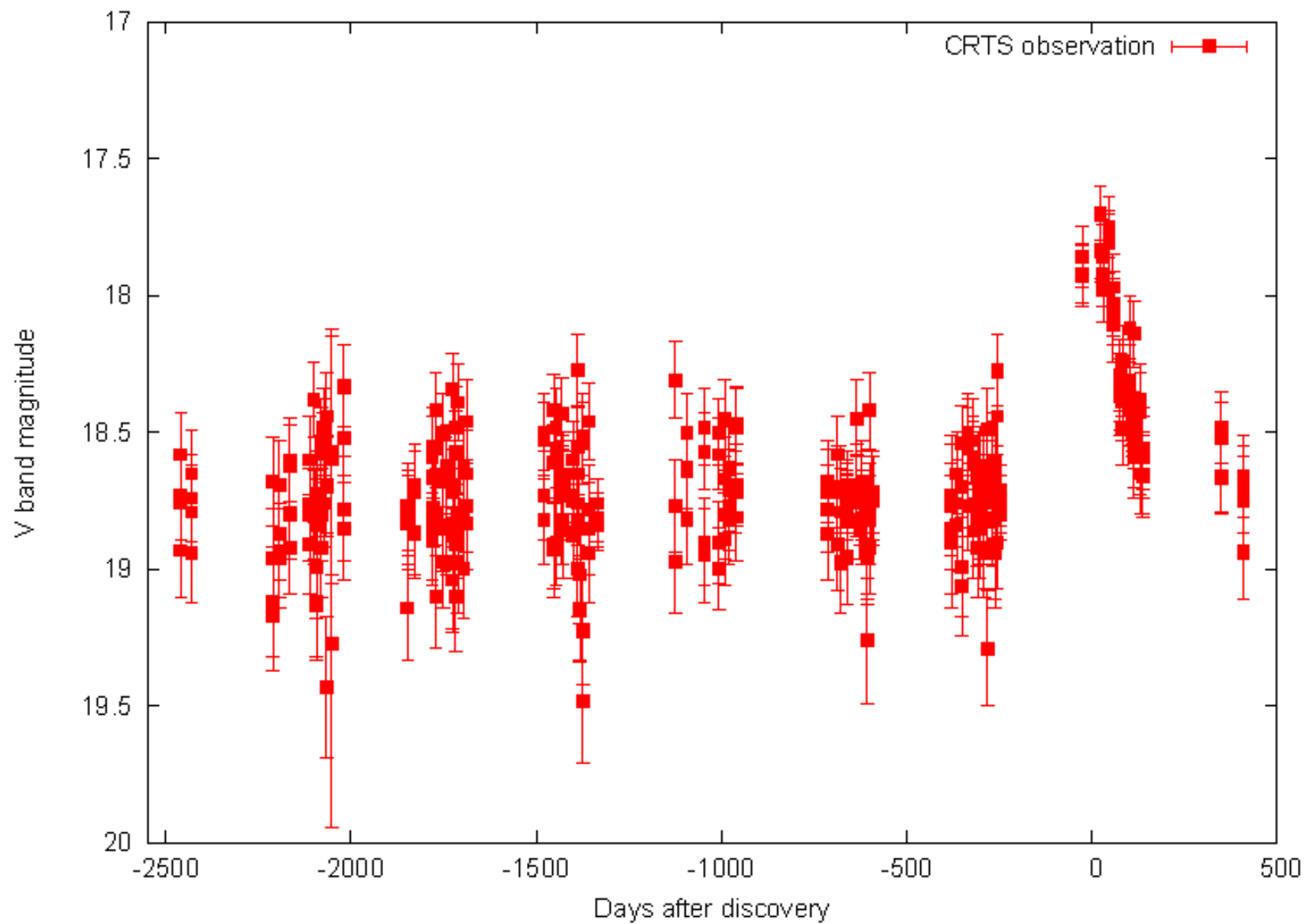


SN host in Pre-SN DSS image

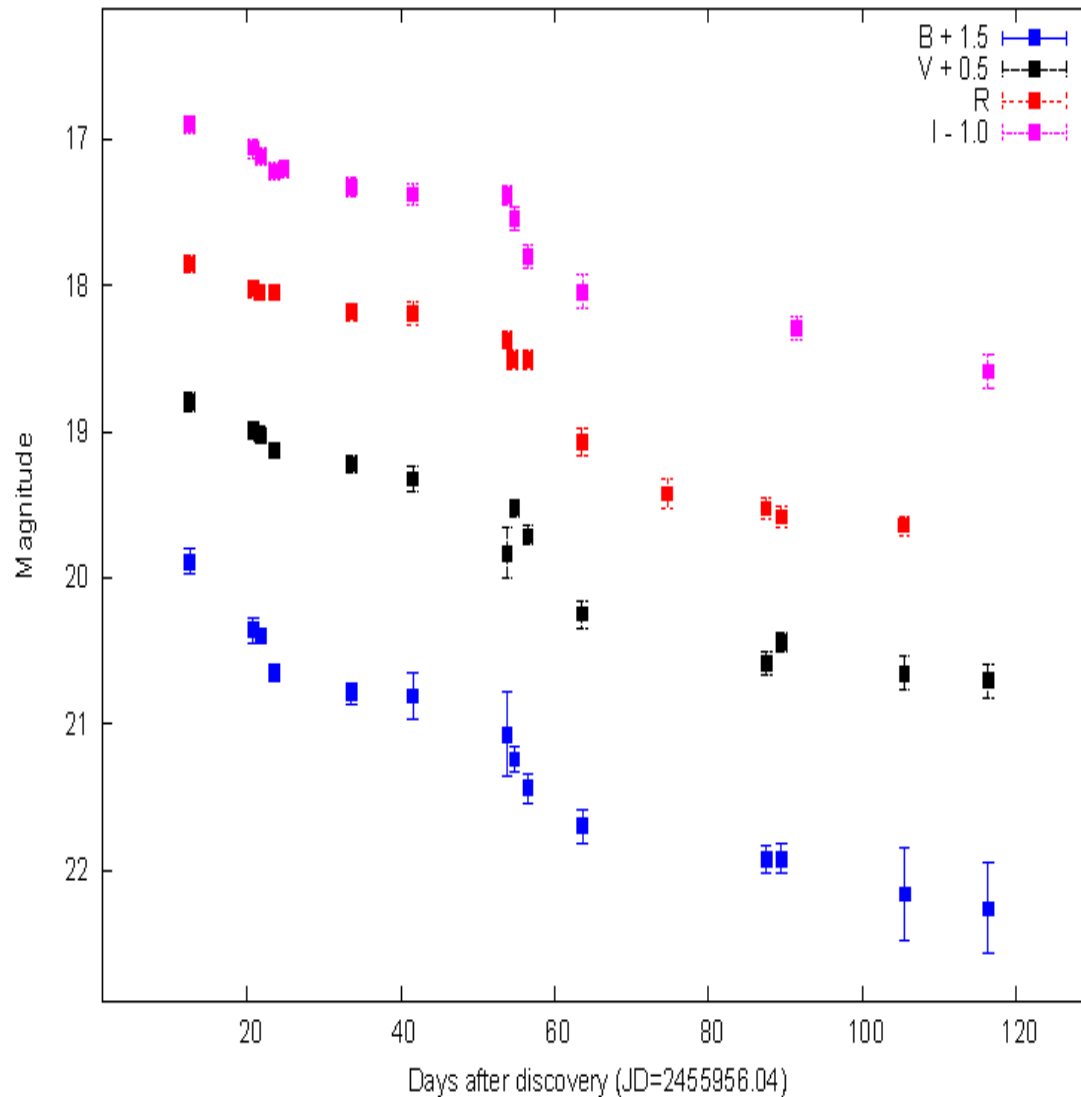
Time line of the event

- **29th January, 2012 : Discovery of the event by LOSS**
- **1st February, 2012 : A second confirmation by Joseph Brimacombe (CBET 3015).**
- **2nd February, 2012 : Confirmation as a Type Ic explosion by LOSS.**
- **No Radio observation was triggered.**
- **No X-ray observation was triggered.**
- **The optical photometry and spectroscopic follow up observations from CRTS, ARIES, NTT, LICK and KECK.**

CRTS observations



Photometric observations

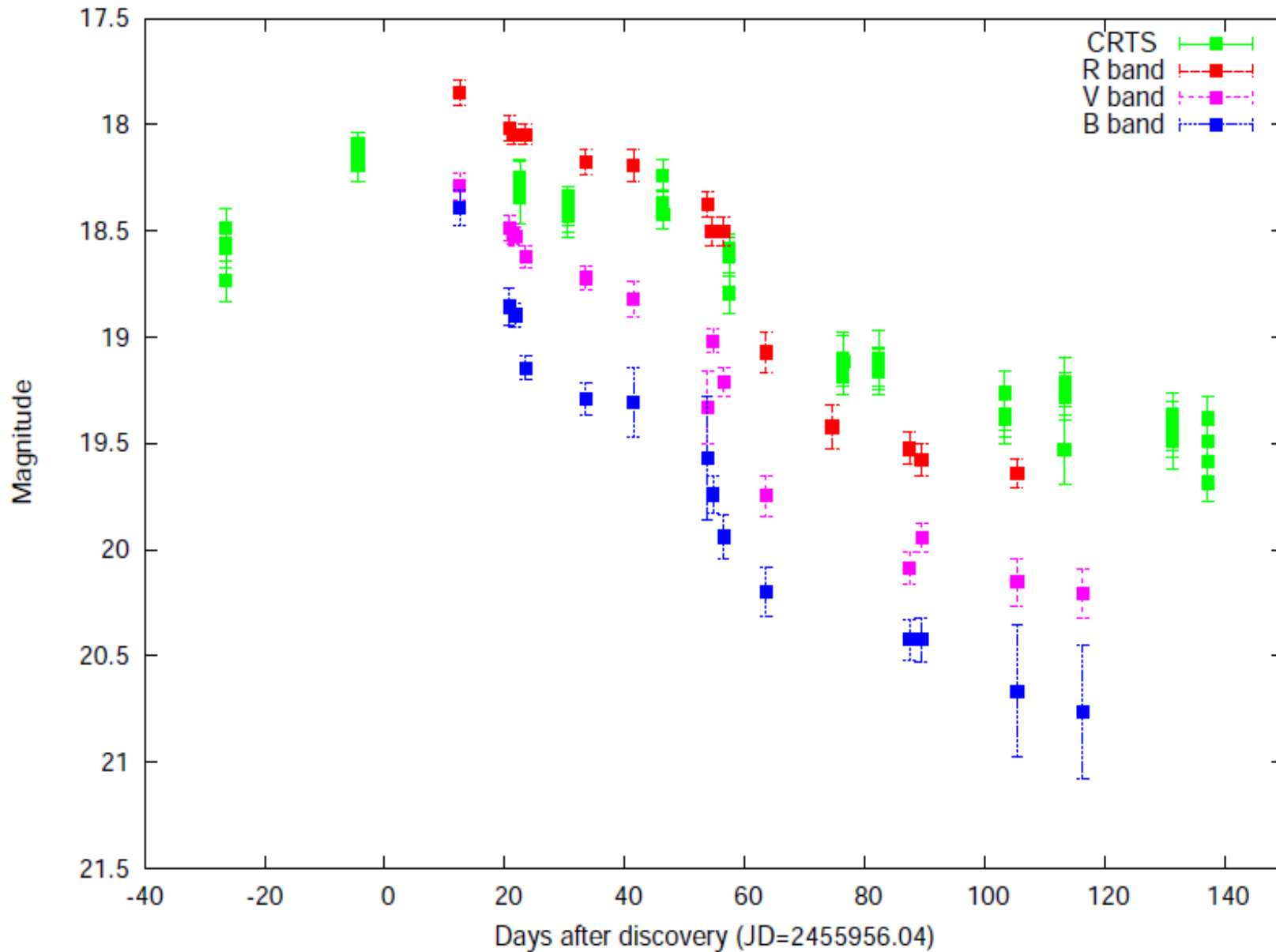


For subtraction of background flux, Late time images have been used.

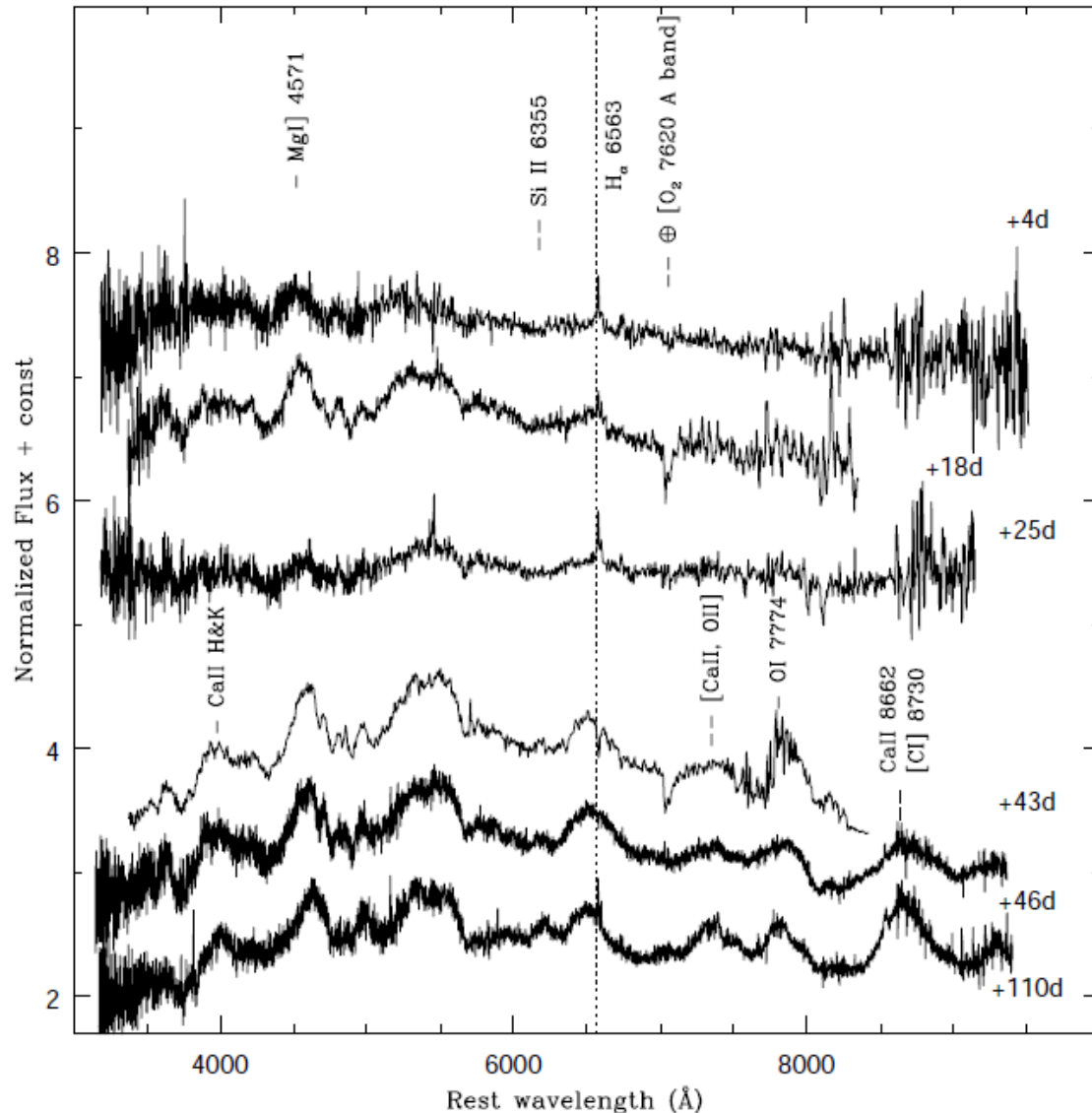
A kink can be seen in all bands at around +50 day .

Decay rate in all bands beyond 60 days ~ 0.0098 mag/day

Comparison : CRTS and Bessel



Spectroscopic follow up

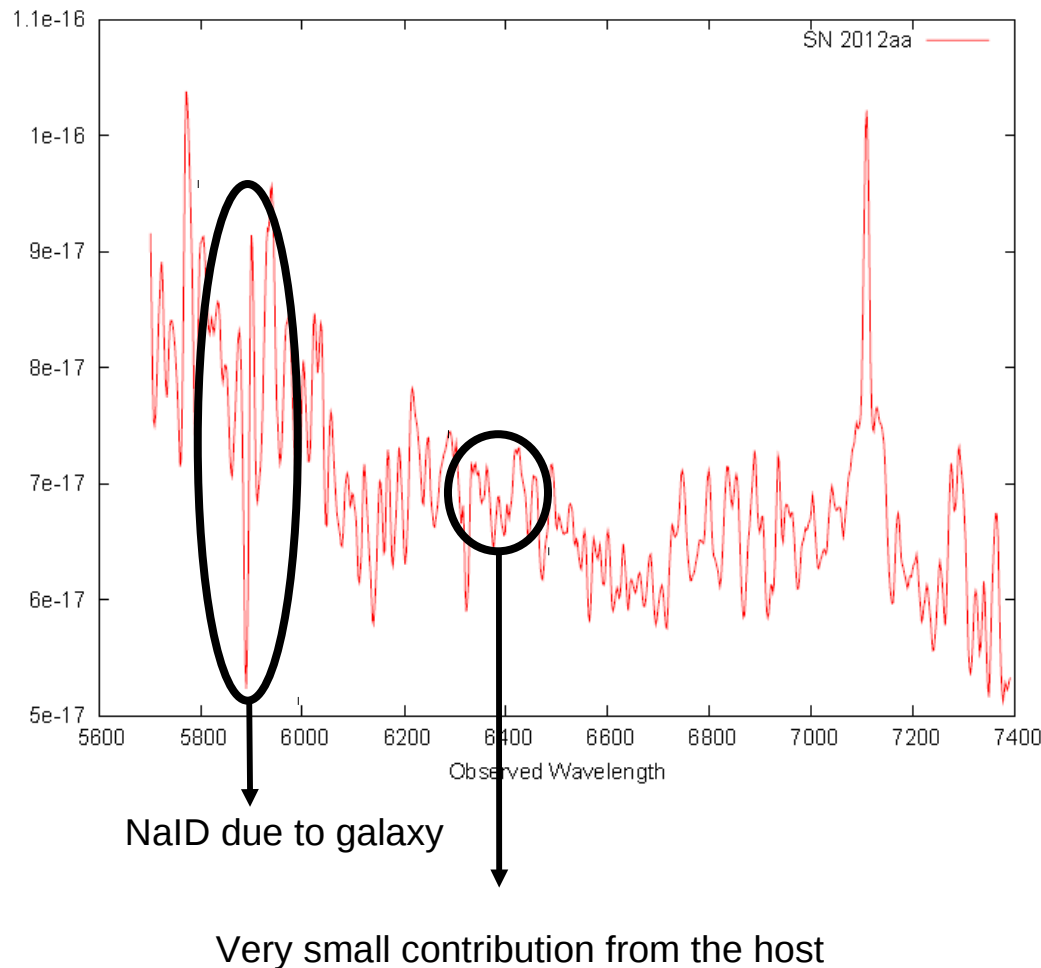


The spectroscopic evolution is similar to Type Ic events.

The early spectra are dominated by blue continuum. The late spectra are more dominated by line emission.

Early spectrum is similar to broad line Type Ic SN 2003jd (1.5d after Bmax)

Extinction along the line of sight



Total visual extinction (A_V) along the line of sight due to Milky Way is about 0.32 mag.

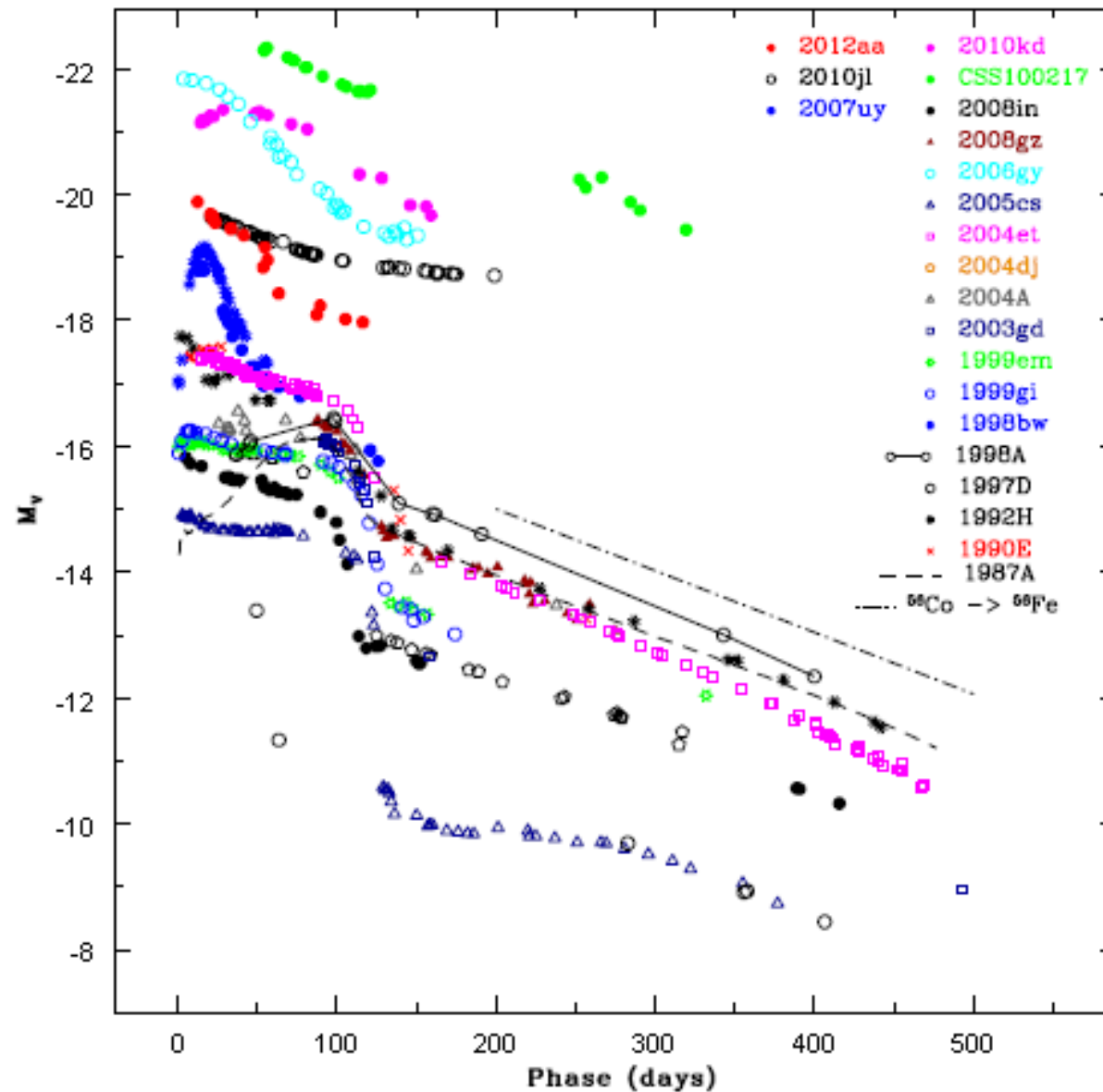
No impression of Na ID due to host was found in the spectra.

So, we assumed that total reddening is mainly due to Milky Way.

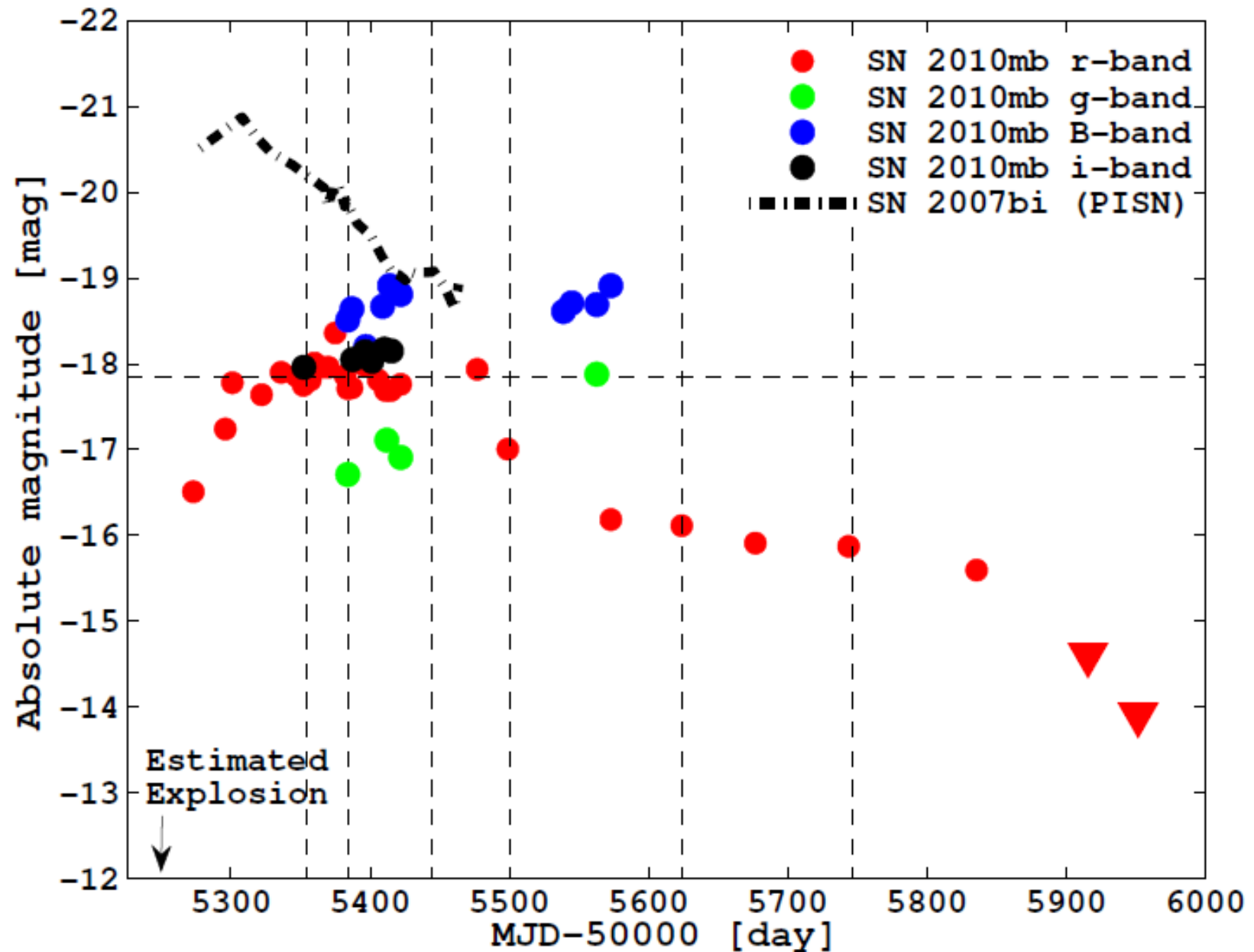
Redshift of the host is 0.08

This corresponds to a luminosity distance ~ 373 Mpc

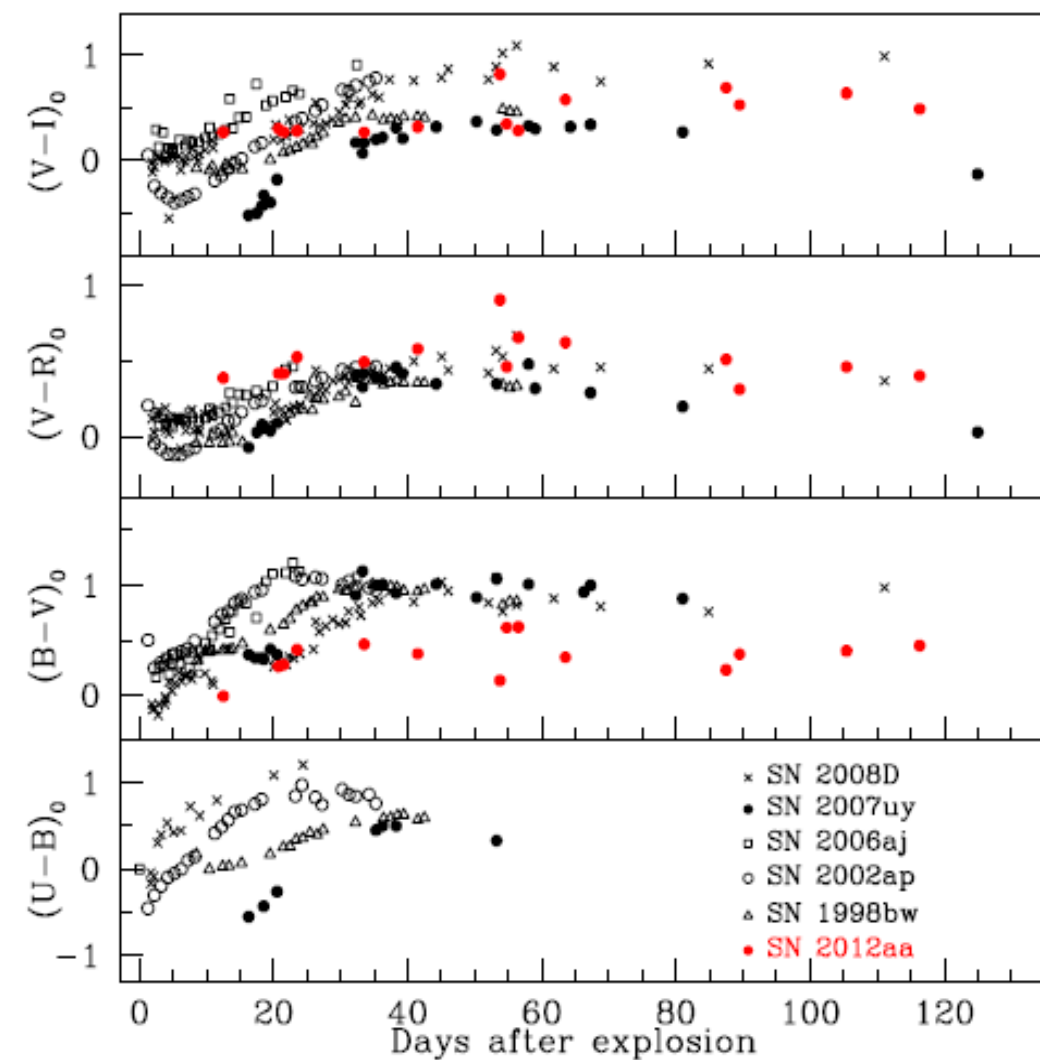
Absolute V band light curve



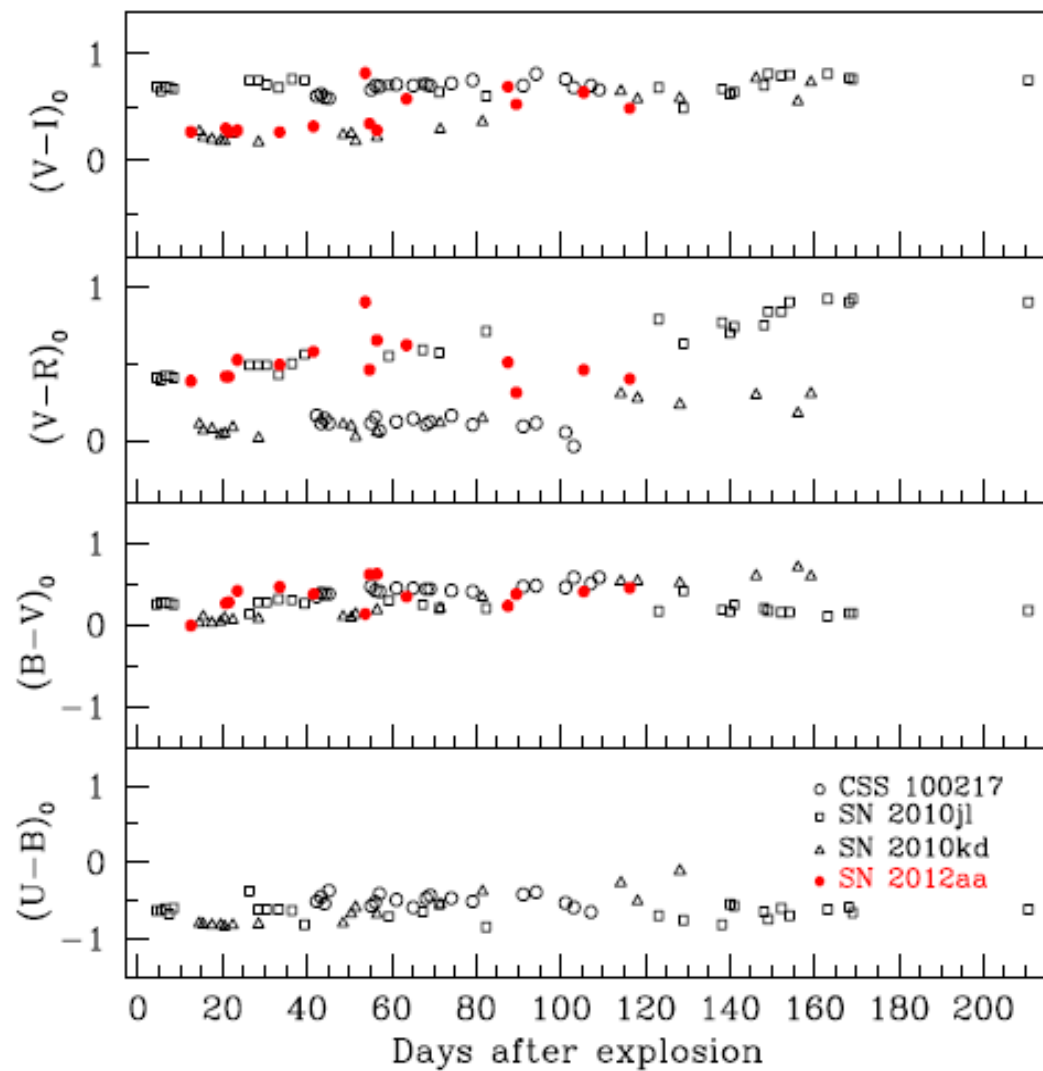
Comparison : 2010mb



Colour evolution of SN 2012aa

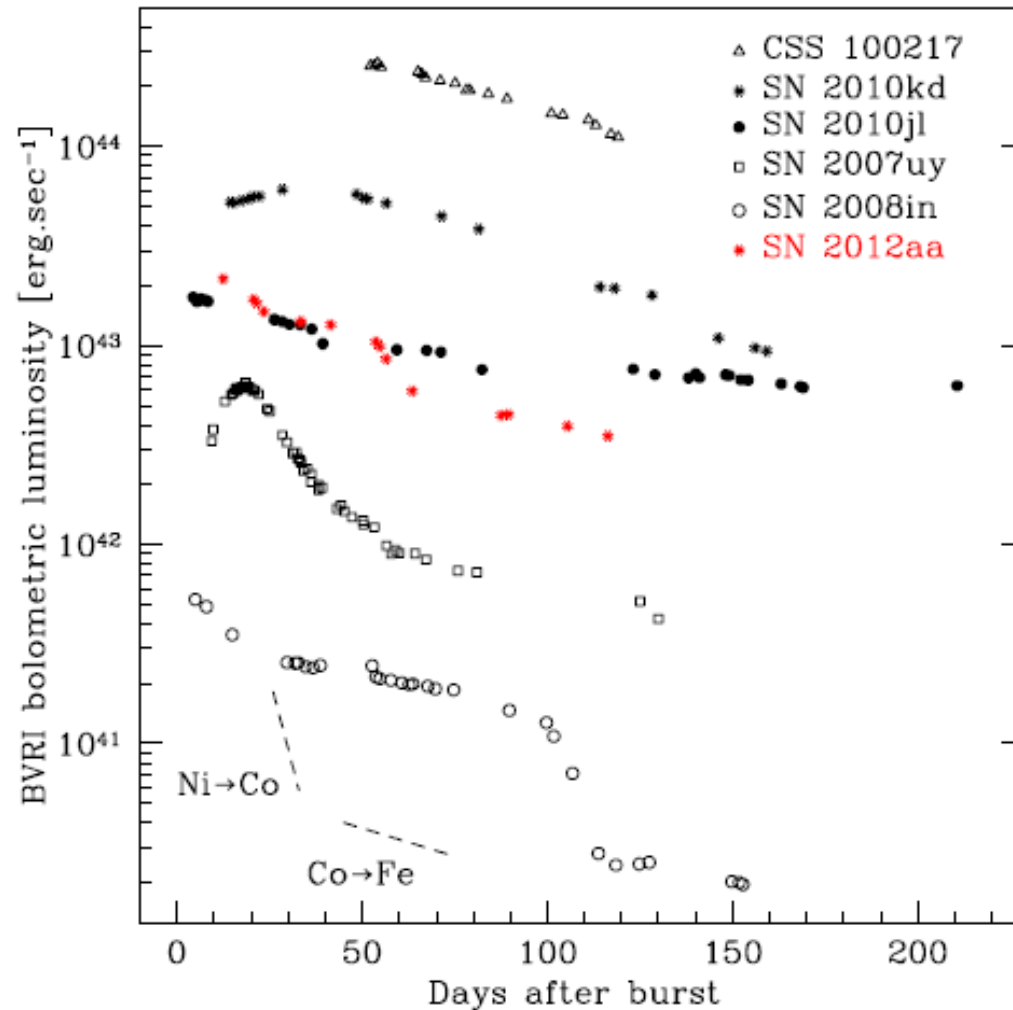


Comparison with CCSNe



Similarity with SLSNe

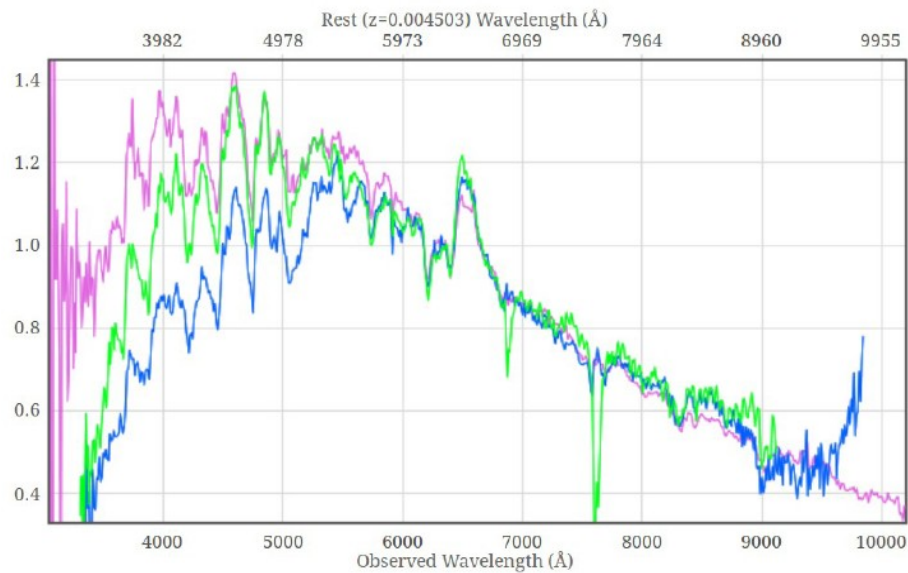
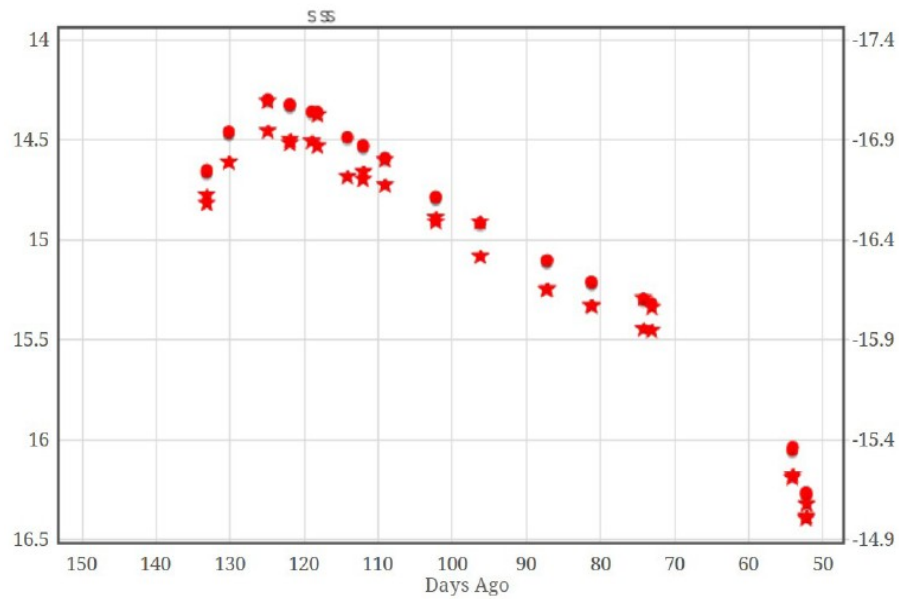
Bolometric evolution of SN 2012aa



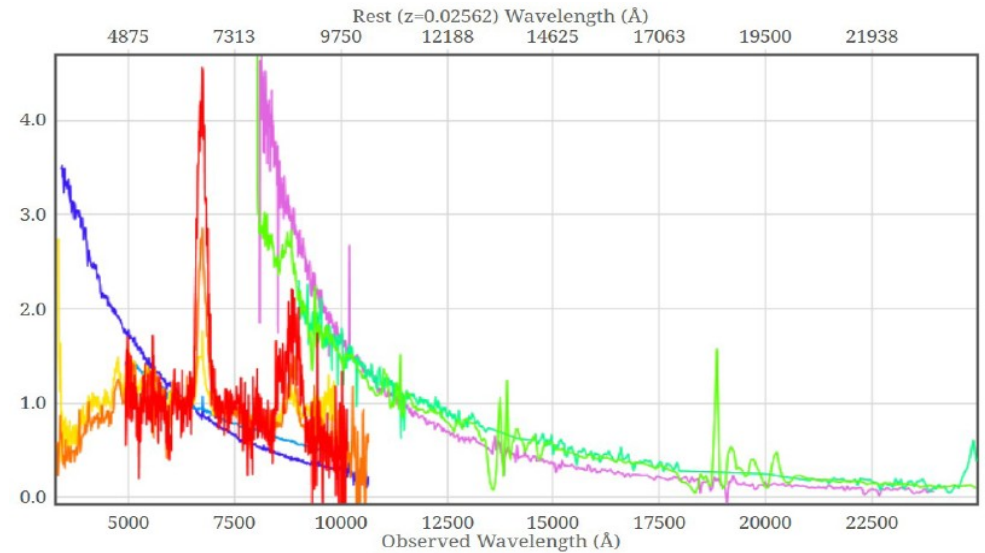
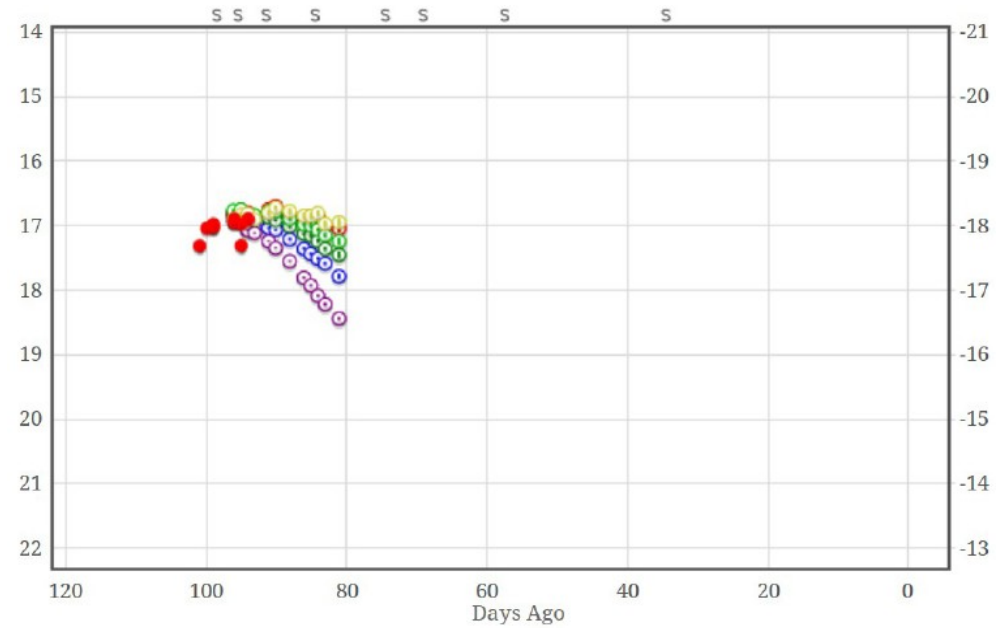
From nebular phase, the derived value of ^{56}Ni is about $0.8 M_{\text{sun}}$,

iPTF objects

14fe



14to



Summary

Probably the SN shock interaction with the CSM is responsible for large luminosity of SN 2012aa.

Credits :

Rupak Roy, A. J. Drake, J. M. Silverman, S. Benetti, R. Martin, S. Bose, E. Cappellaro, E. Kankare, A. Pastorello, Brajesh Kumar, A. V. Filippenko, D. Garcia-Alvarez, Brijesh Kumar, L. Tomasella, M. Turatto, S. Valenti.

Thanks