

# Photometric distances to the Type Ia SNe 2012cg, 2012ht, 2013dy and 2014J

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## Motivation

Type Ia supernovae are excellent distance indicators. However, recent tests with SN 2011fe (Vinkó et al. 2012) revealed systematic differences between the distance moduli calculated with the popular light curve fitters, MLCS2k2 and SALT2, at 0.1 - 0.2 mag level ( $\sim 10\%$  in linear distance).

## Observations

We have obtained well sampled, multi-band photometric observations of recent nearby Type Ia SNe: SN 2012cg, 2012ht, 2013dy and 2014J.

Data were collected with the 0.6m Schmidt telescope of Konkoly Observatory at Piszkestető Mountain Station (in *BVRI*) and with the 0.5m BART telescope at Baja Observatory, Hungary (in Sloan *g'r'i'z'*).

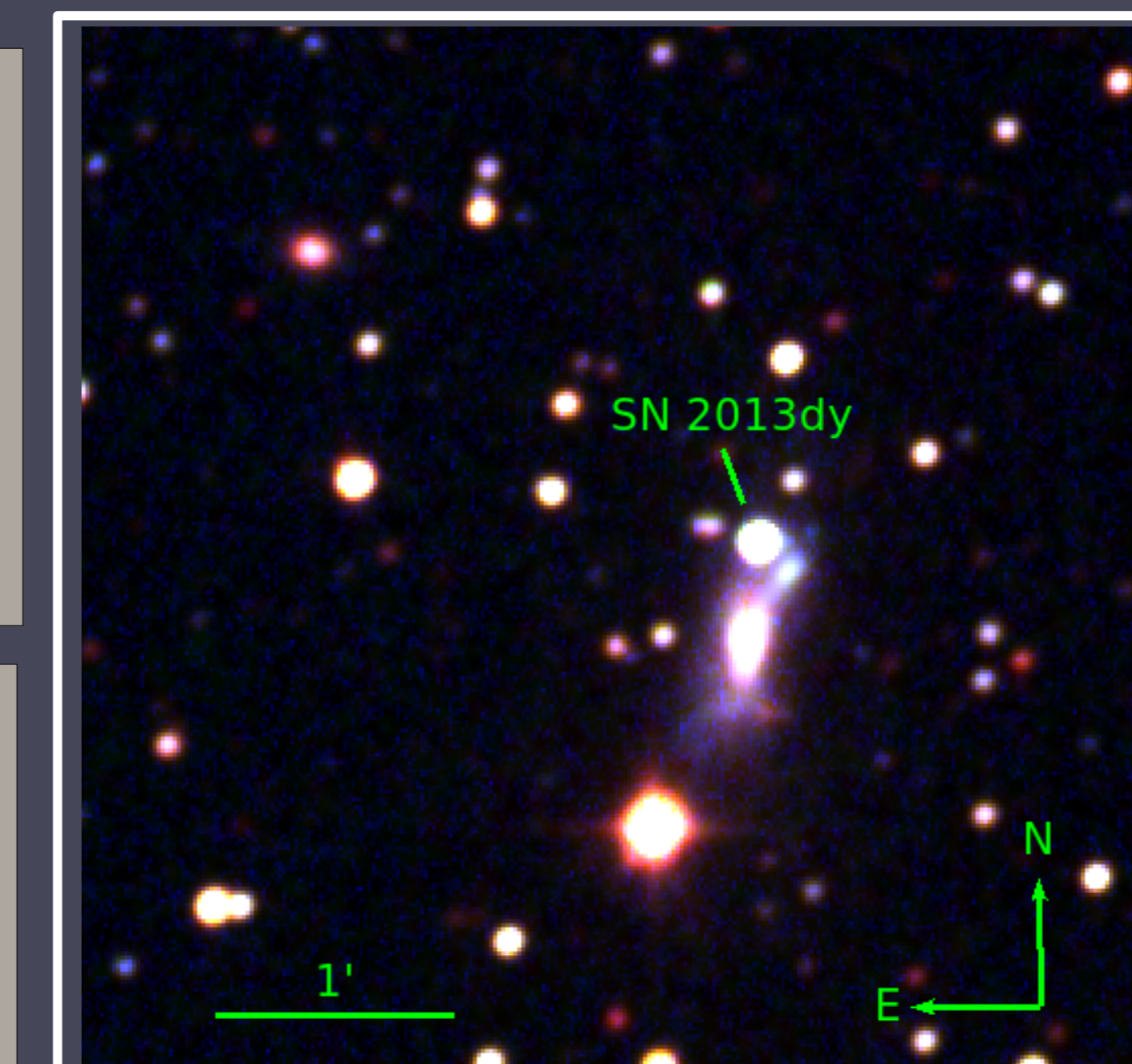
## Conclusions

- **photo-distances agree in  $1\sigma$  in case of 12cg and 13dy**
- **SALT2 fails in B-band for heavily reddened 14J**
- **larger ( $> 2\sigma$ ) differences for 12ht (reddening issue?)**

## Results

**Table 1.** The calculated photometric distances in Mpc (all transformed to  $H_0 = 73$  km/s/Mpc)

Method	2012cg	2012ht	2013dy	2014J
MLCS2k2	$14.9 \pm 0.5$	$22.3 \pm 0.6$	$22.3 \pm 0.7$	$4.4 \pm 0.5$
SALT2 BVRI	$14.9 \pm 0.6$	$23.8 \pm 1.2$	$20.5 \pm 0.9$	$2.5 \pm 0.6$
SALT2 <i>g'r'i'z'</i>	no data	$28.3 \pm 2.4$	$22.0 \pm 1.3$	$4.6 \pm 0.3$
SALT2 comb	no data	$24.8 \pm 1.2$	$21.5 \pm 0.9$	fitting failed
mean D in NED	$15.4 \pm 0.9$	N.A.	$13.7 \pm 4.4$	$3.7 \pm 0.7$



SN 2013dy

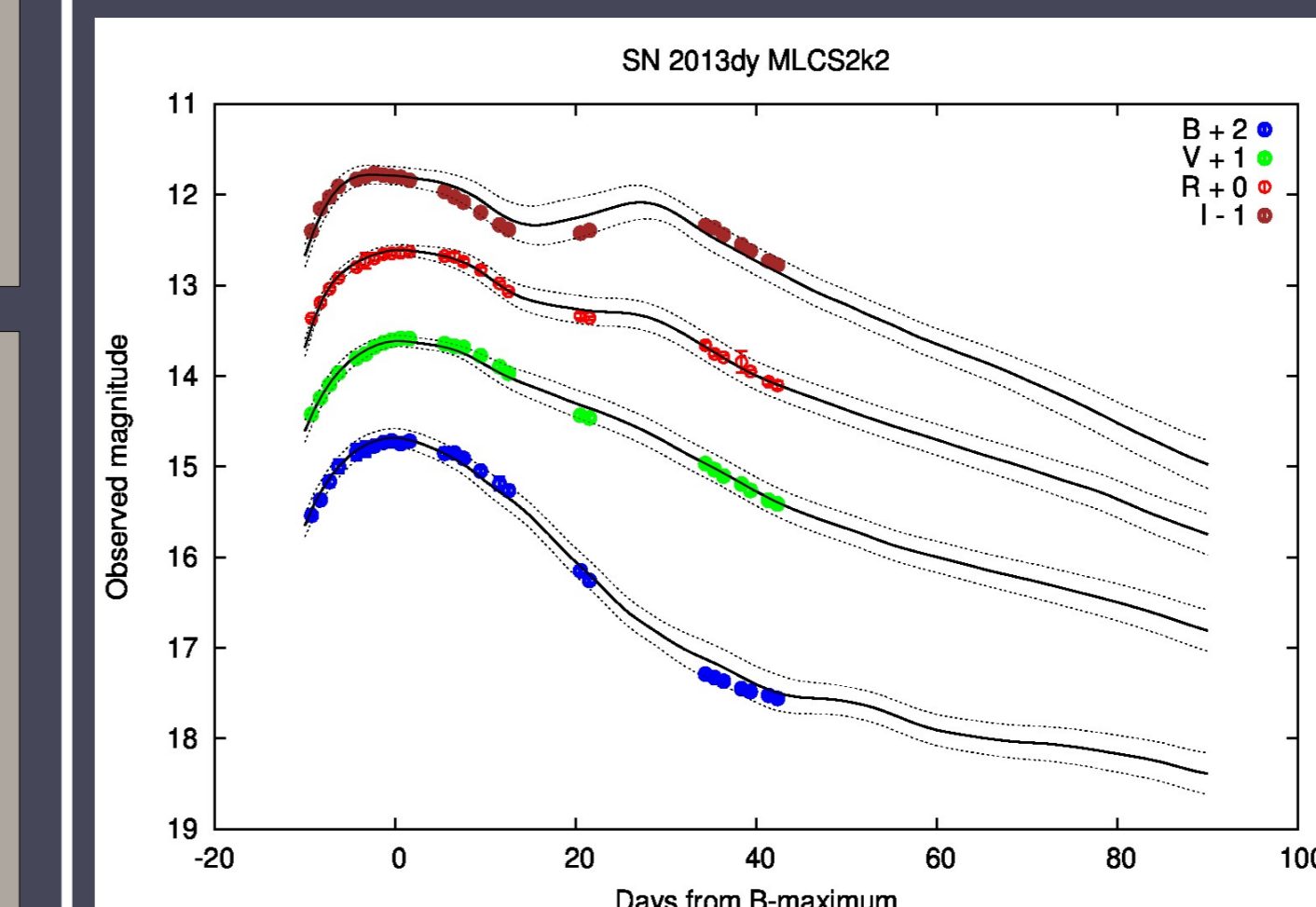


Fig.5: MLCS2k2 fit to SN 2013dy

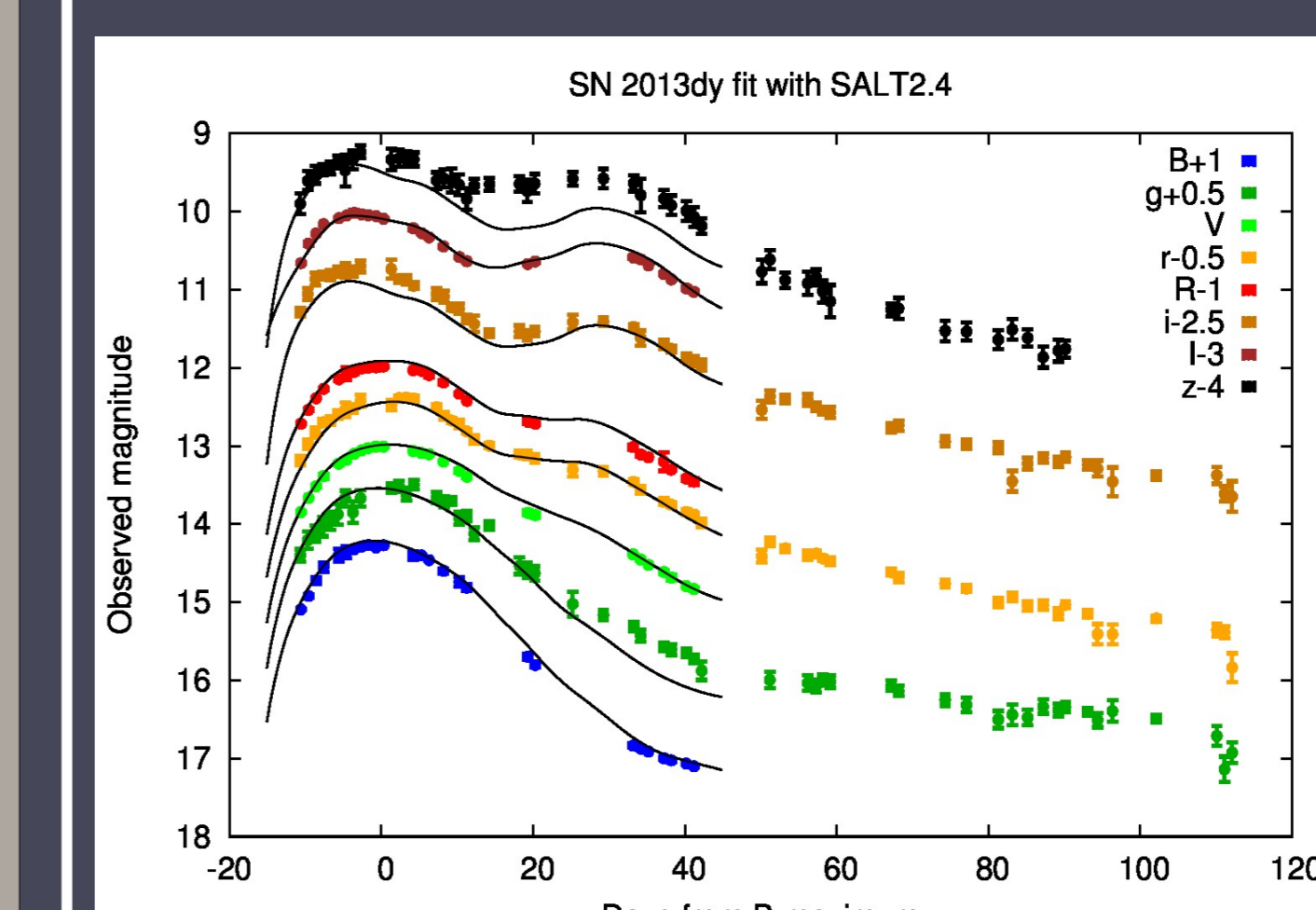
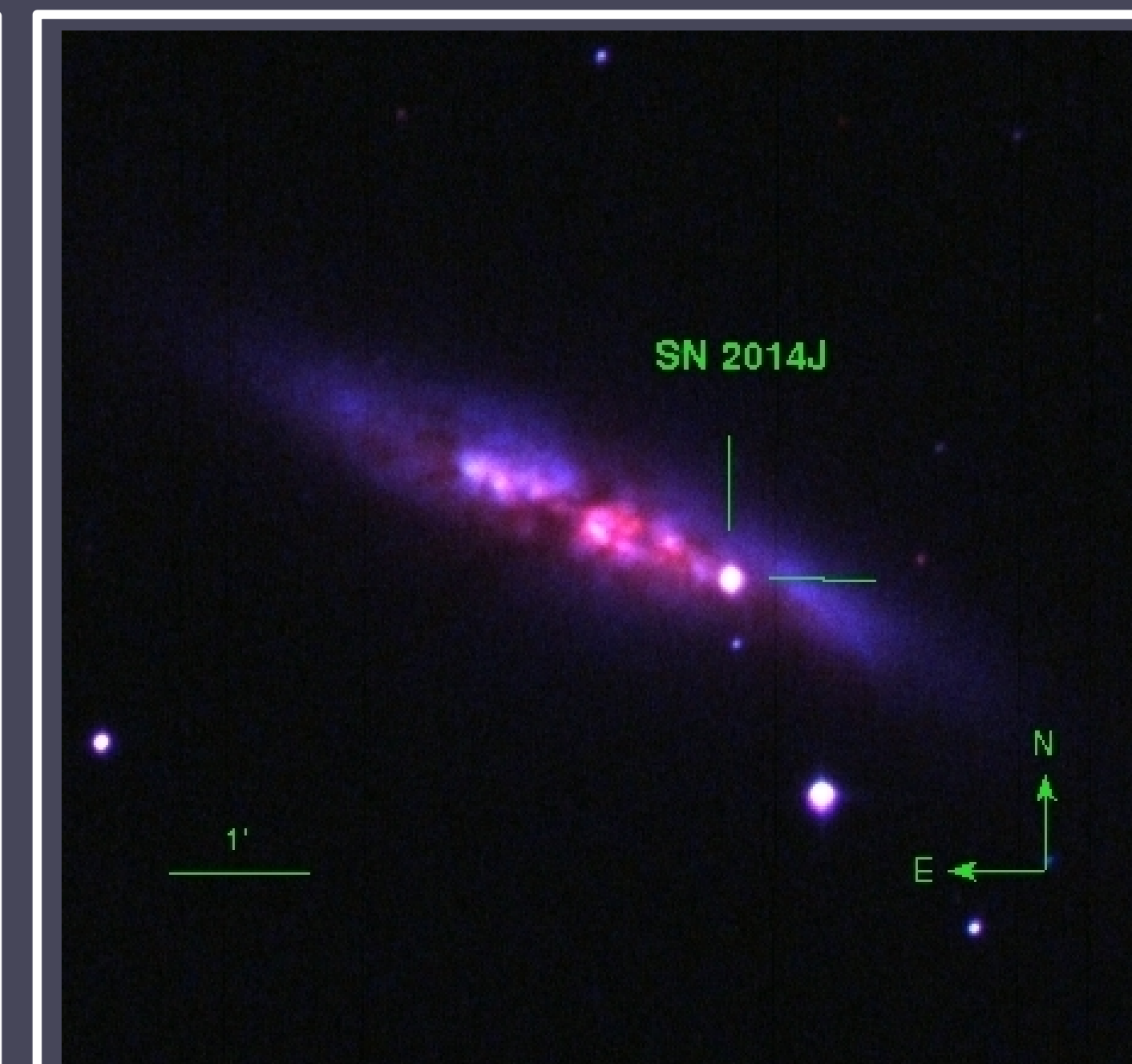


Fig.6: SALT2.4 fit to SN 2013dy



SN 2014J

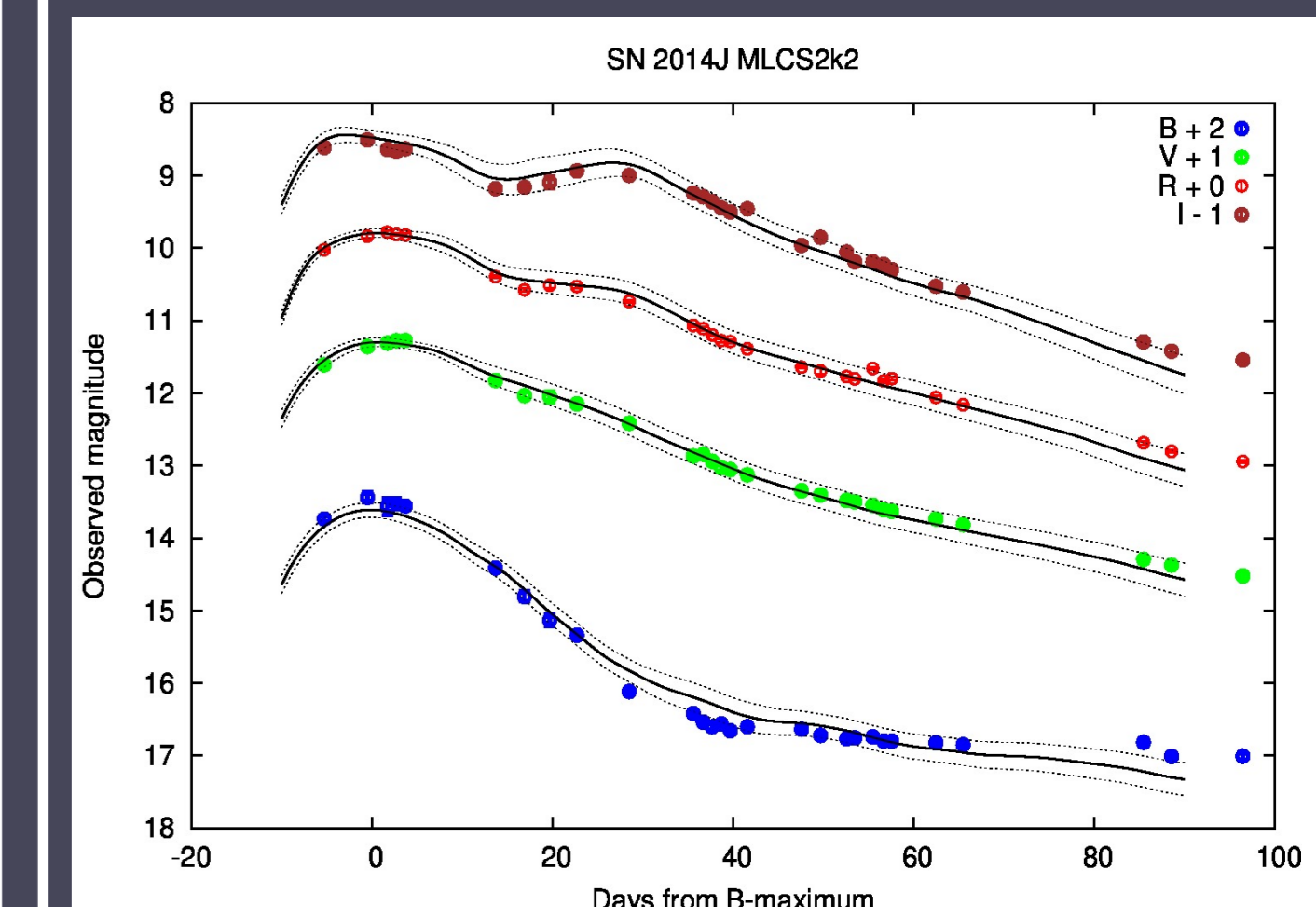


Fig.7: MLCS2k2 fit to SN 2014J ( $R_V = 1.0$ ;  $A_V = 1.46$  mag)

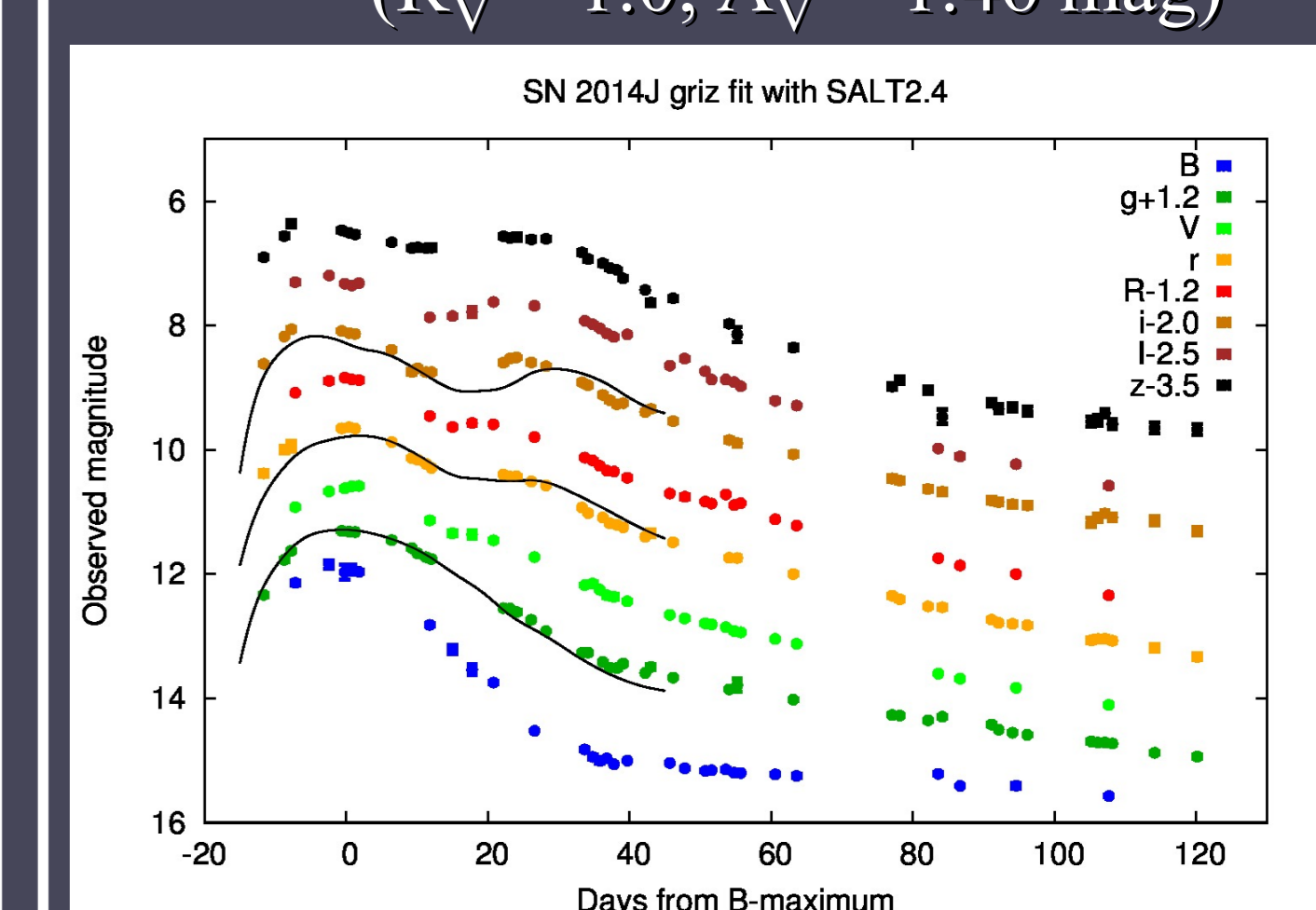


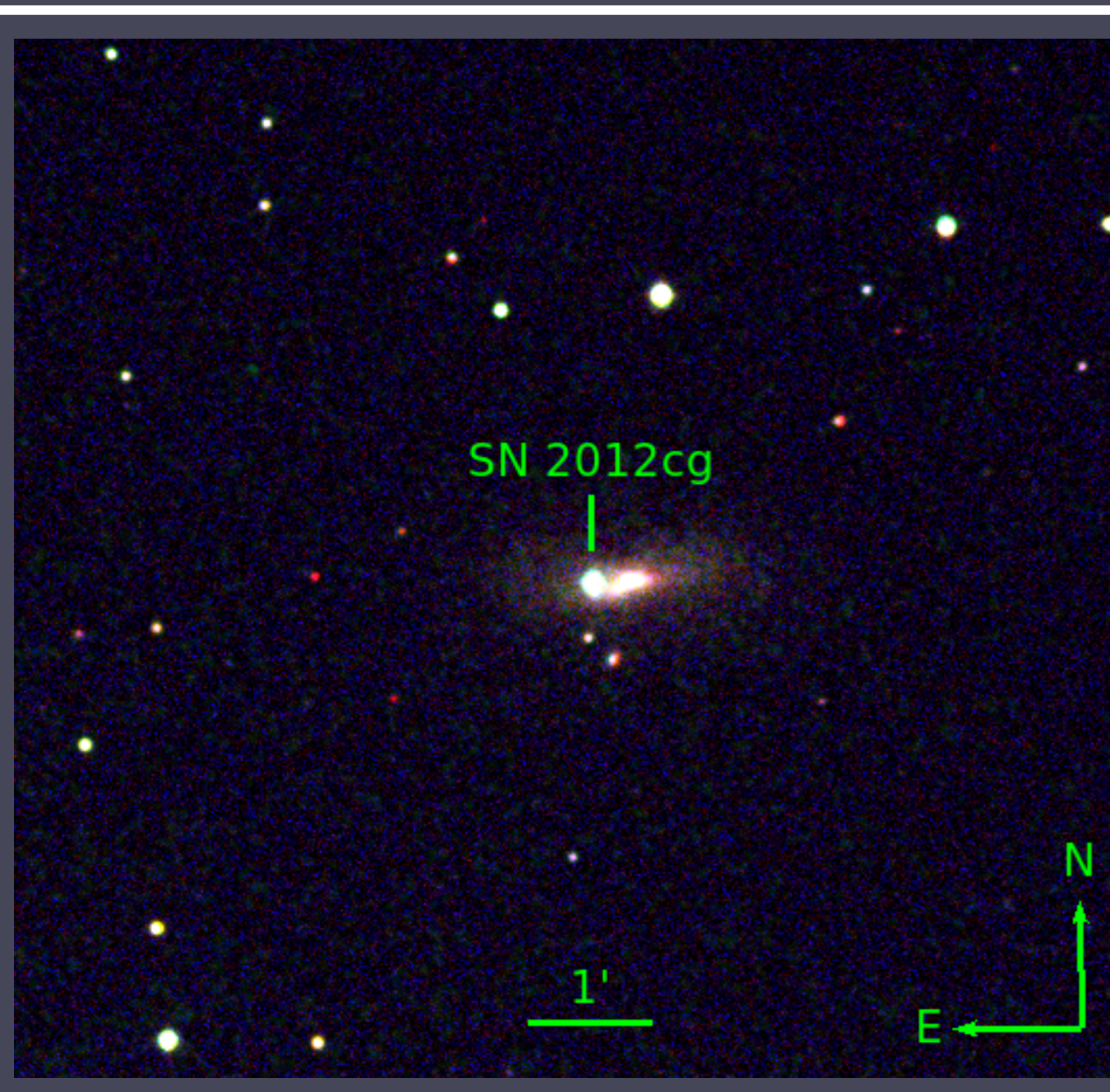
Fig.8: SALT2.4 griz fit to SN 2014J

## Acknowledgement

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## References

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SN 2012cg

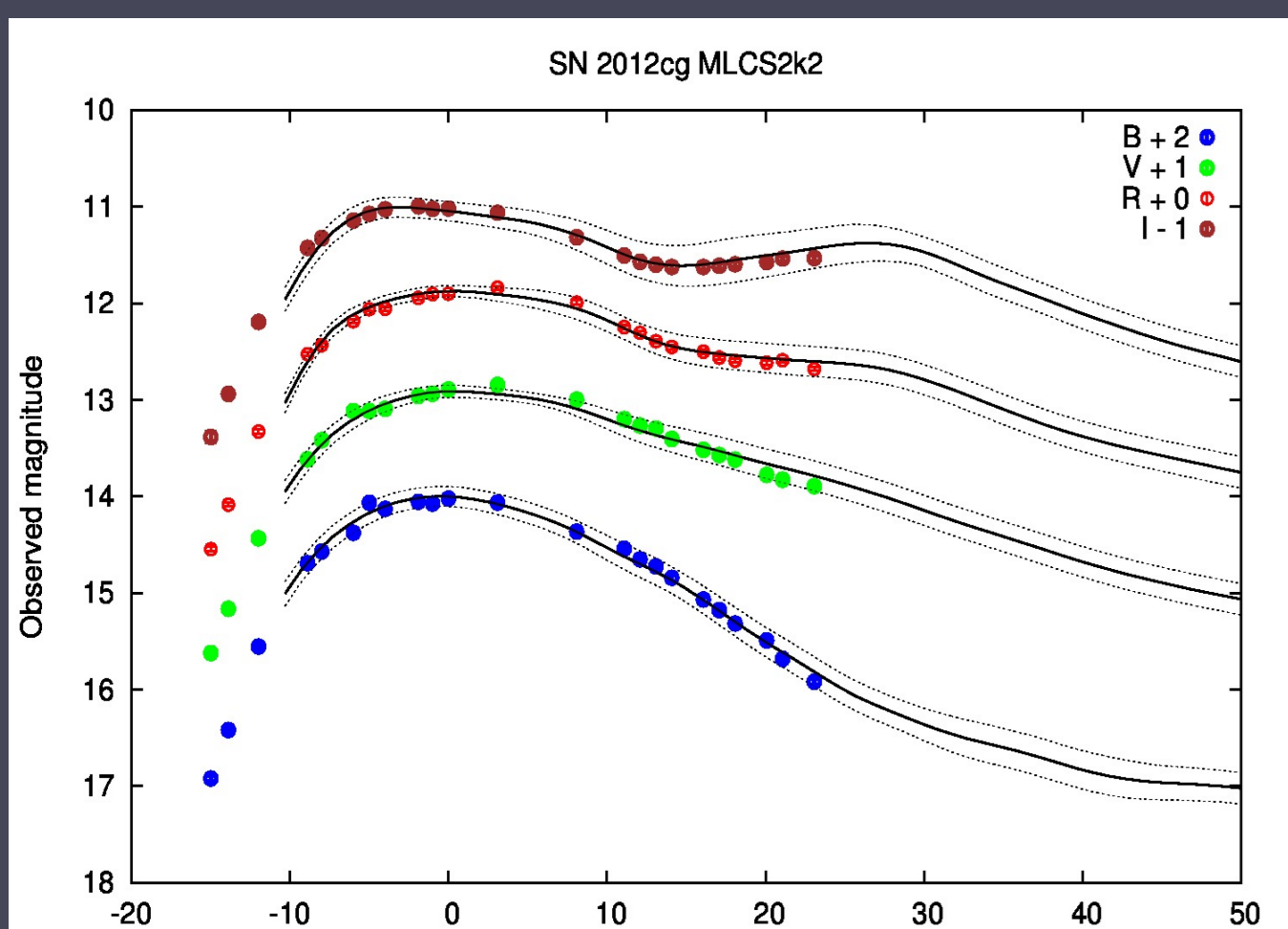


Fig.1: MLCS2k2 fit to SN 2012cg

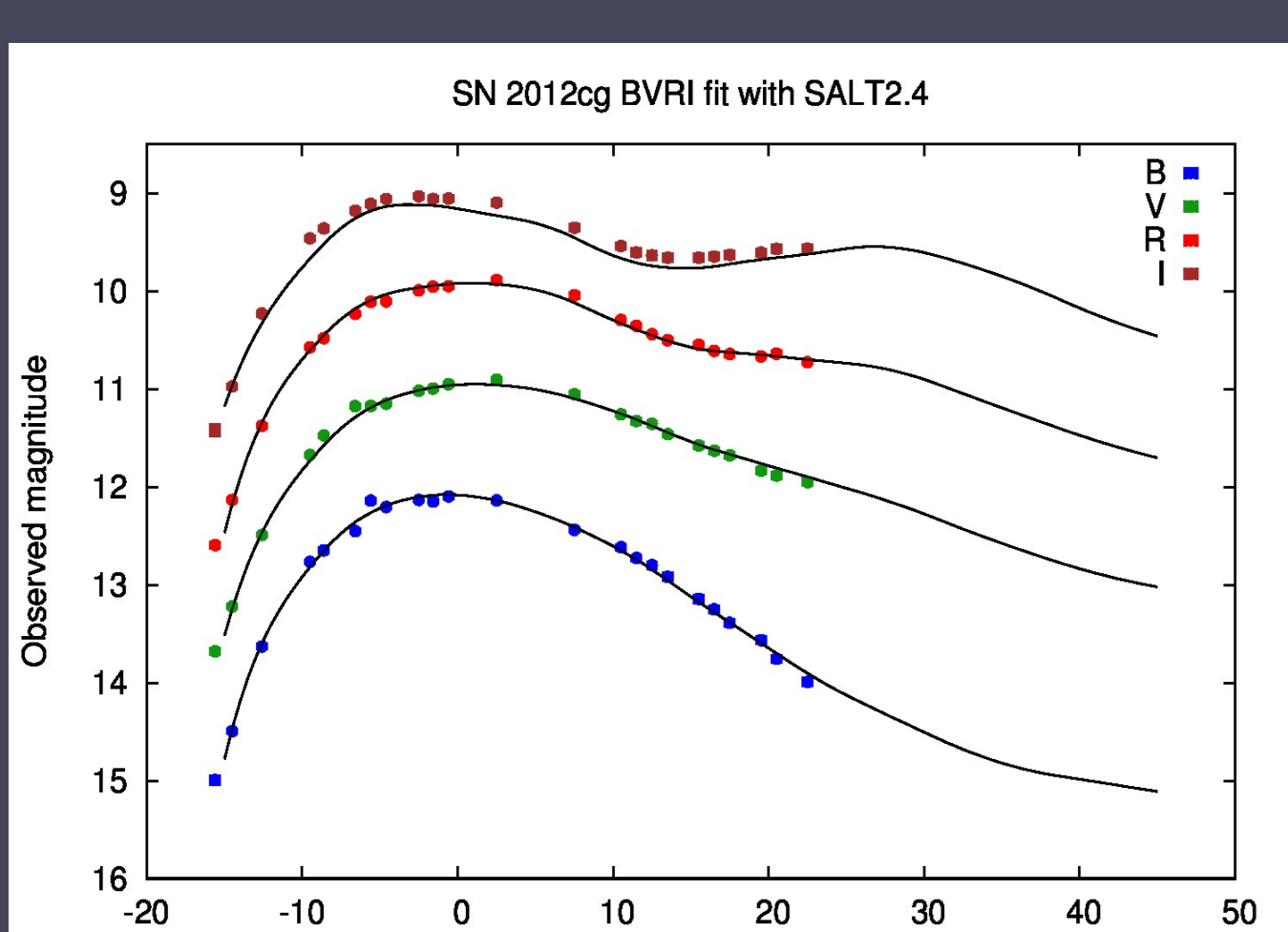
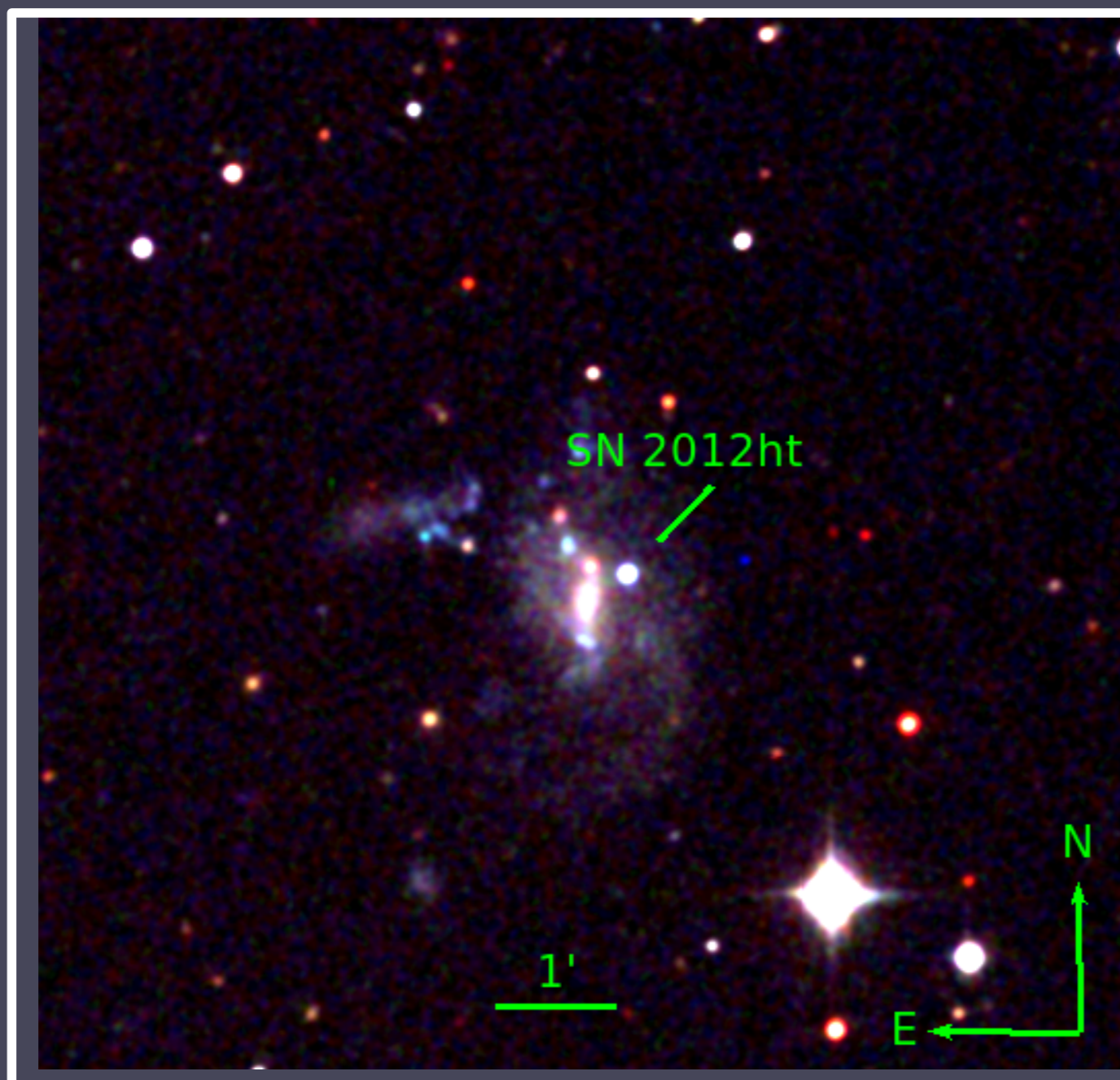


Fig.2: SALT2.4 fit to SN 2012cg



SN 2012ht

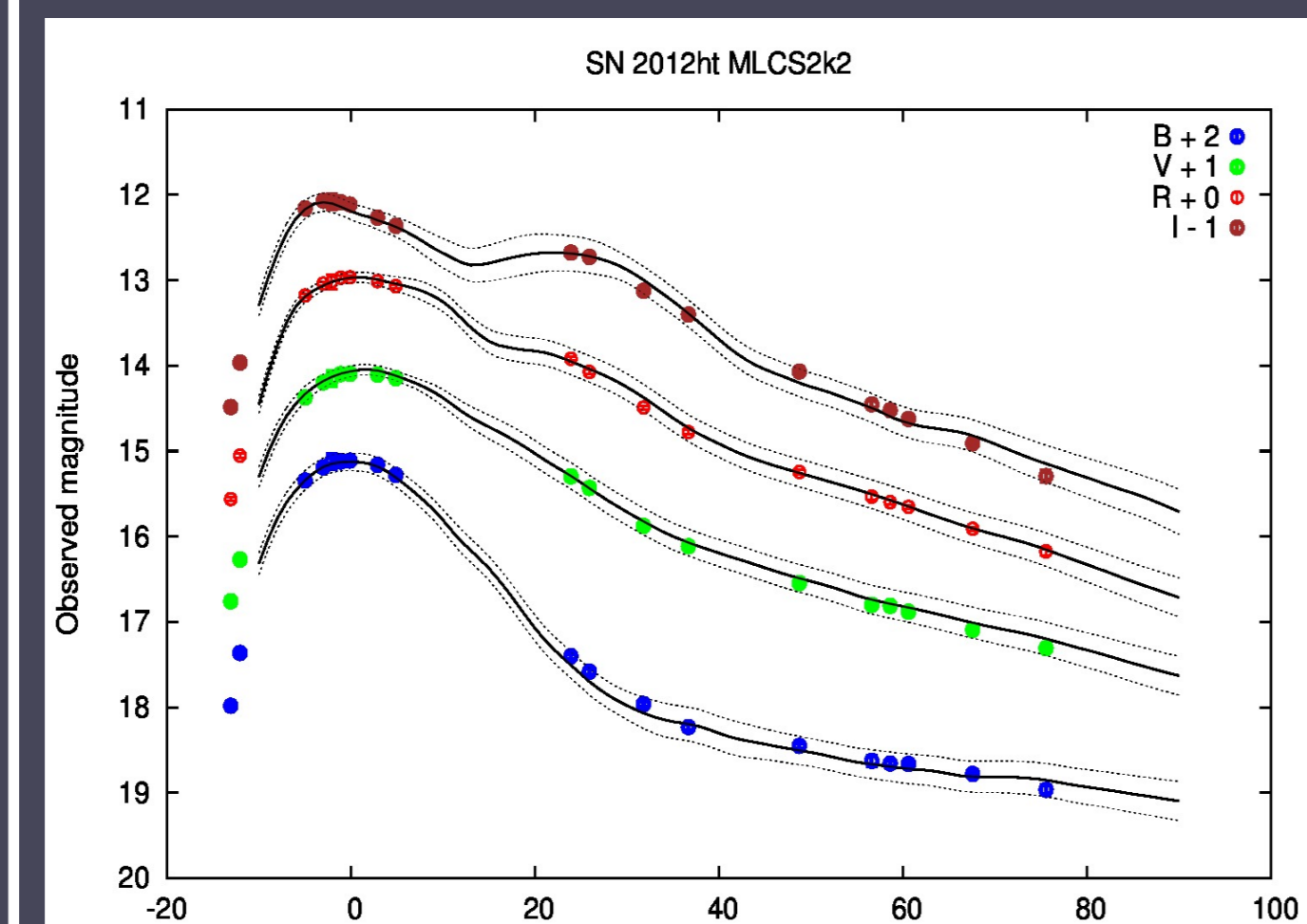


Fig.3: MLCS2k2 fit to SN 2012ht

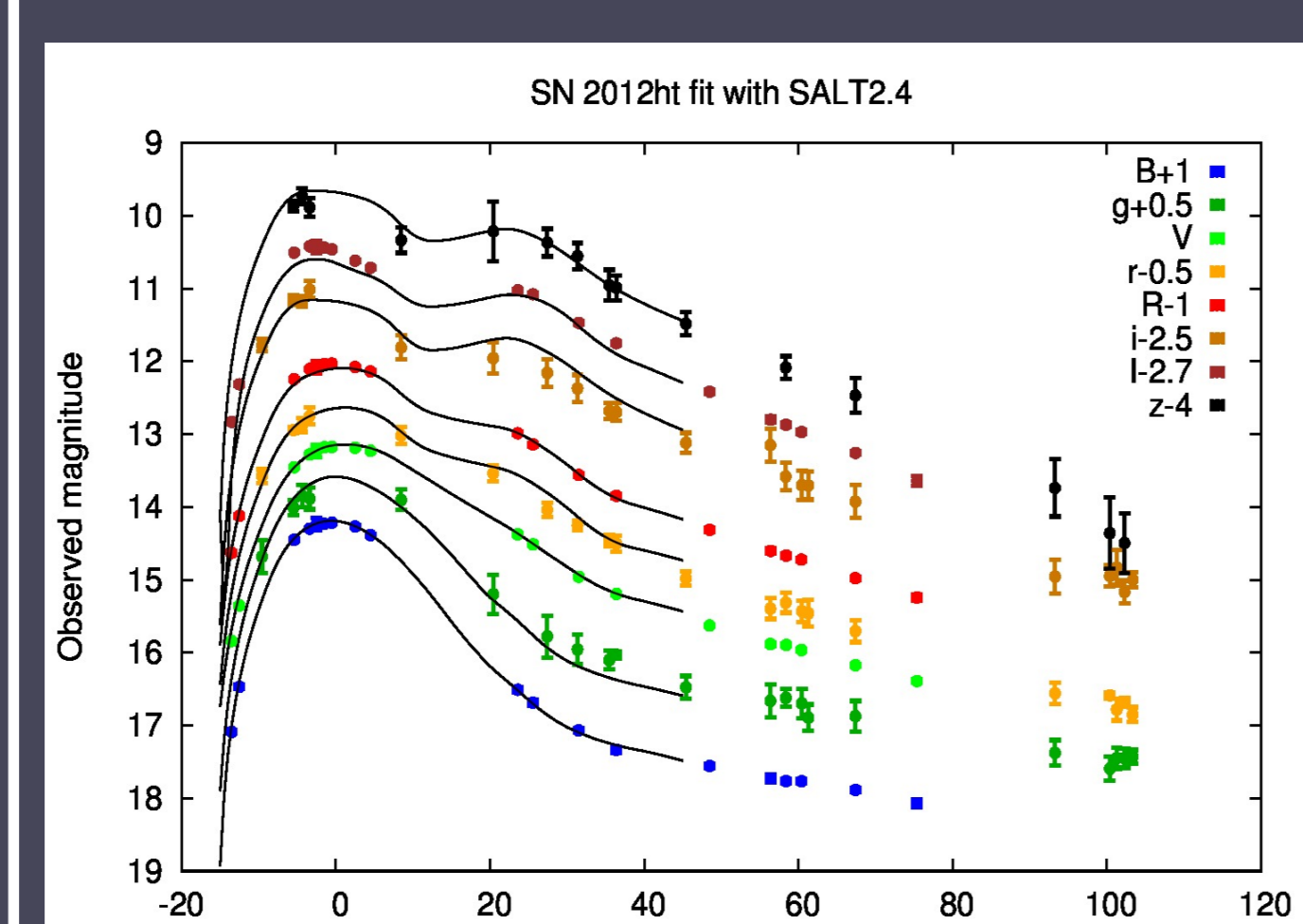


Fig.4: SALT2.4 fit to SN 2012ht

## Methods

The light curves (Figs 1- 8) were fit with *MLCS2k2* (Jha et al., 2007) and *SALT 2.4* (Guy et al. 2007; Betoule et al. 2014). The distances calculated with these light curve fitters are shown in **Table 1**.