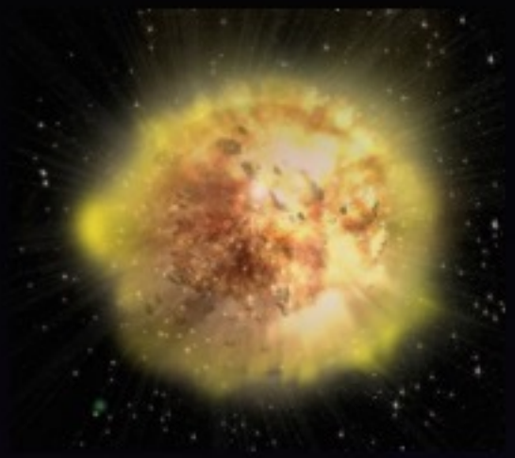
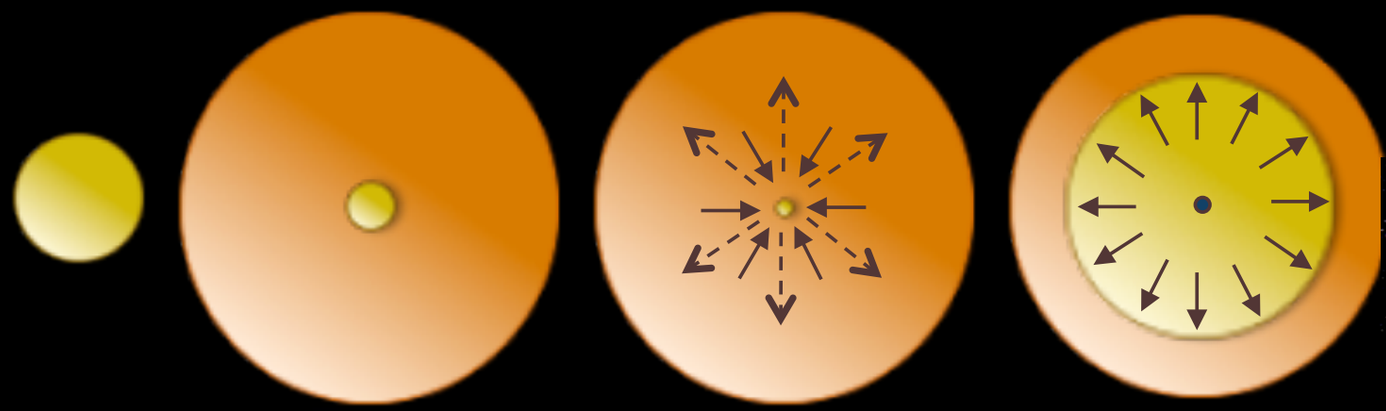


The core-collapse supernova

hEterOgeNeity @ TNG

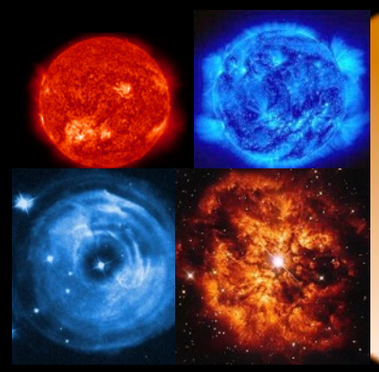
G. Terreran, S. Benetti, E. Cappellaro, A. Harutyunyan, A. Pastorello, N. Elias-Rosa, L. Tartaglia, L. Tomasella, M. Turatto, ...

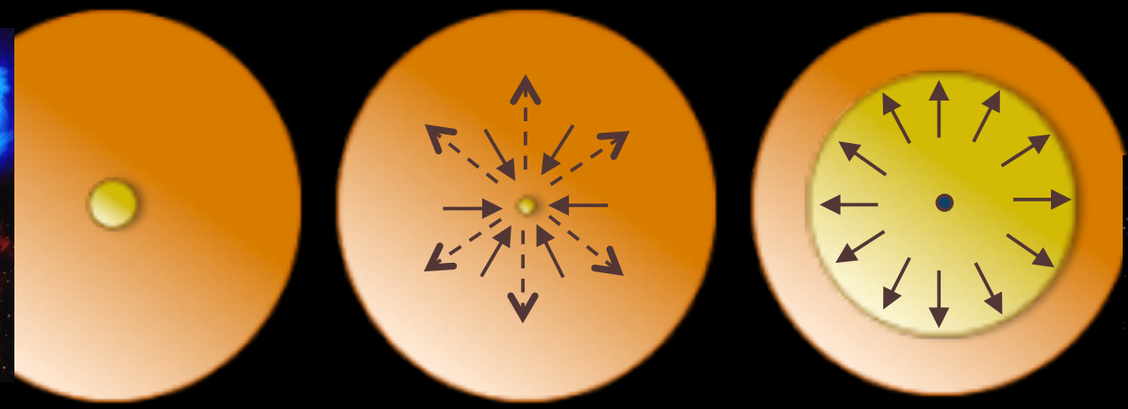
Core-collapse supernovae



> 8 $M_\odot$

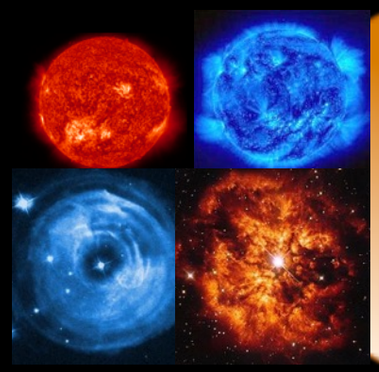
Core-collapse supernovae

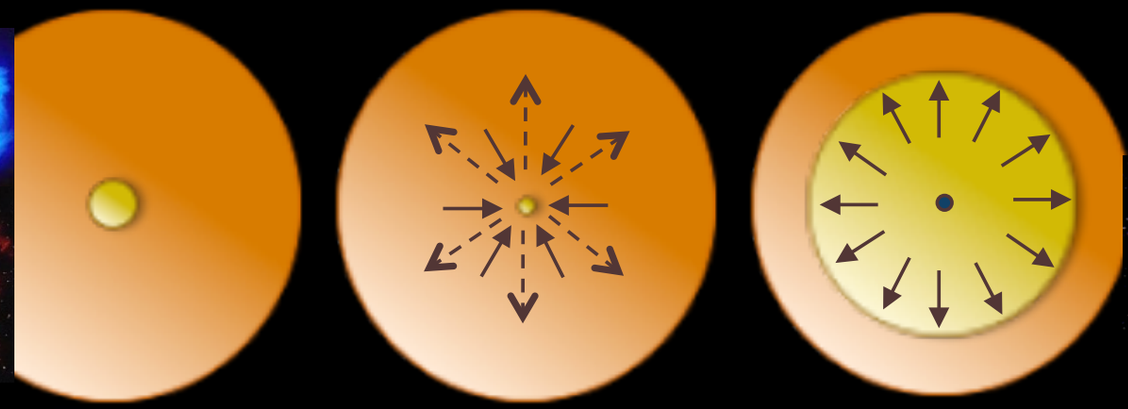


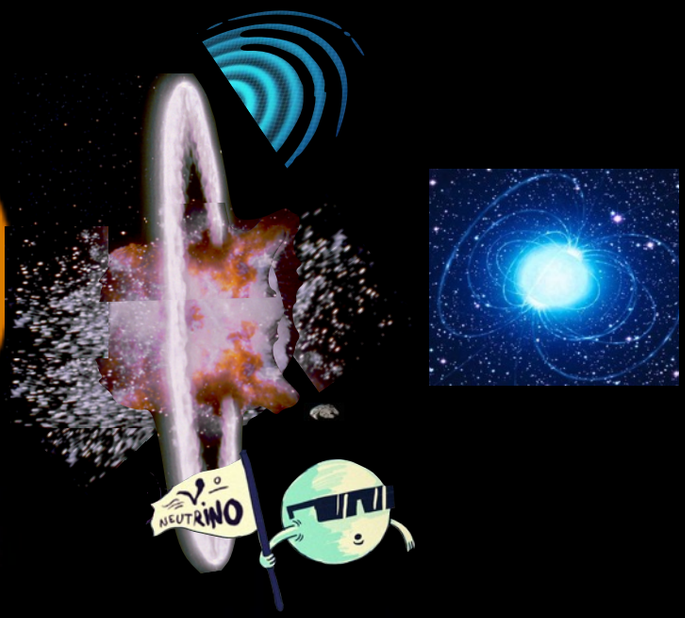


$> 8\ M_{\odot}$

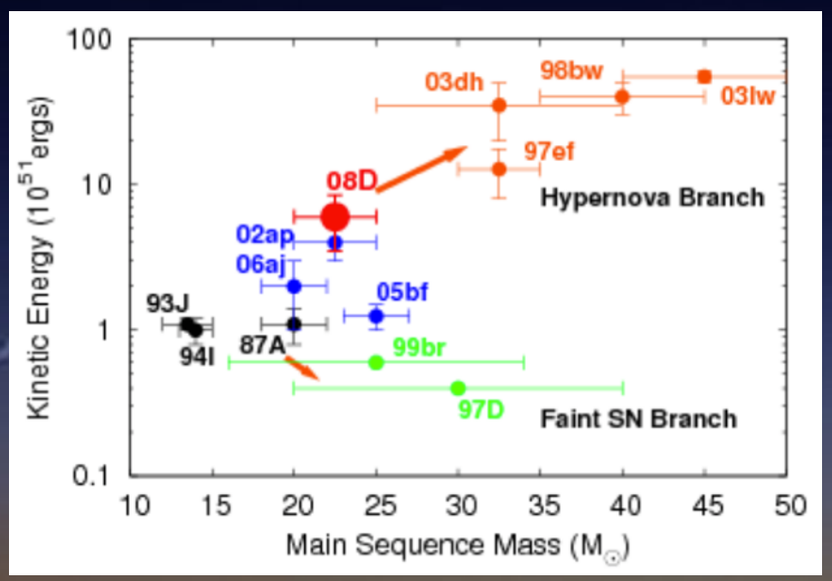
Core-collapse supernovae



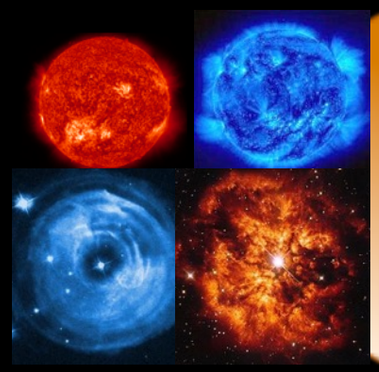


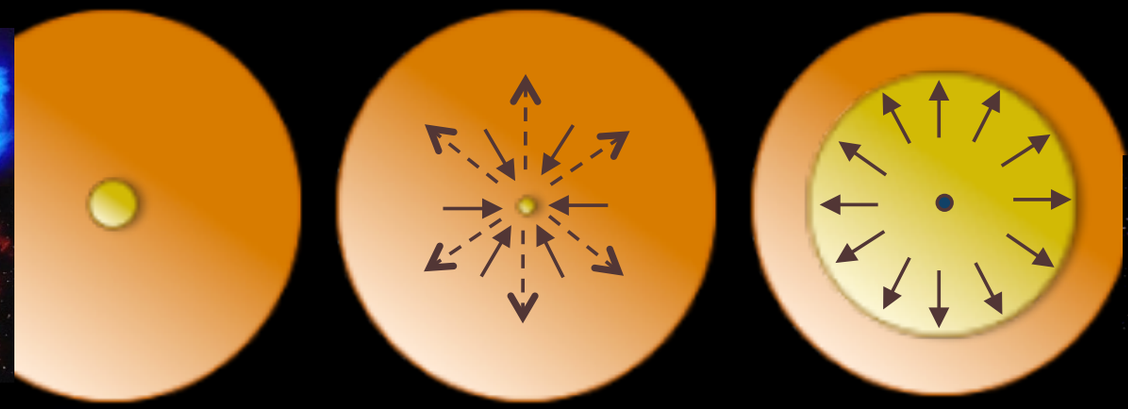


> 8 $M_\odot$

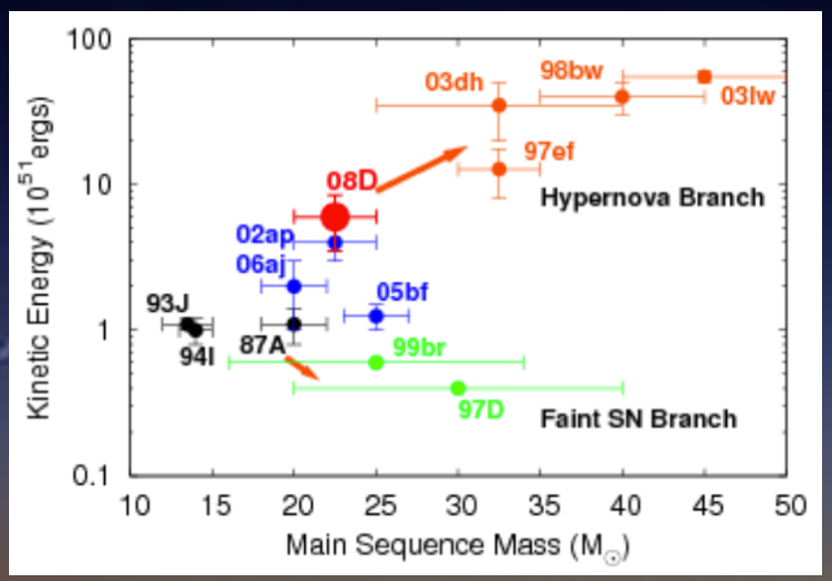


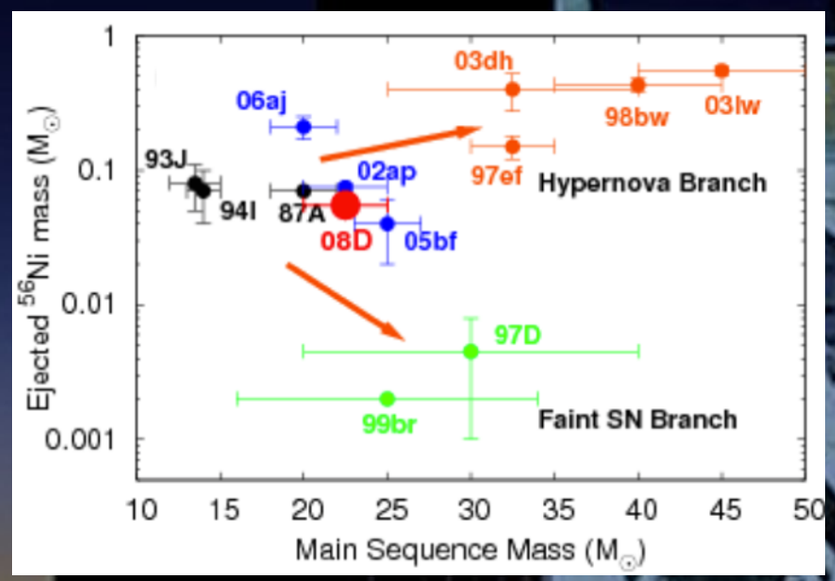
Core-collapse supernovae





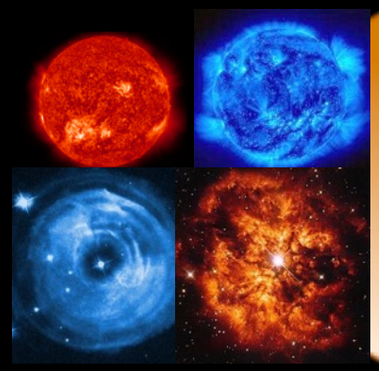
> 8 M$_\odot$

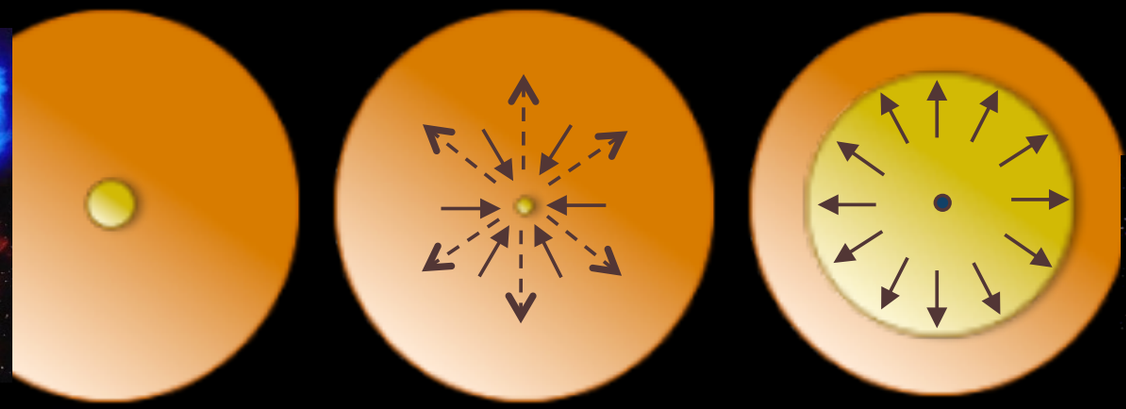




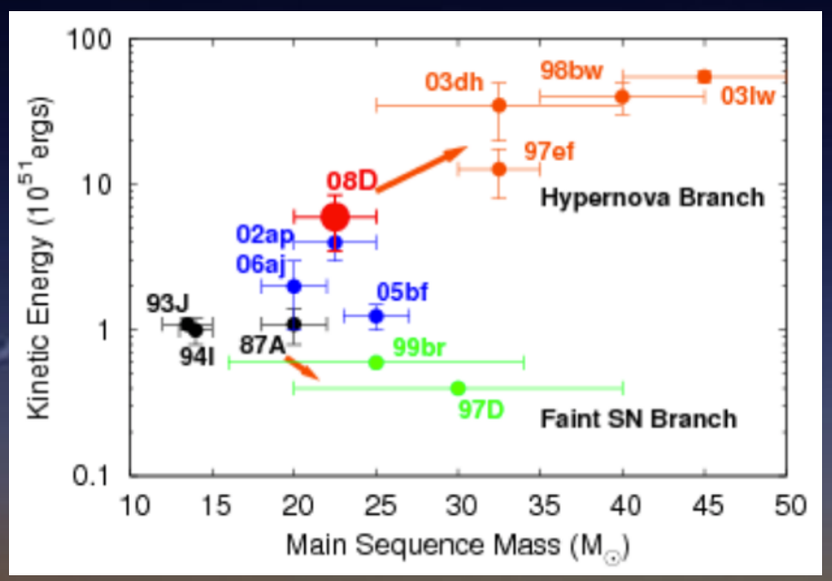
Janka 2012 ARNPS, 62, 407

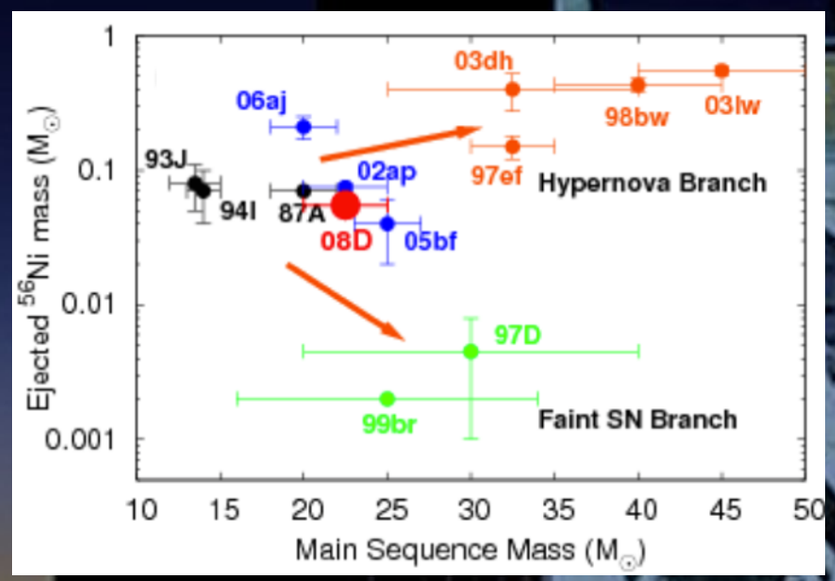
Core-collapse supernovae

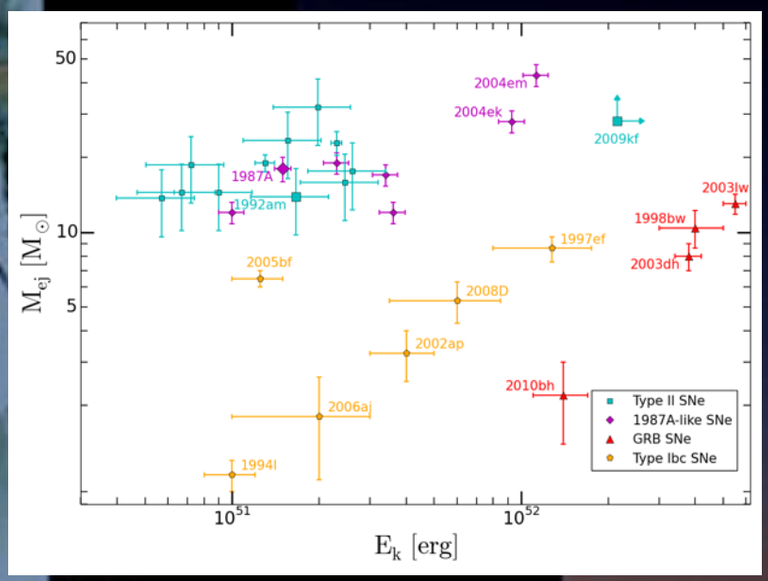




> 8 M$_\odot$



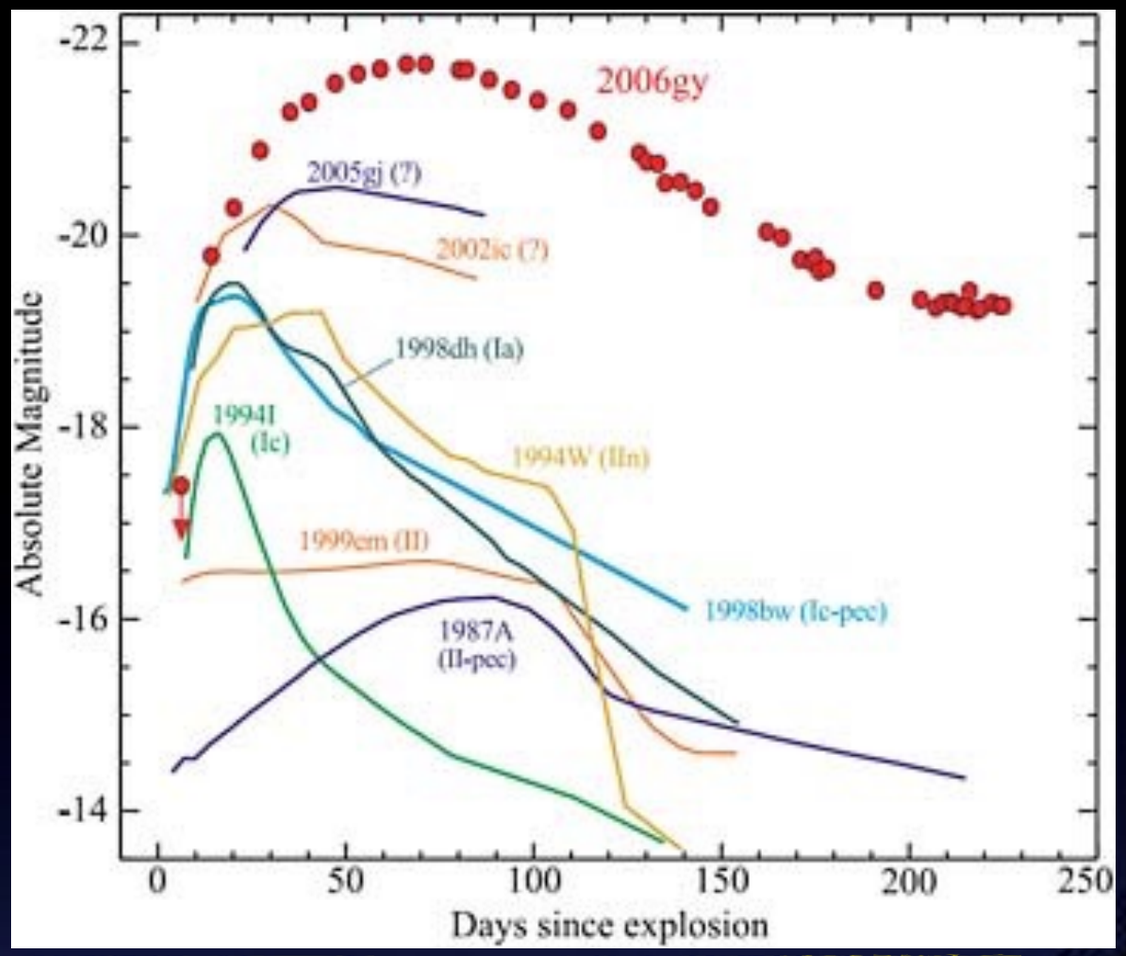




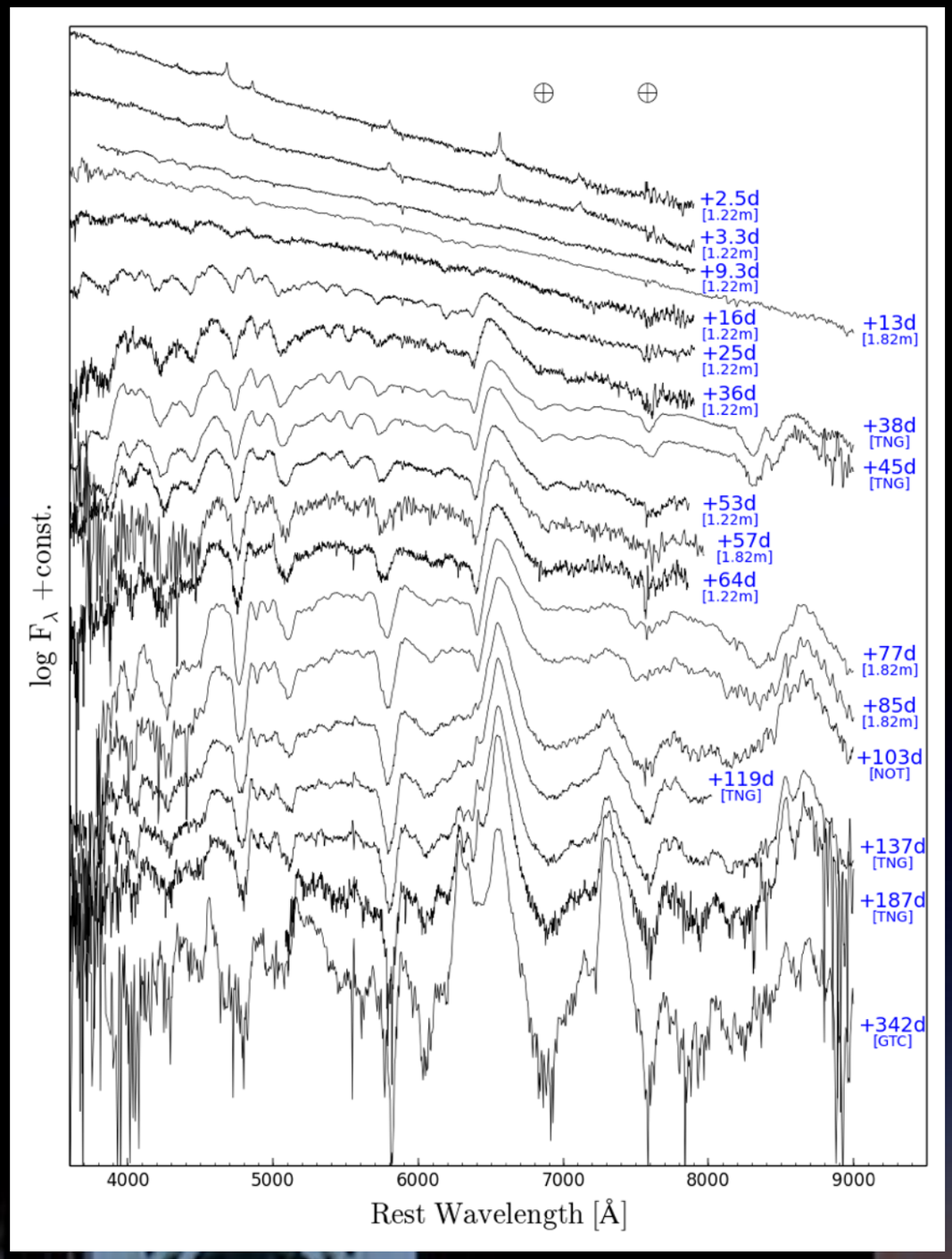
Janka 2012 ARNPS, 62, 407

Terreran+ 2017, submitted to Nat.

Optical follow-up

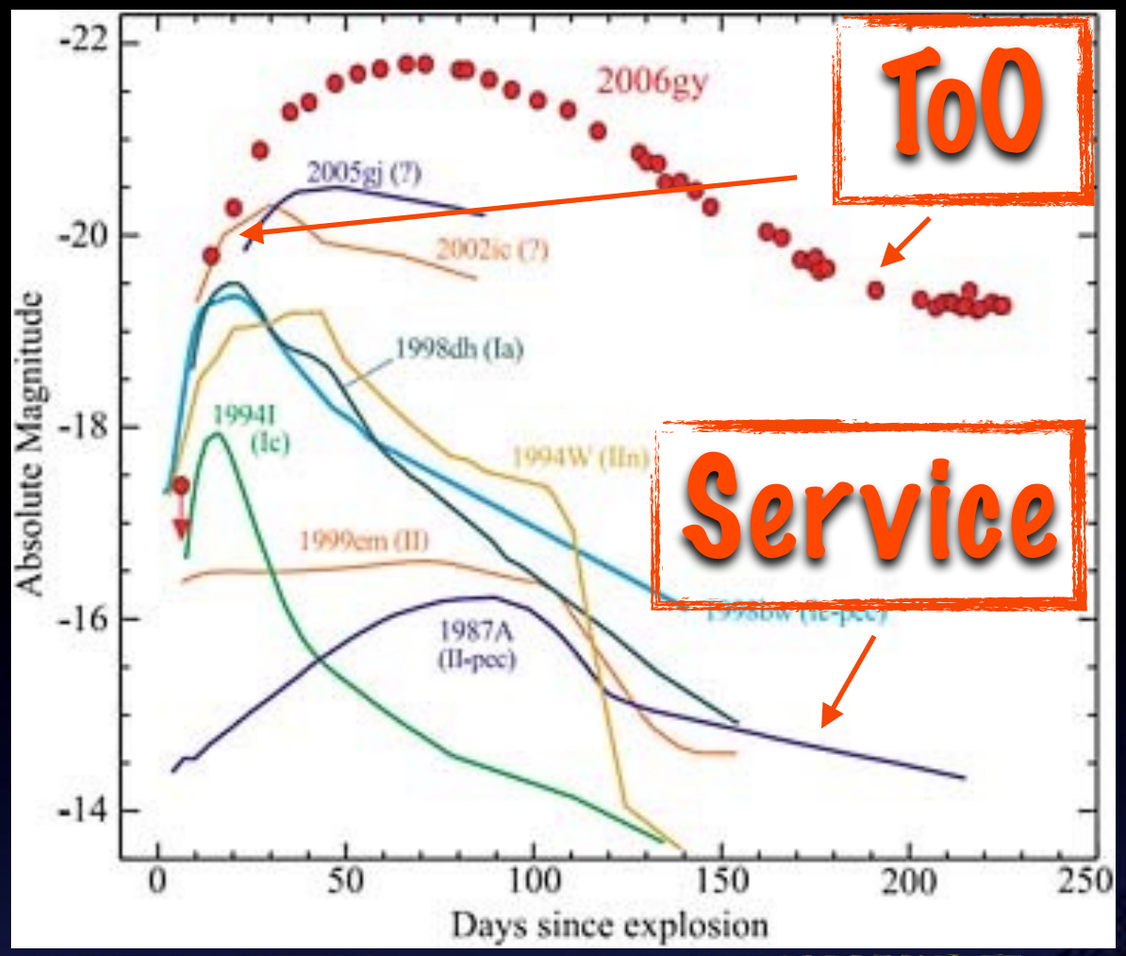


from Smith+ 2007 ApJ, 666, 1116

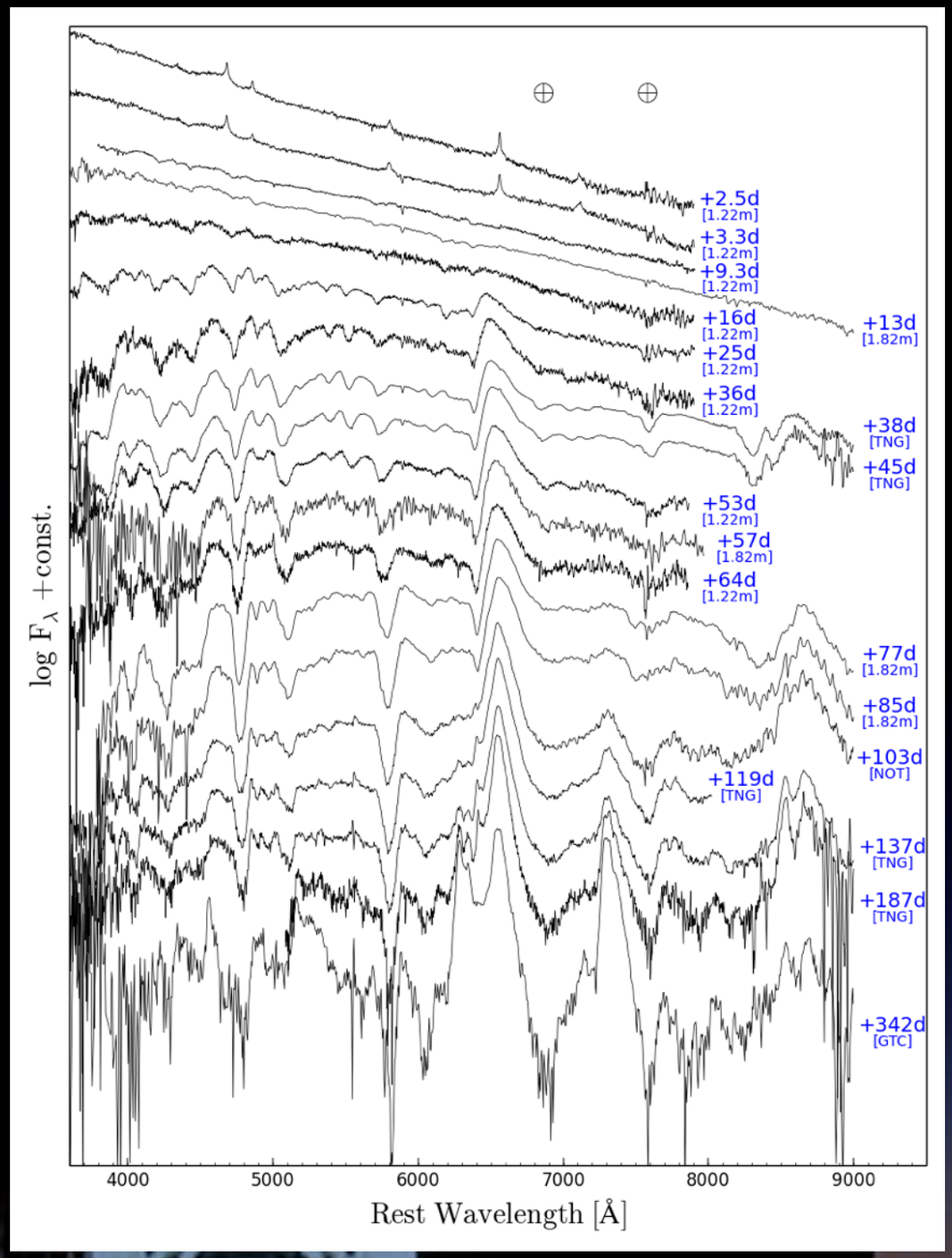


from Terreran+ 2016 MNRAS, 462, 137

Optical follow-up

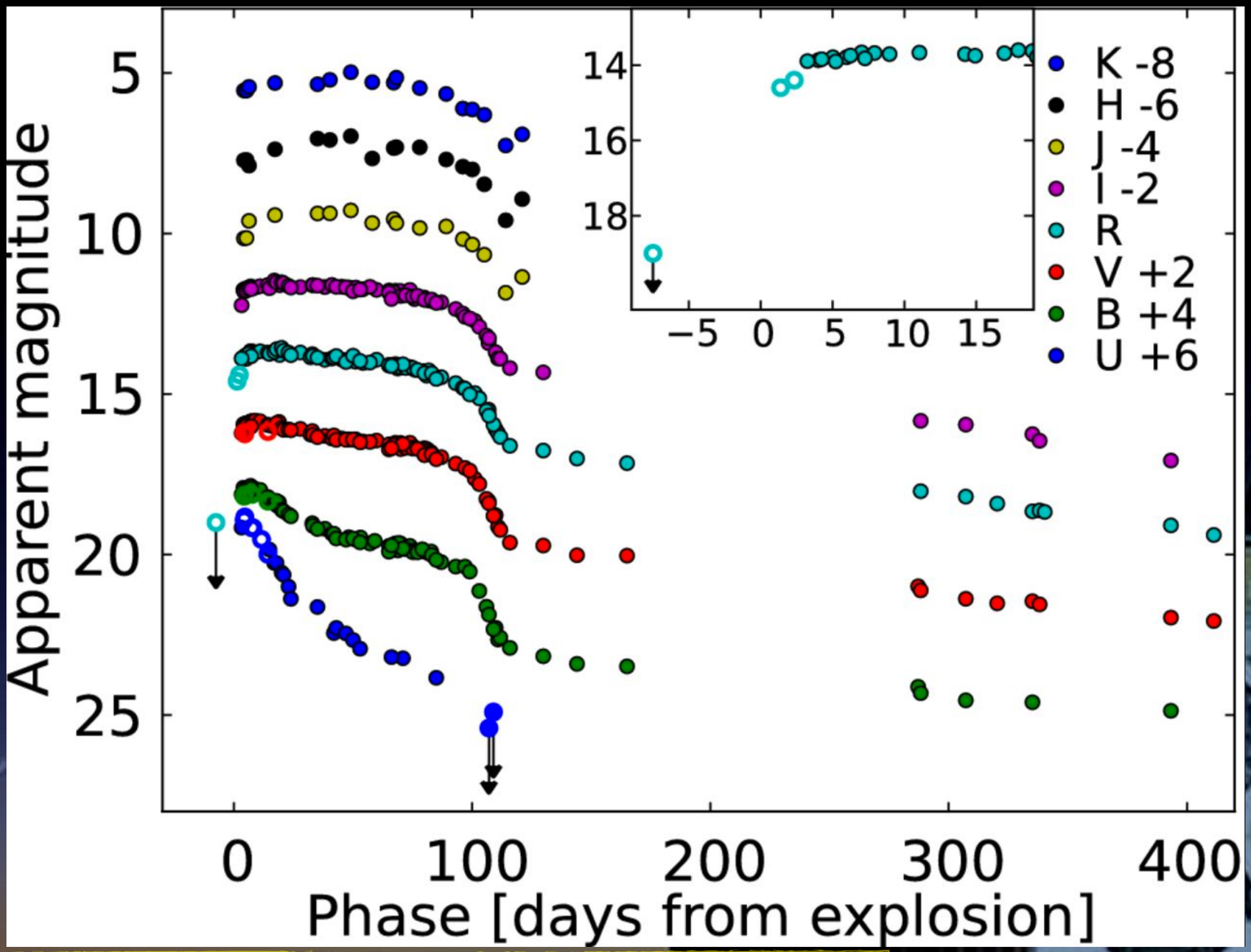


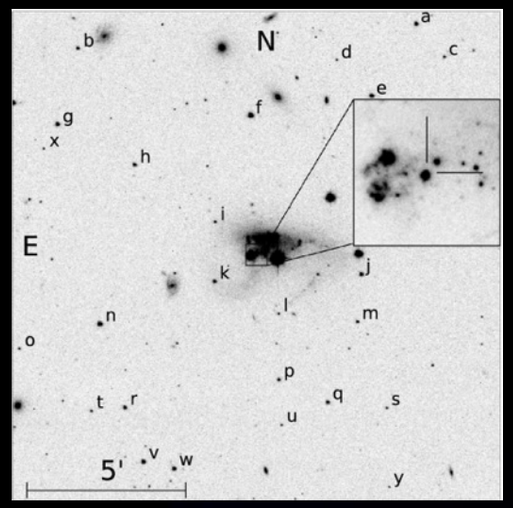
from Smith+ 2007 ApJ, 666, 1116

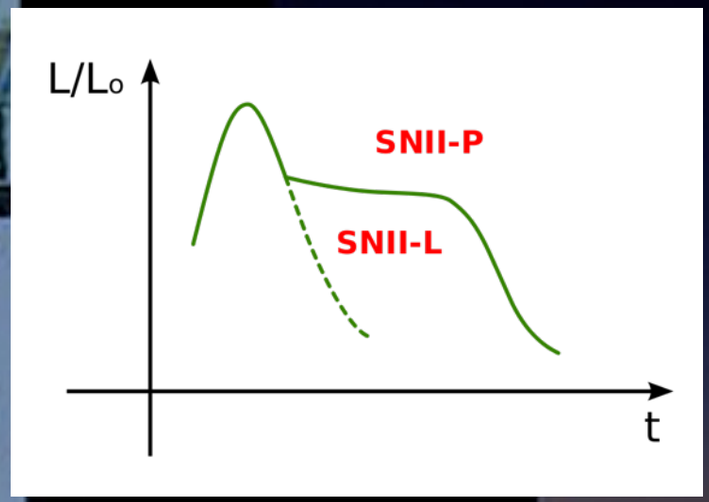


from Terreran+ 2016 MNRAS, 462, 137

Type II-P - SN 2012A

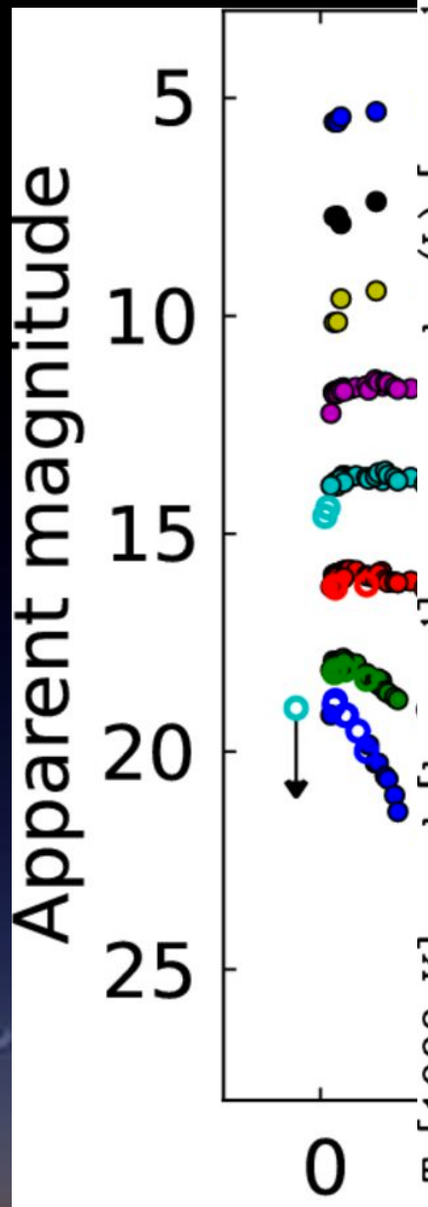


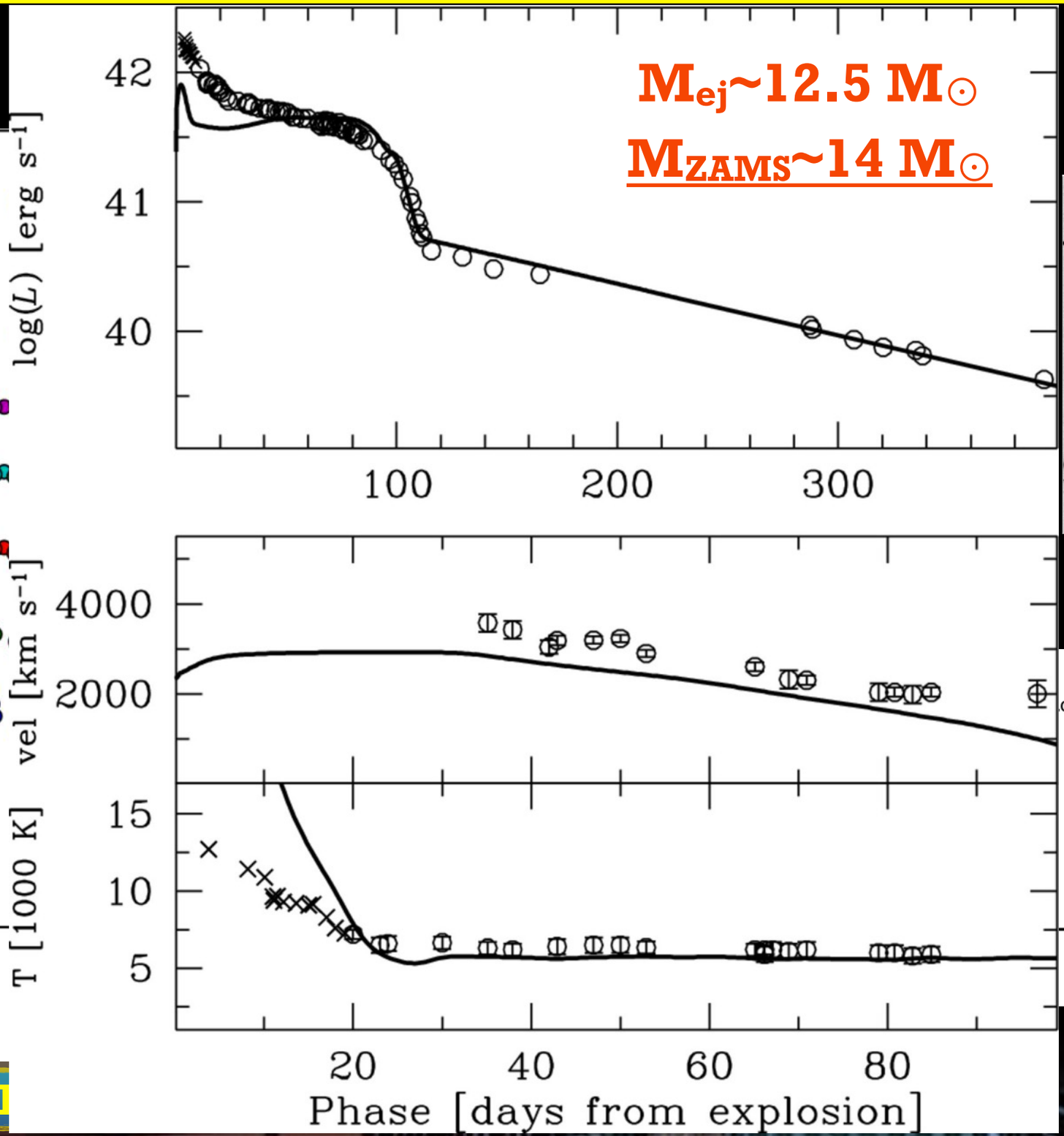




from Tomasella+ 2013 MNRAS 434, 1636

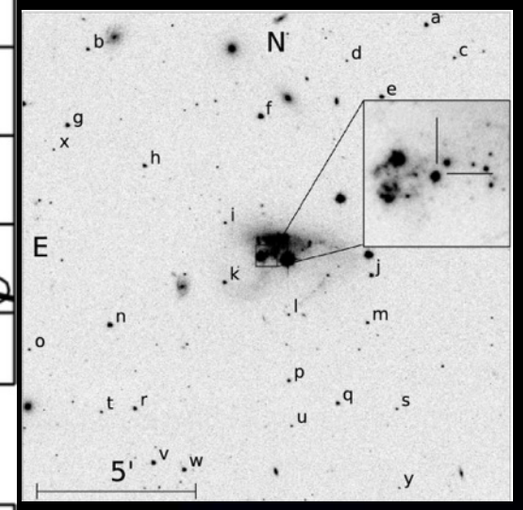
Type II-P - SN 2012A

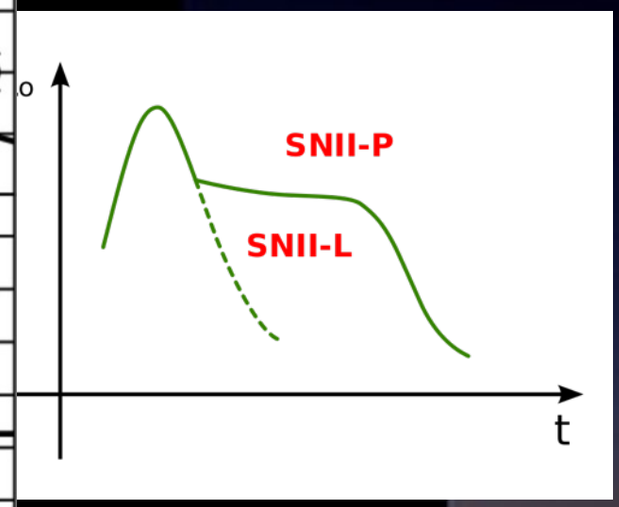




M_{ej}~12.5 $M_\odot$

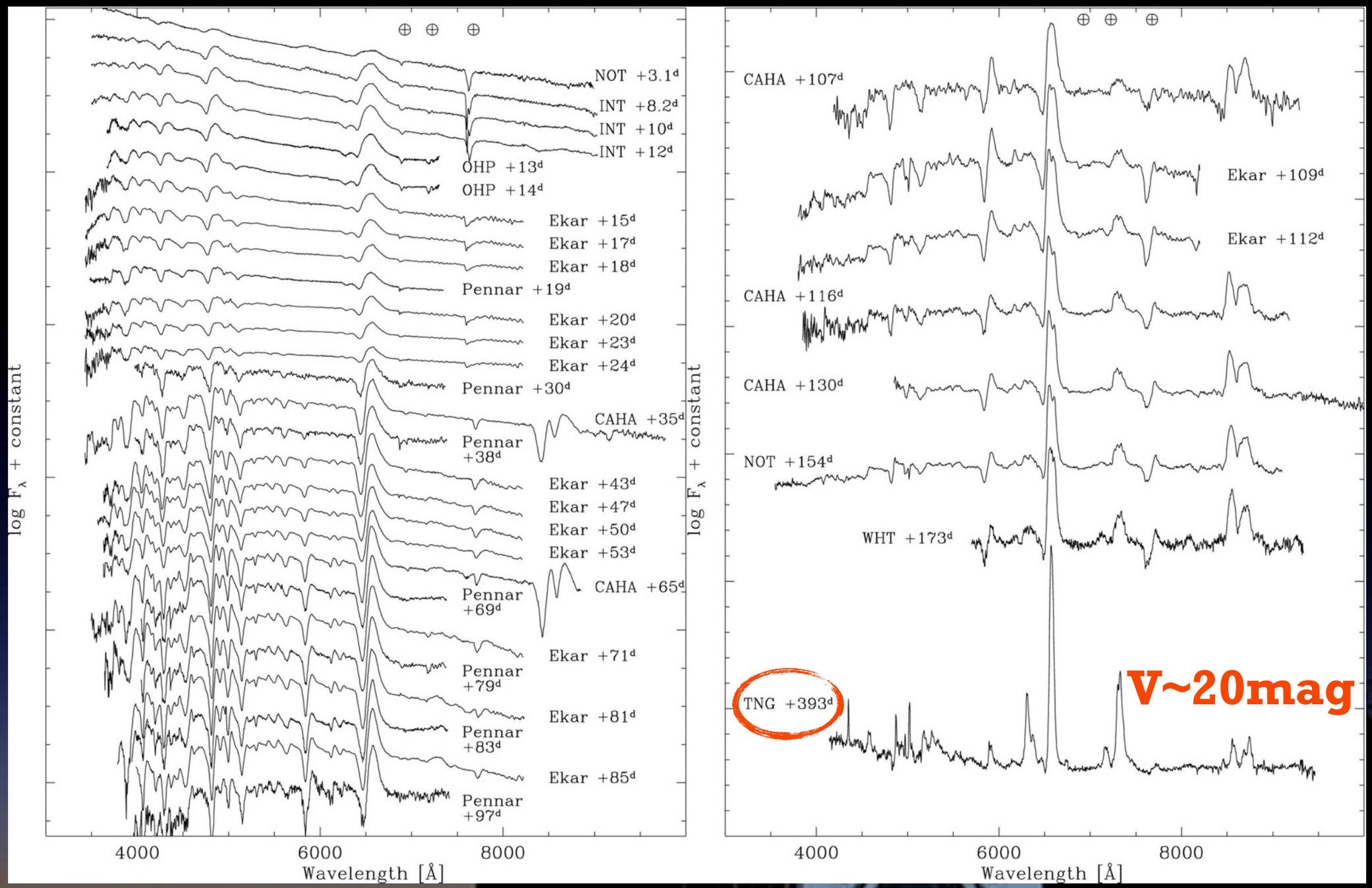
M_{ZAMS}~14 $M_\odot$





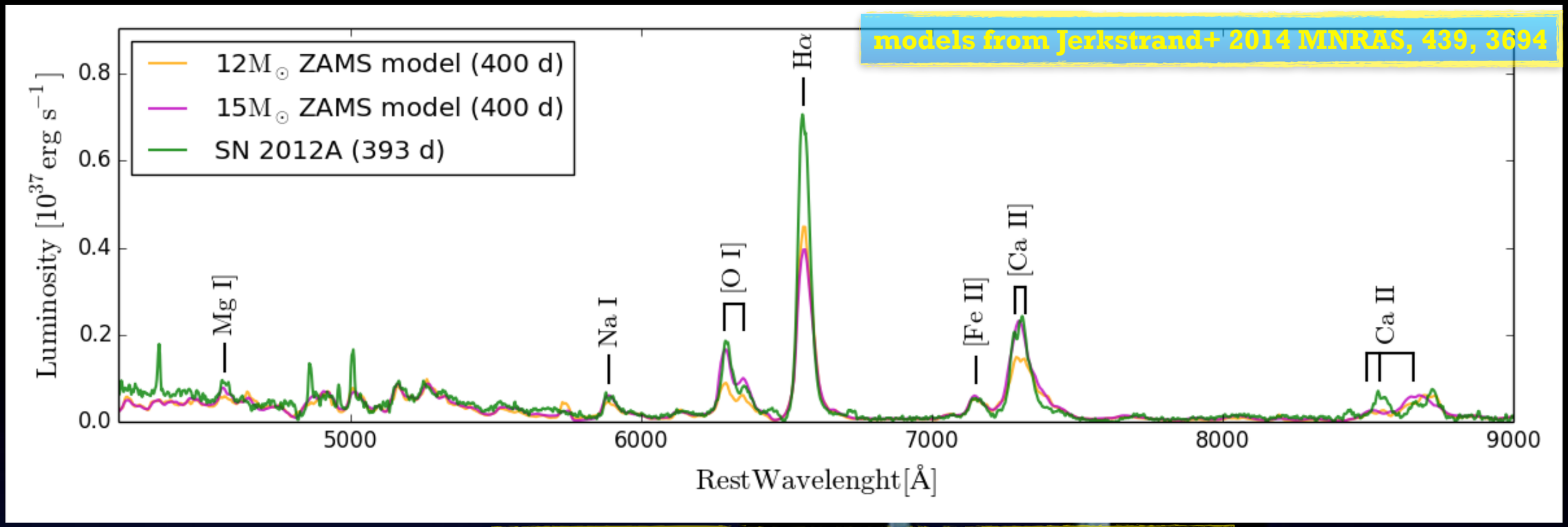
from Tomasel

Type II-P - SN 2012A



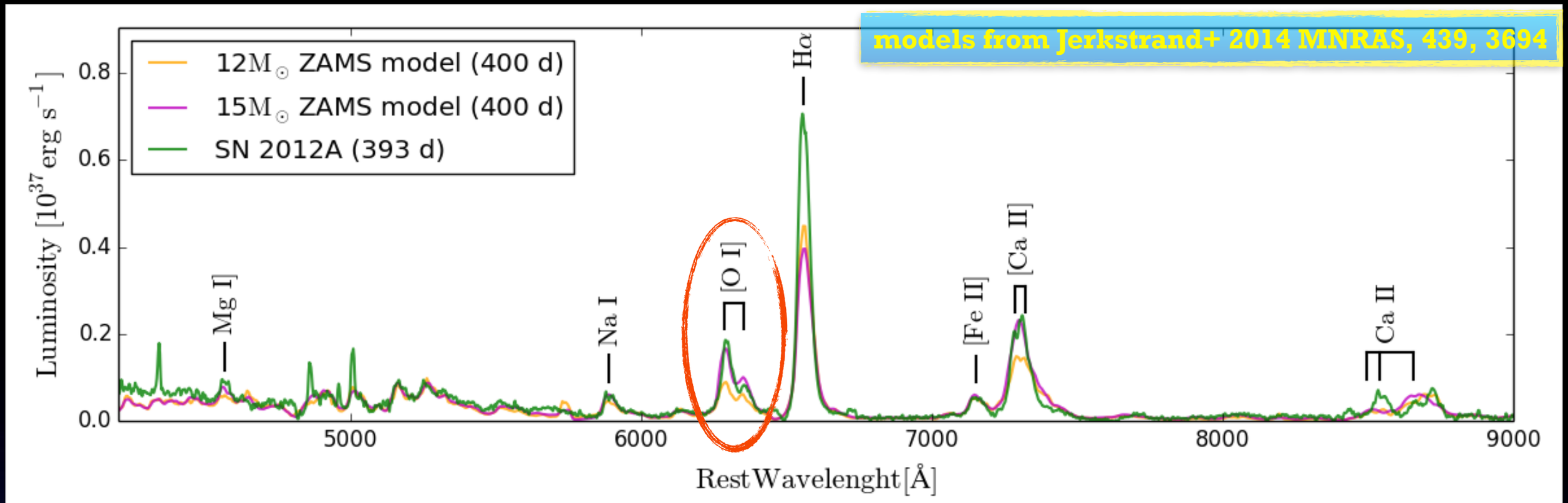
from Tomasella+ 2013 MNRAS 434, 1636

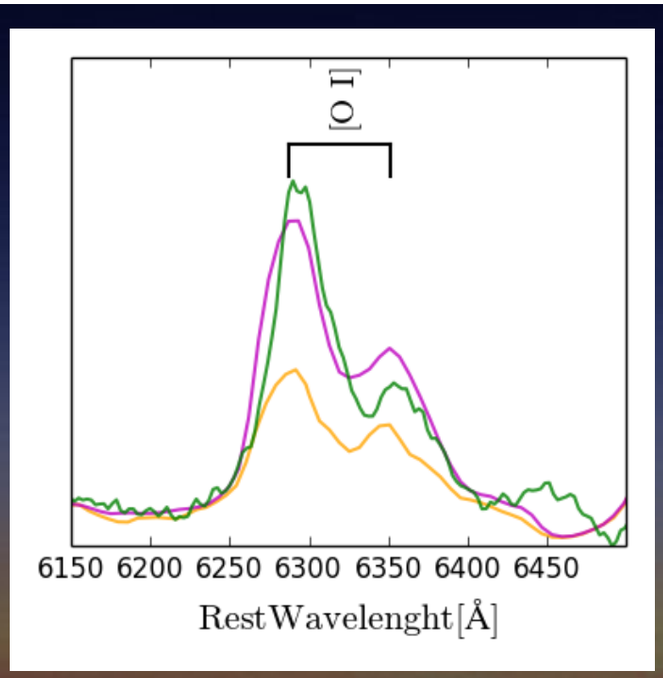
Type II-P - SN 2012A



from Tomasella+ 2013 MNRAS 434, 1636

Type II-P - SN 2012A



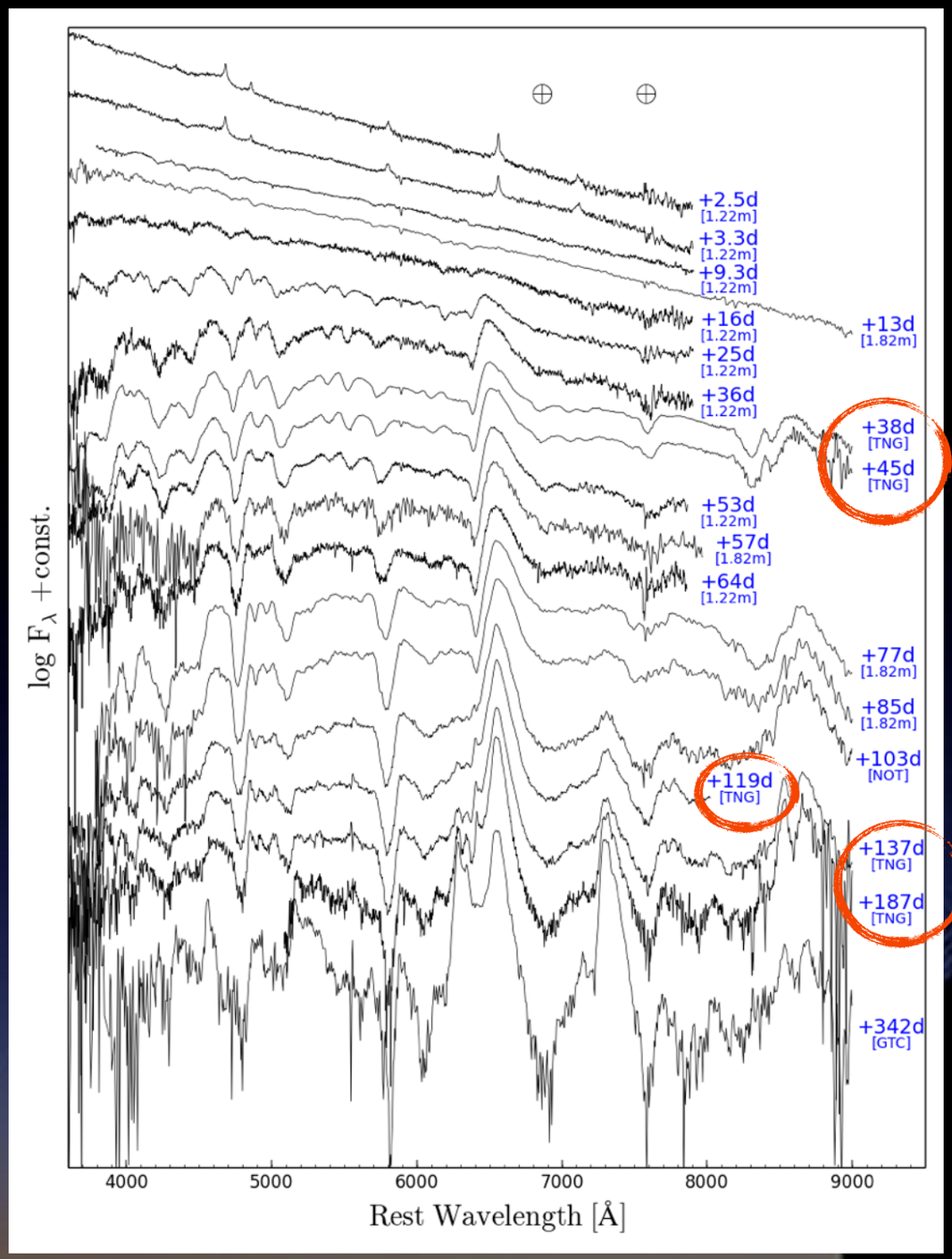


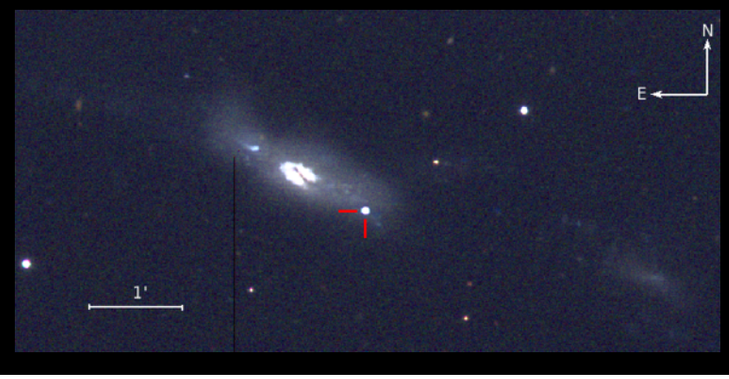
from Tomasella+ 2013 MNRAS 434, 1636

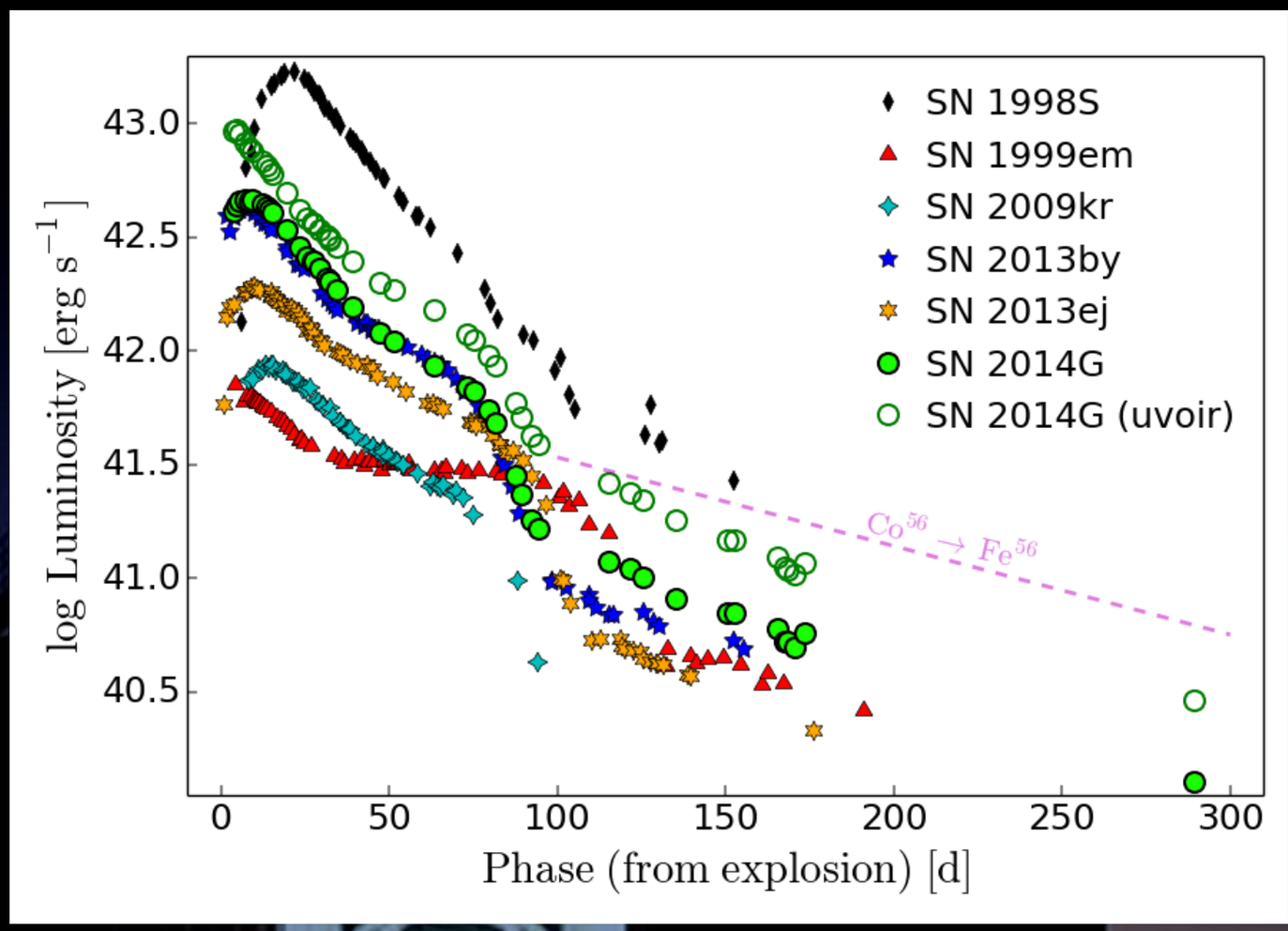
Progenitor with 15 M⊙

With only 1 nebular spectrum!!

Type II-L - SN 2014G

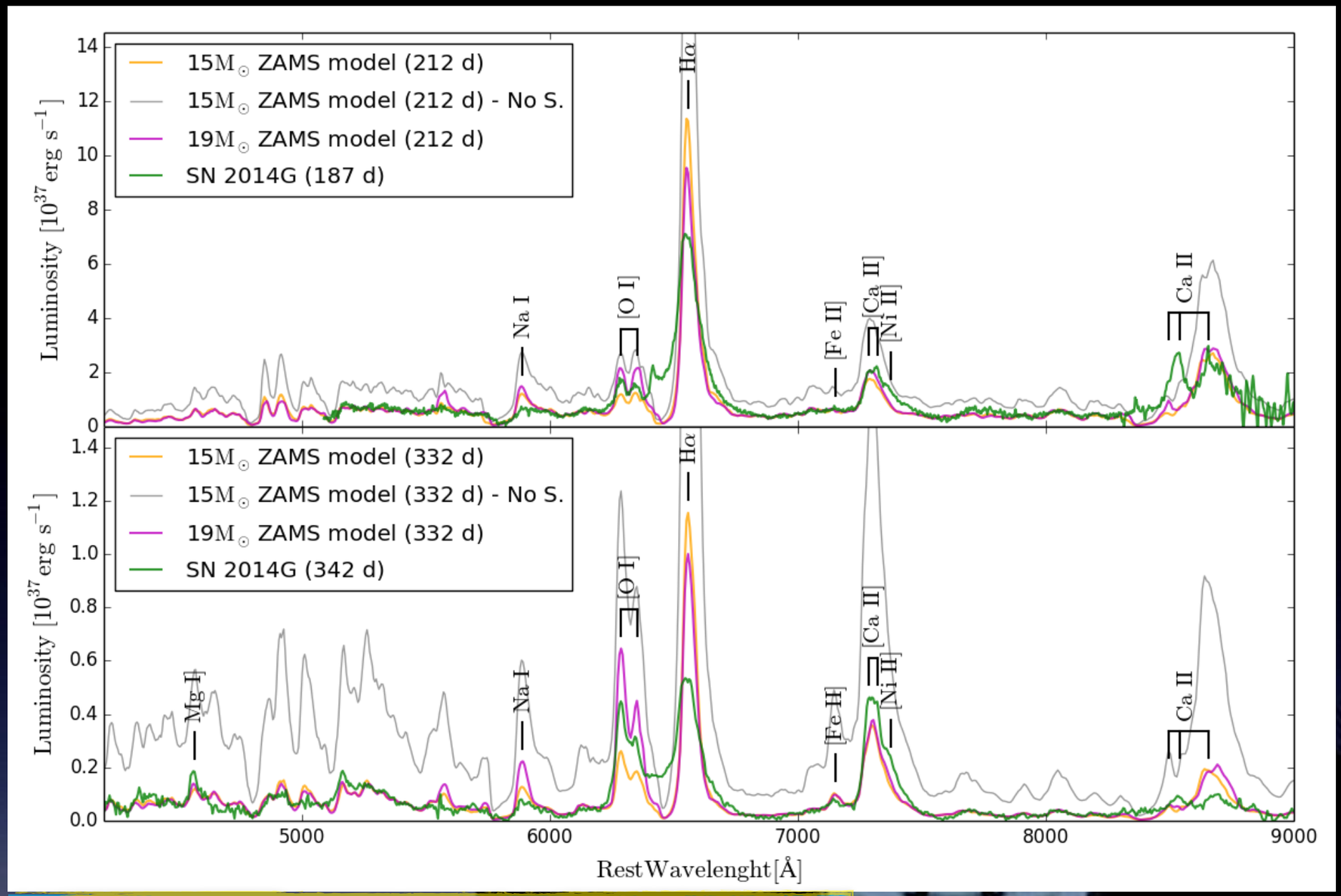






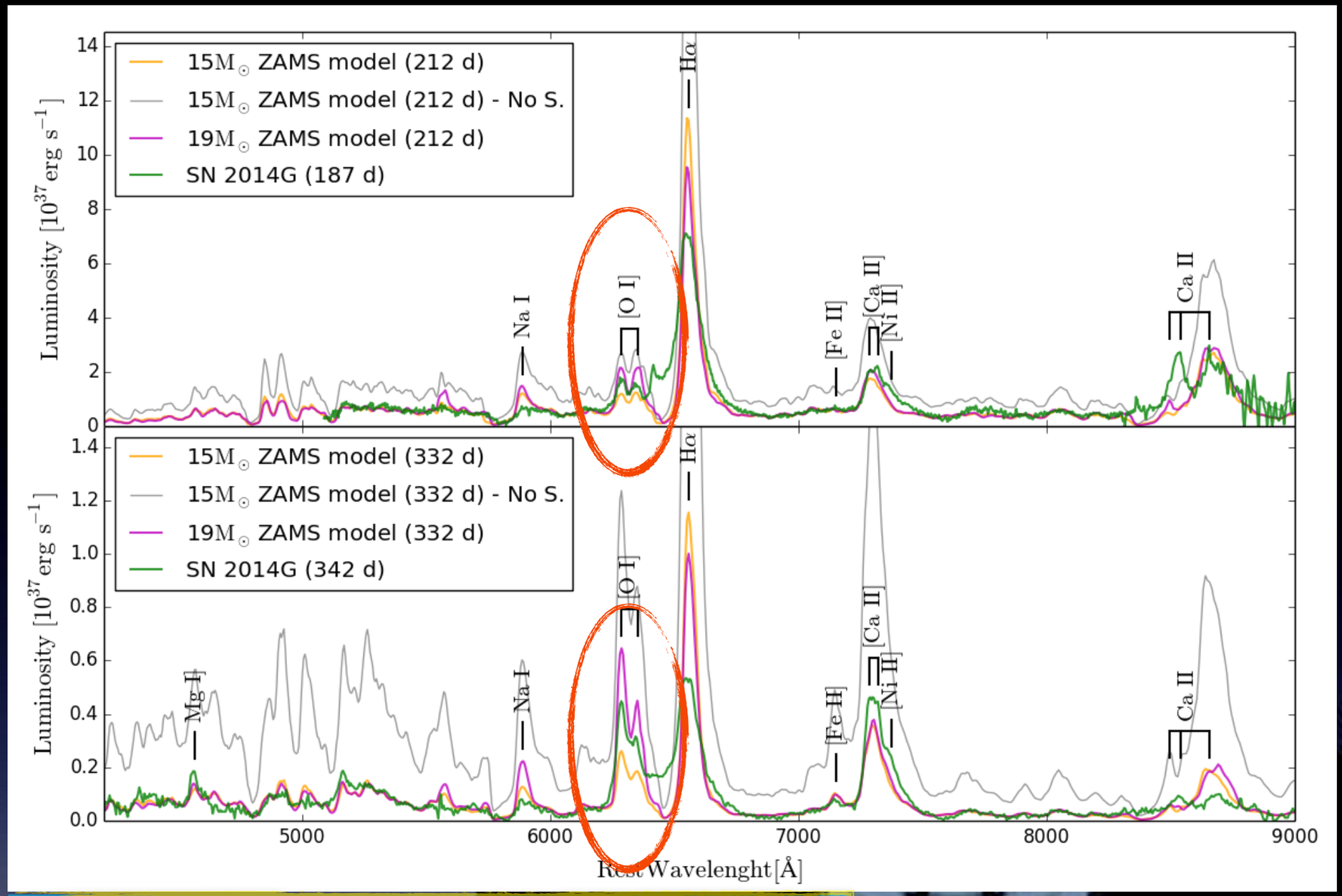
from Terreran+ 2016 MNRAS, 462, 137

Type II-L - SN 2014G



from Terreran+ 2016 MNRAS, 462, 137

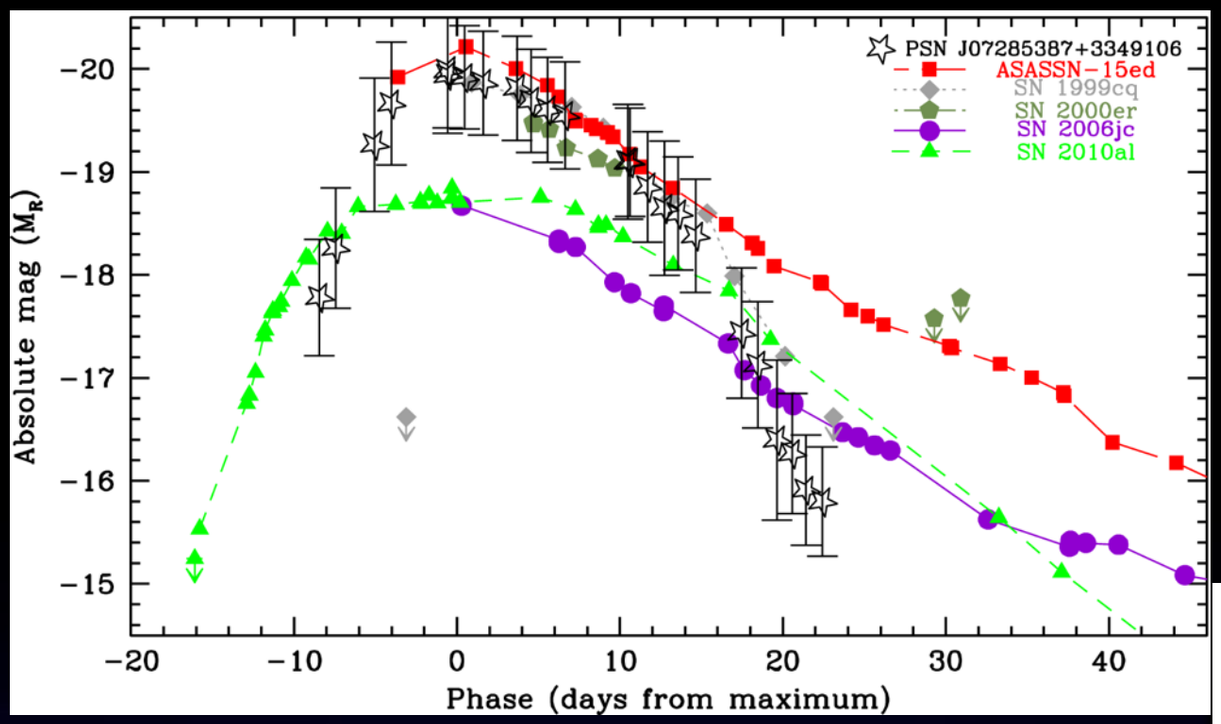
Type II-L - SN 2014G

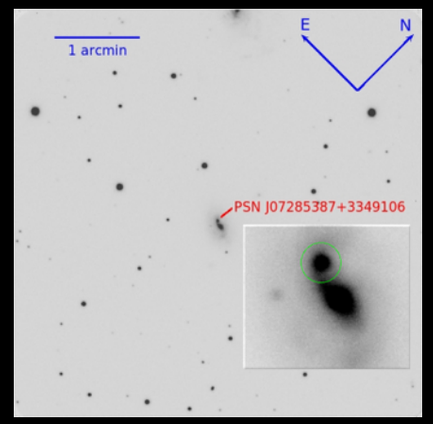


from Terreran+ 2016 MNRAS, 462, 137

Progenitor with 15 $M_\odot$ < M_{ZAMS} < 19 $M_\odot$

Type Ibn: PSN J07285387+3349106

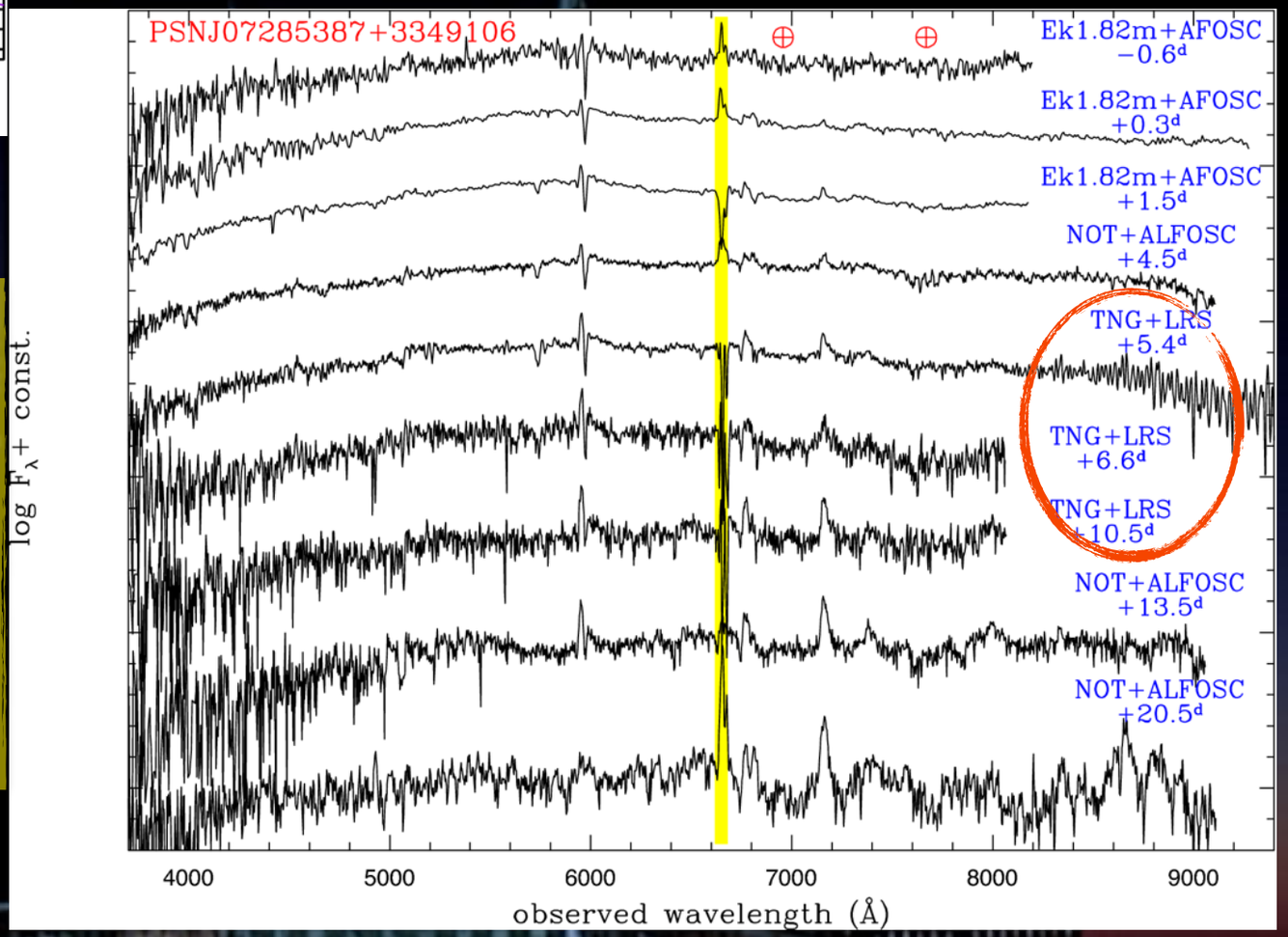




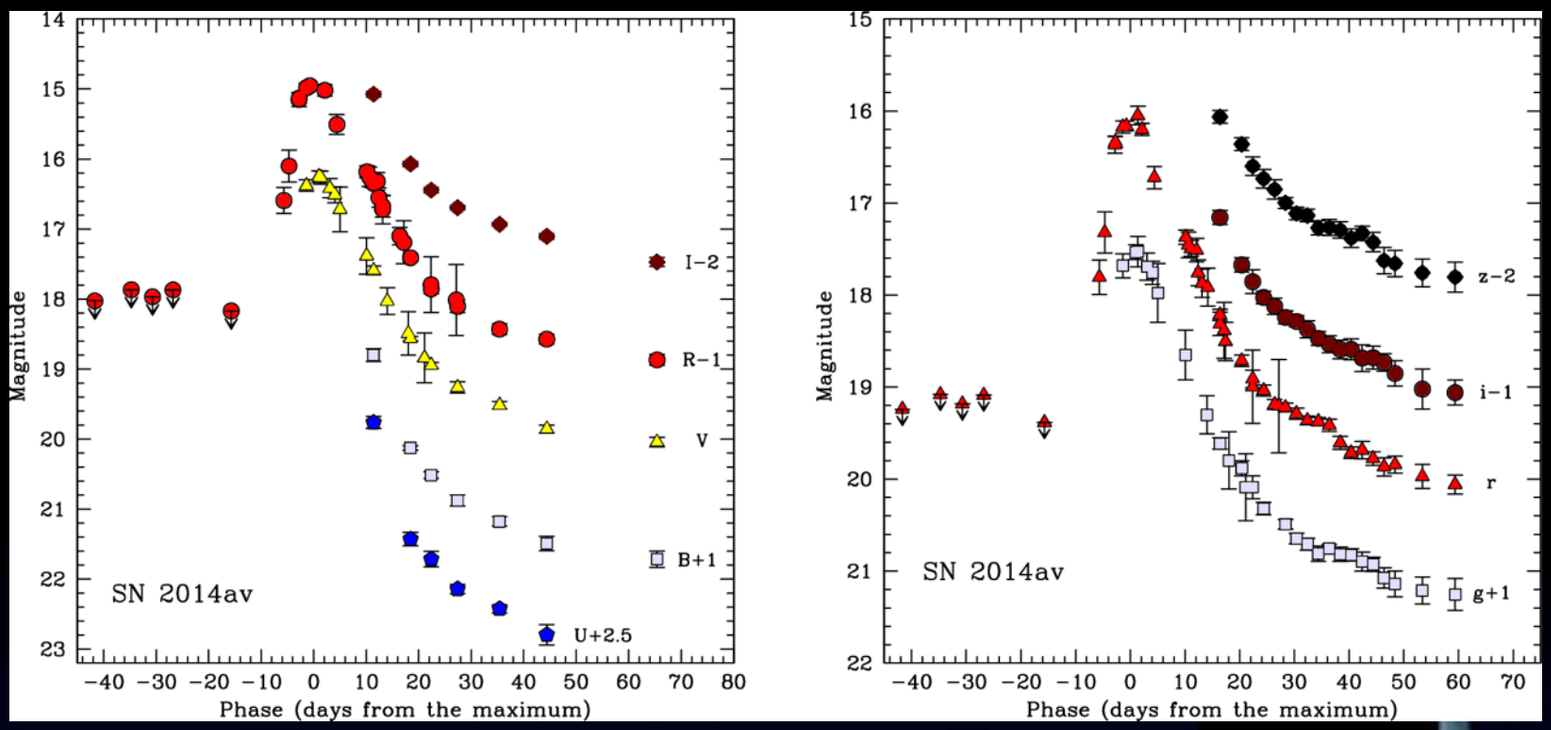
from Pastorello+ 2015 MNRAS 454, 4293

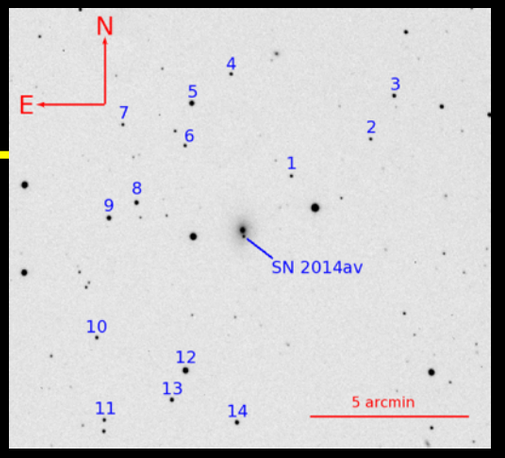
Ibn properties:
luminous + He rich ejecta
very heterogeneous
they are the analogue of SN IIn but with much less H

explosion of massive stars while loosing the He mantle and ejecta INTERACT with it!



Type Ibn: SN 2014av

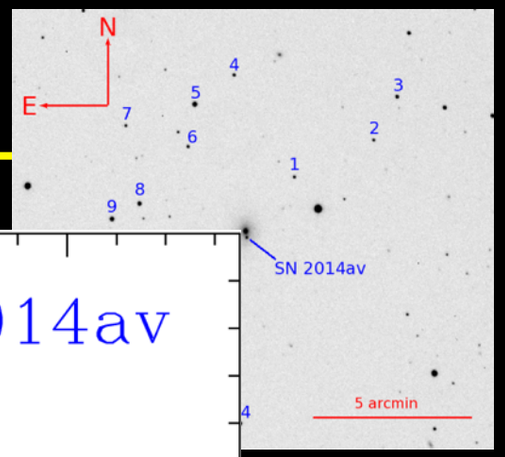


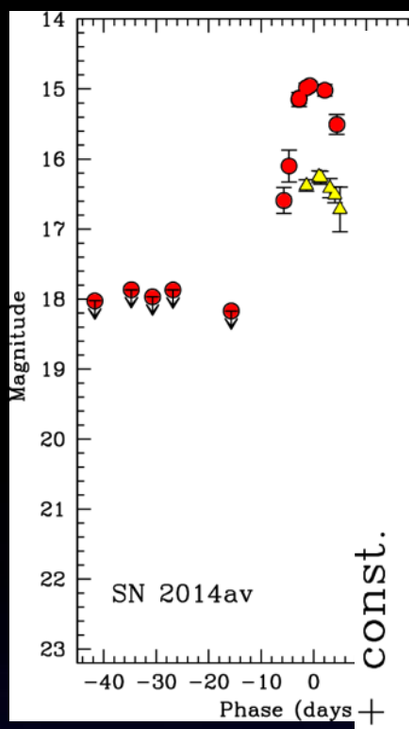


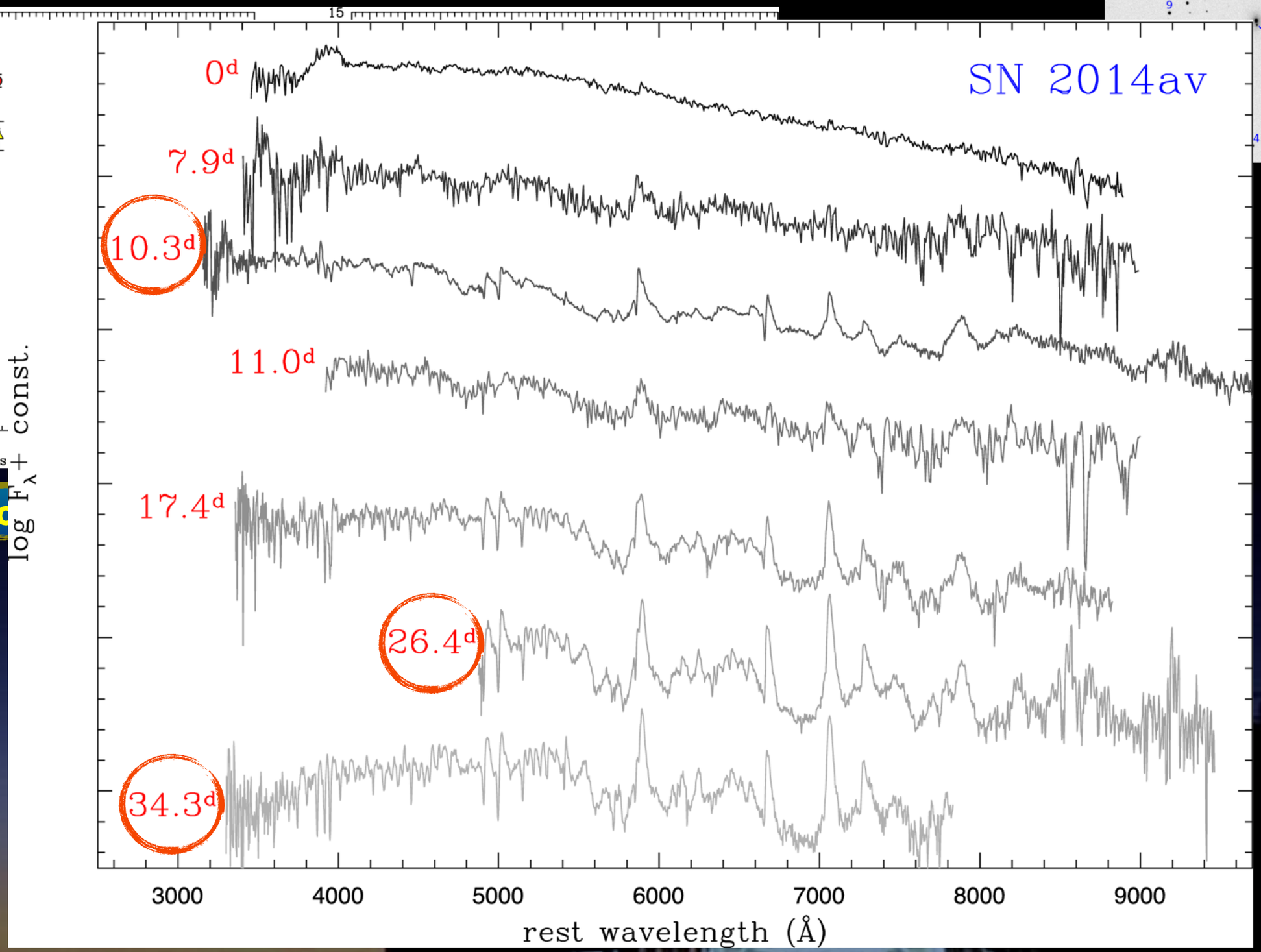
Late photometry with TNG

from Pastorello+ 2016 MNRAS 456, 853

Type Ibn: SN 2014av

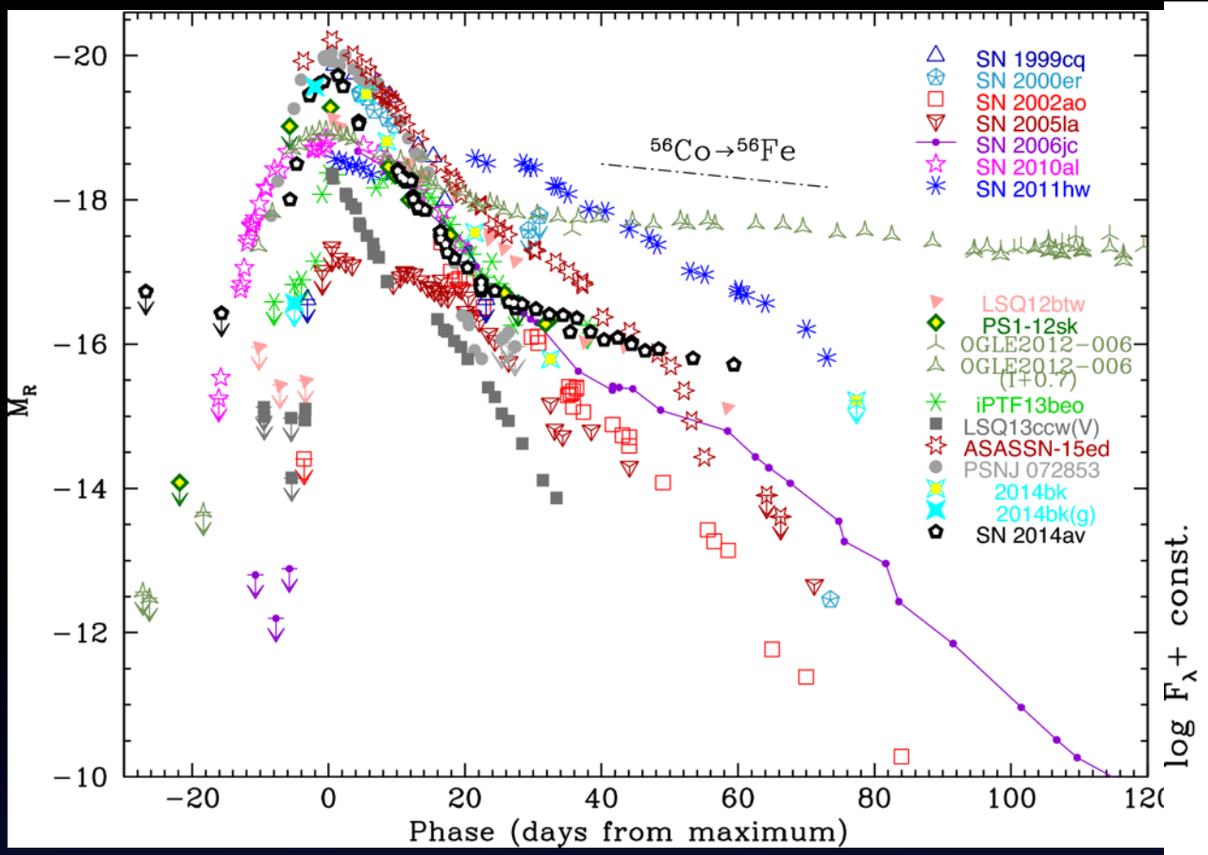


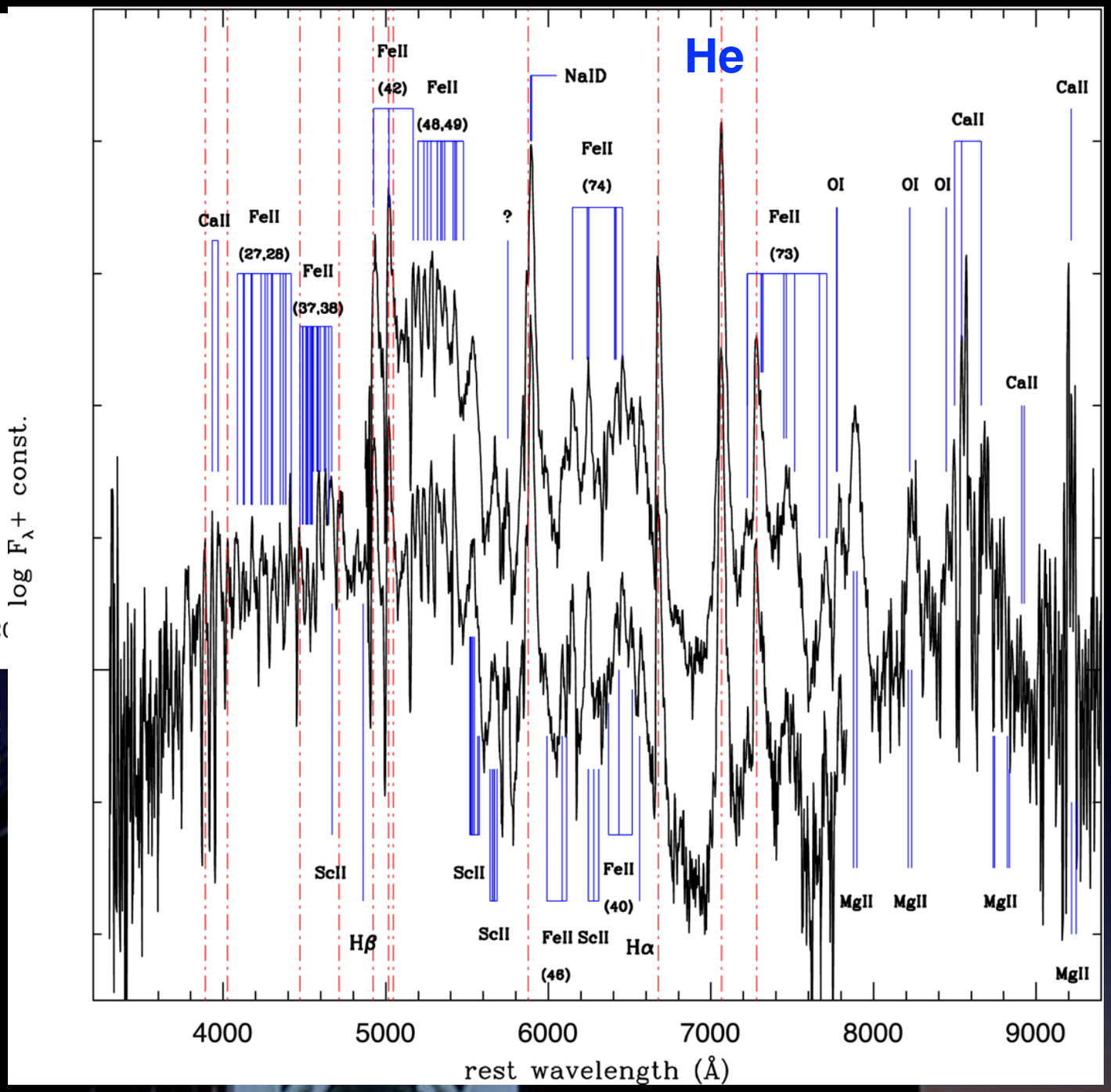




from Pasto

Type Ibn: SN 2014av

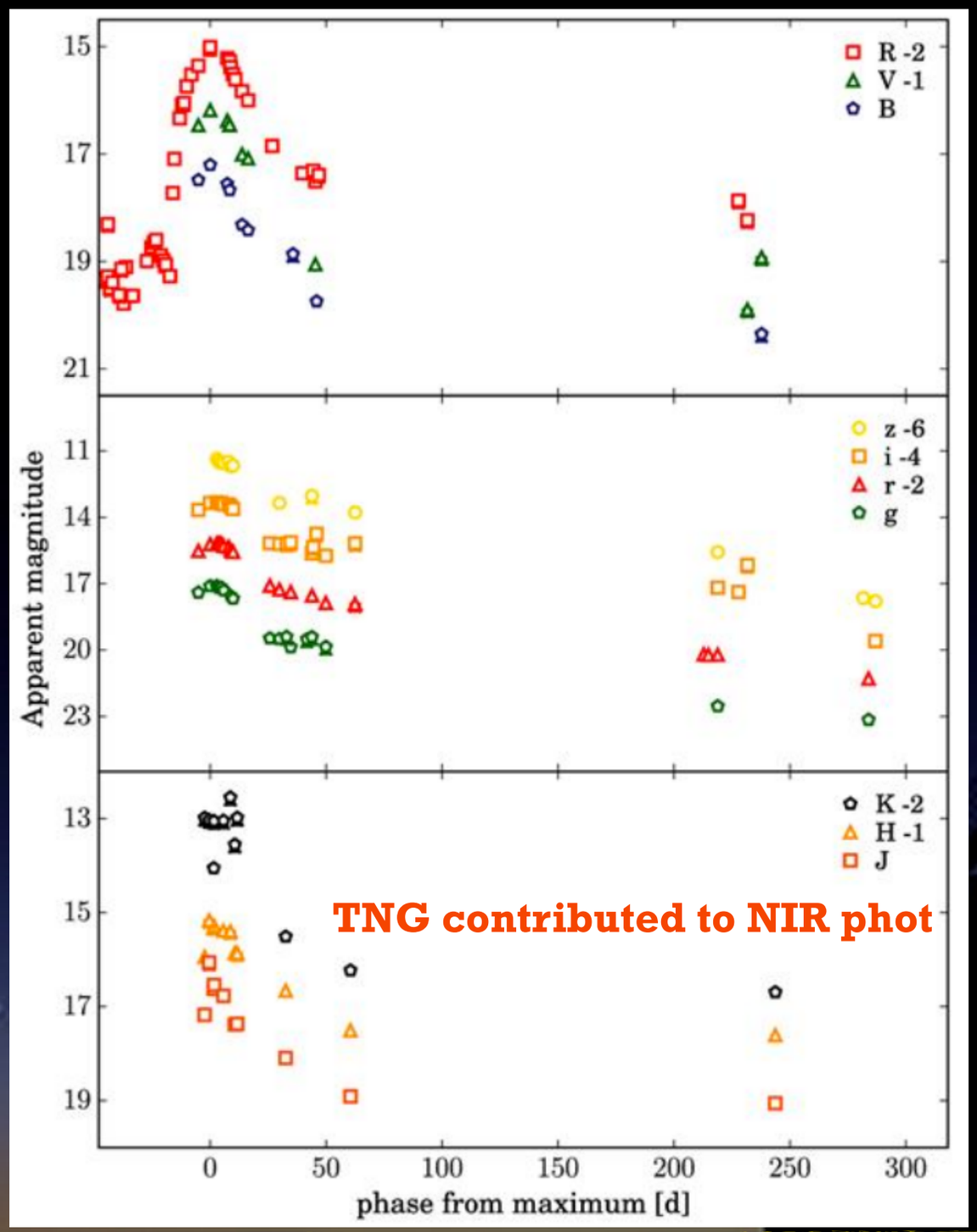


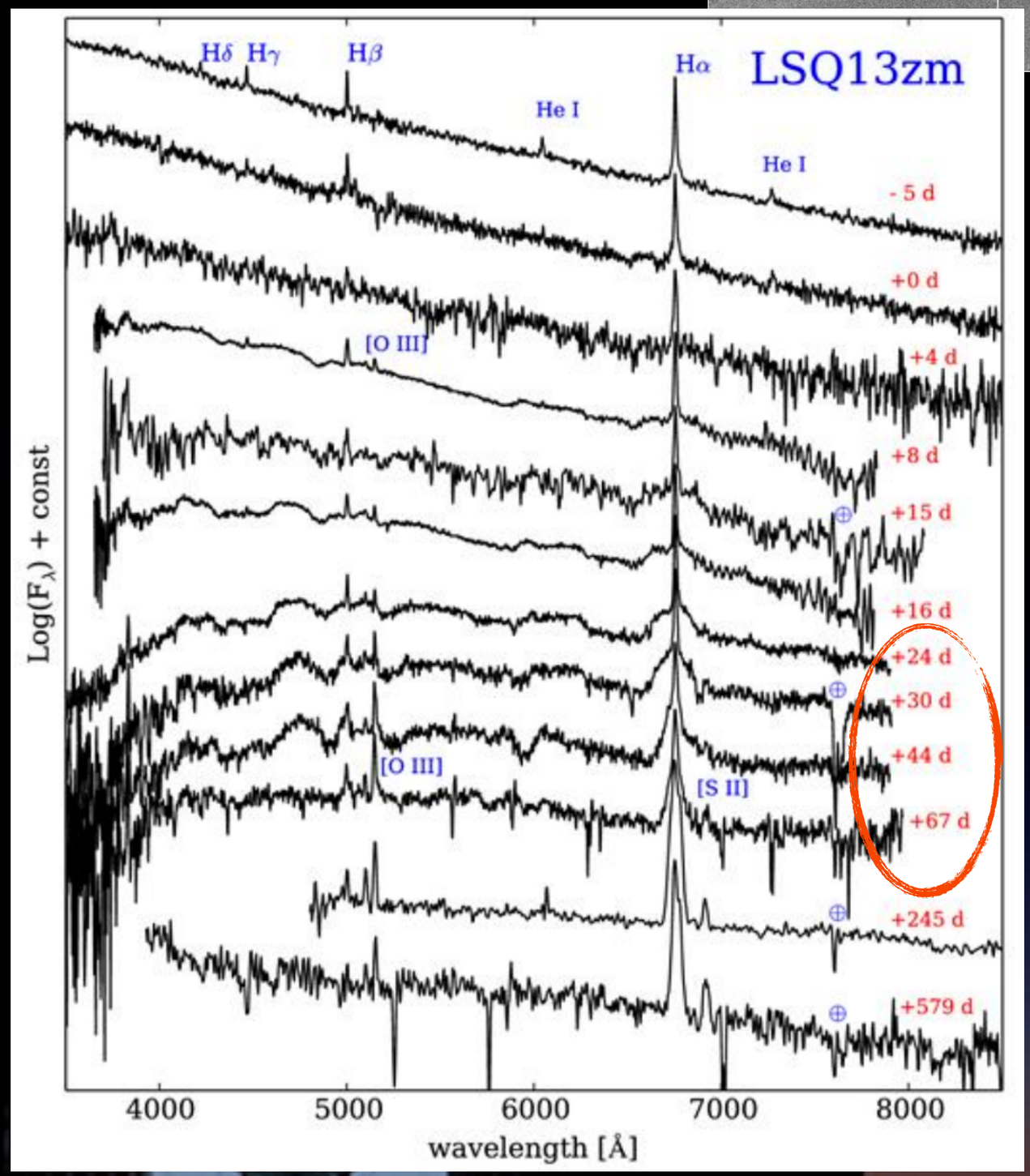


one of the brightest Ibn!

from Pastorello+ 2016 MNRAS 456, 853

SN impostors: LSQ13zm

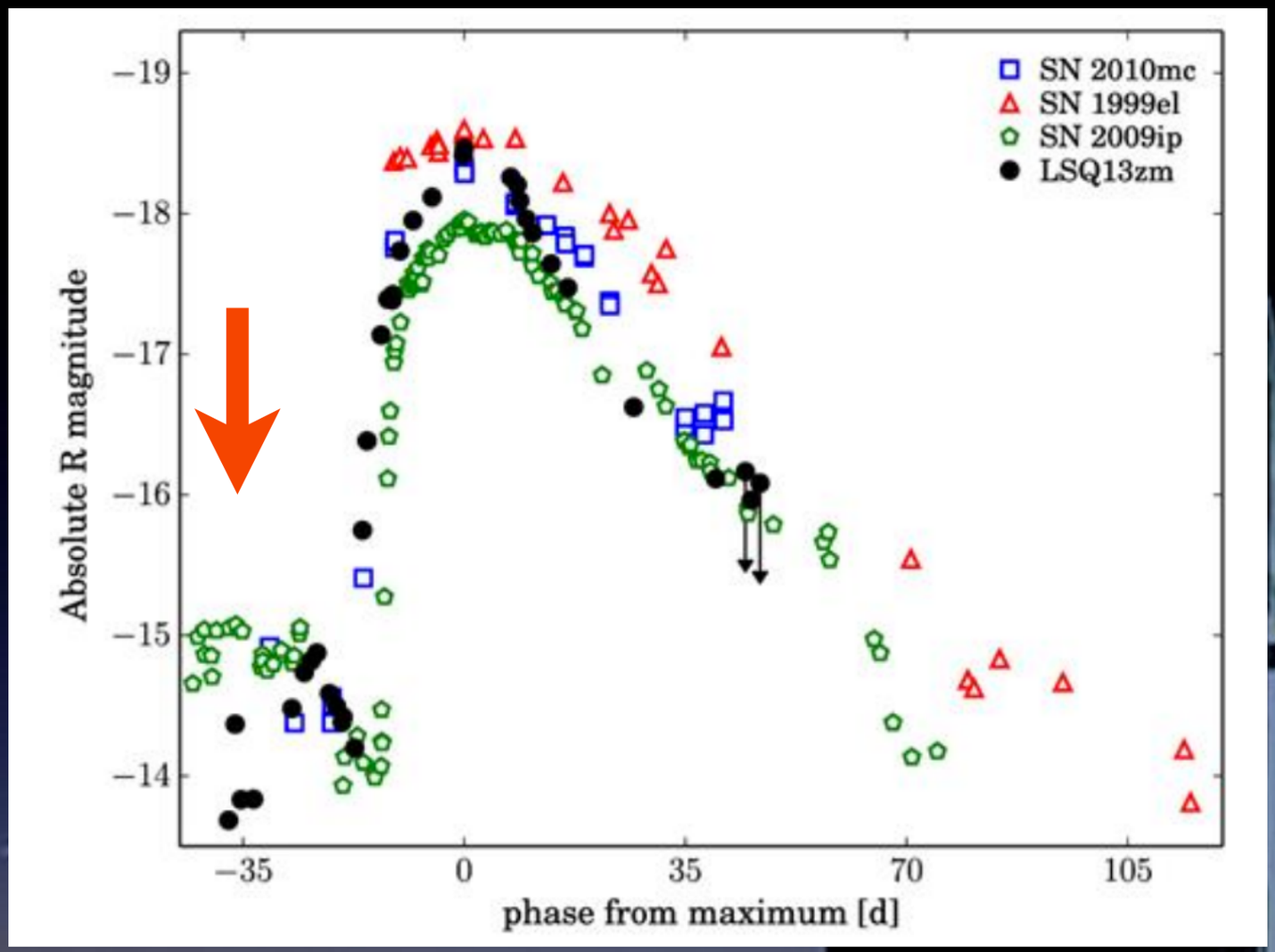


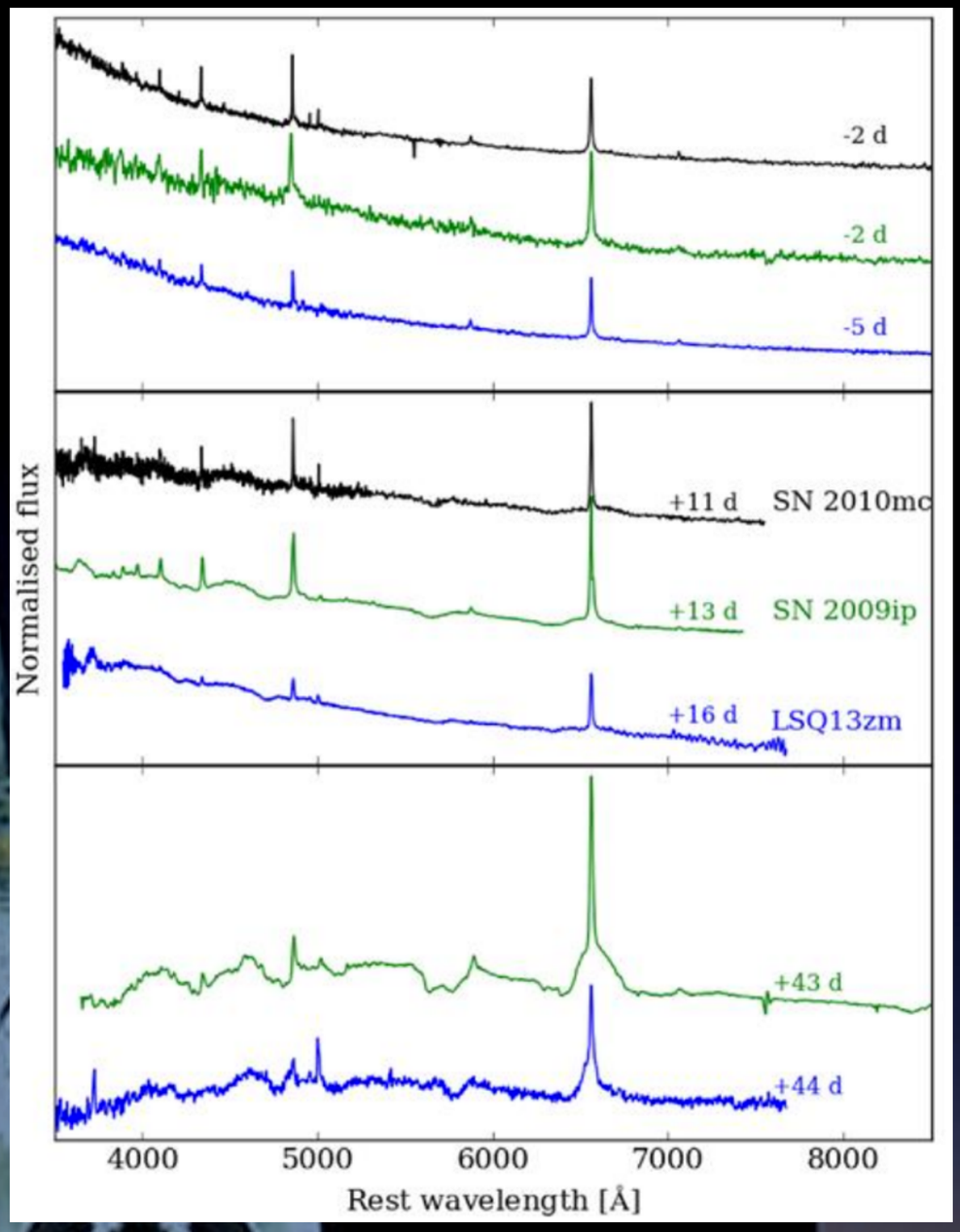


from Tartaglia+ 2016 MNRAS 459, 1039

SN impostors: LSQ13zm

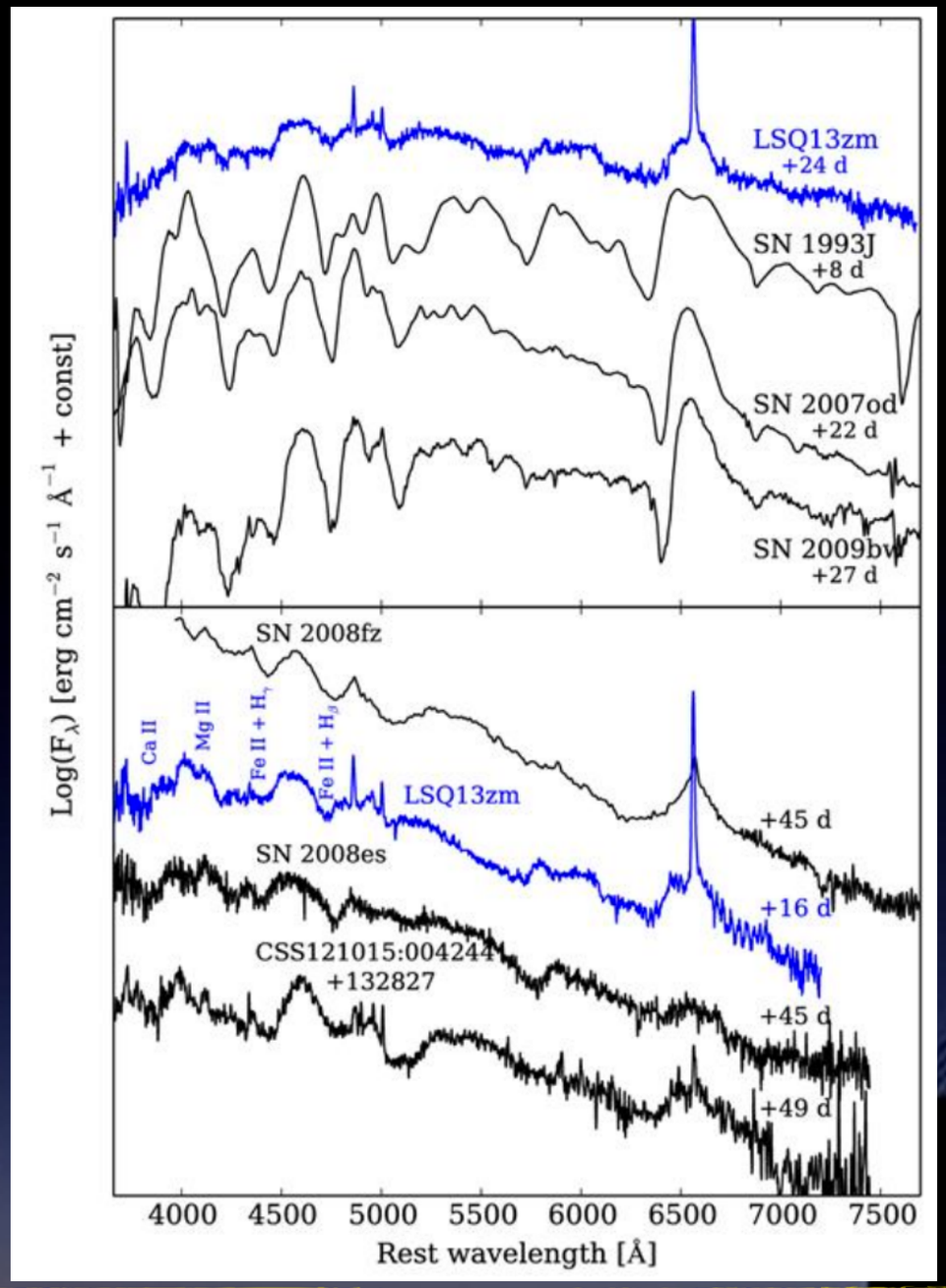
Did it explode? When?



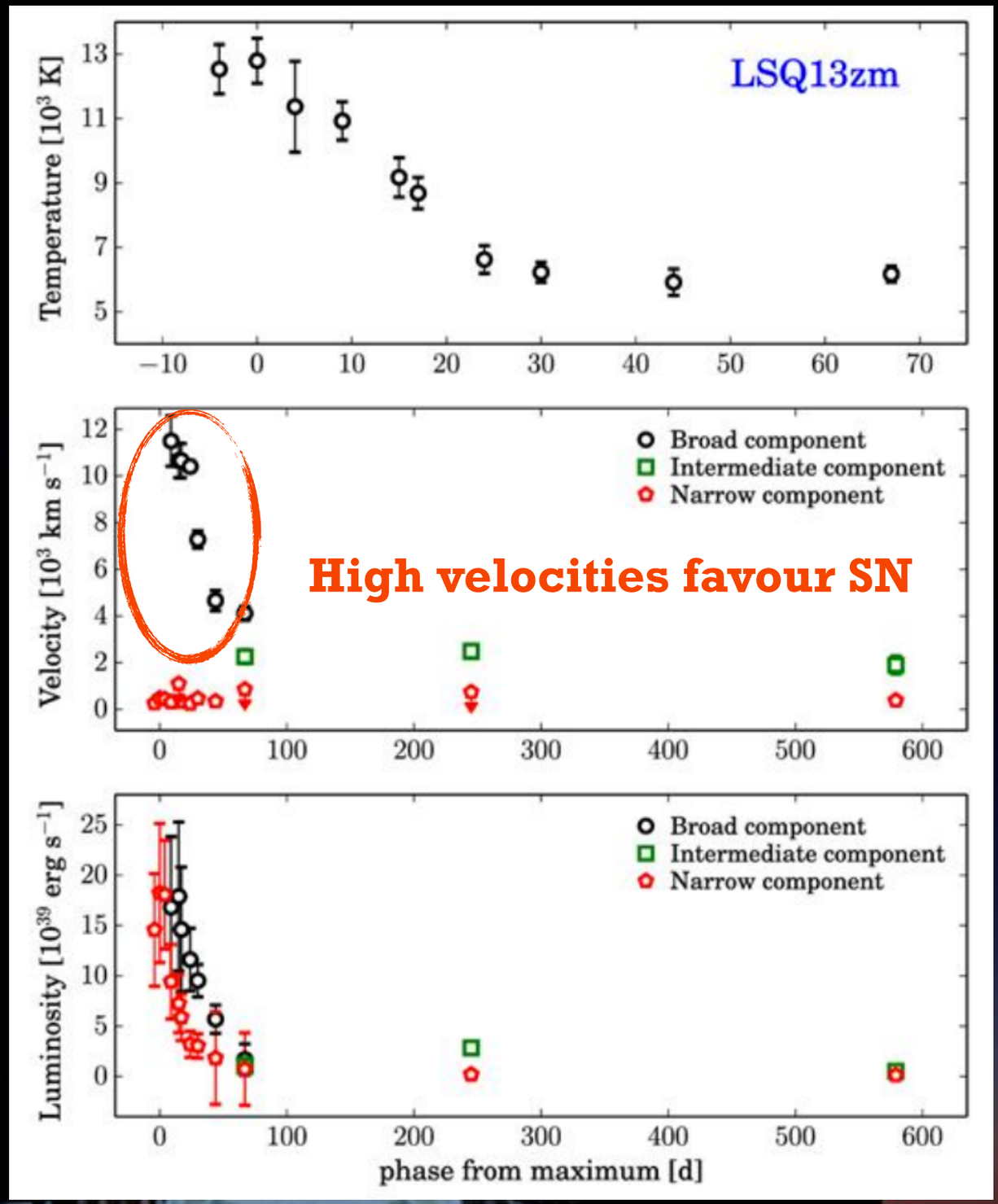


from Tartaglia+ 2016 MNRAS 459, 1039

SN impostors: LSQ13zm

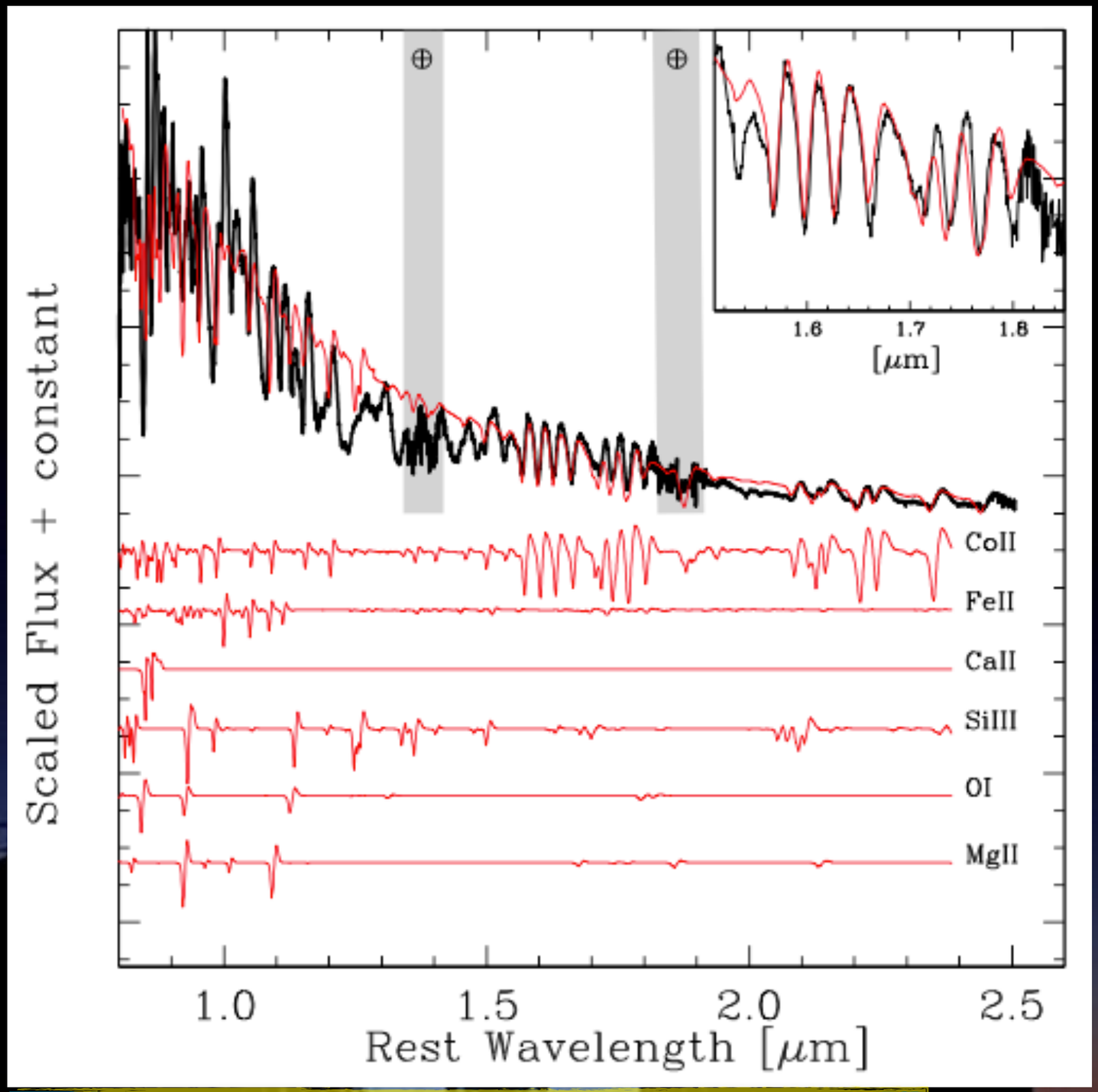


from Tartaglia+ 2016 MNRAS 459, 1039



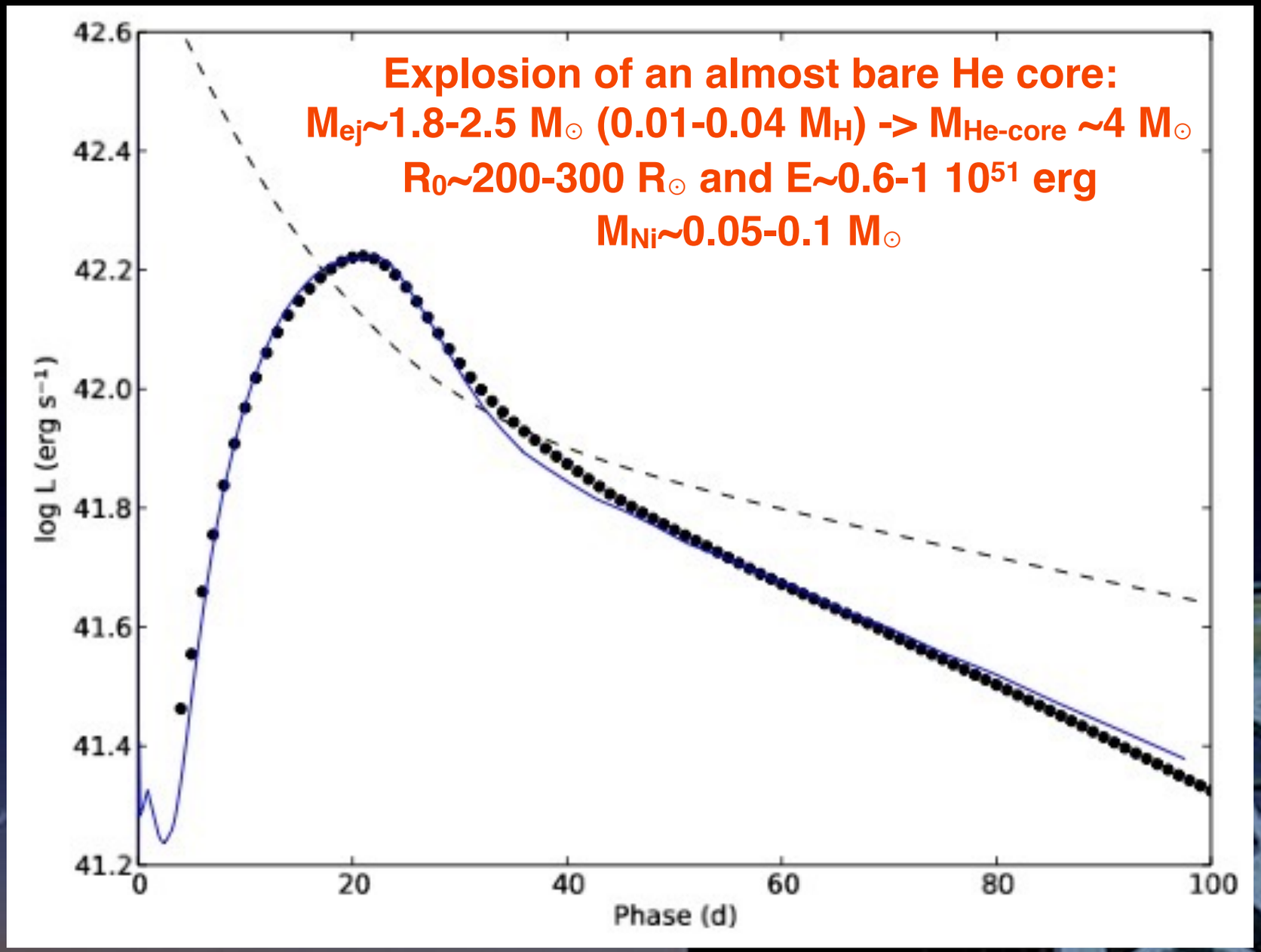
Near Infrared follow-up

NICS is the only NIR spectrograph available to our group in the northern hemisphere

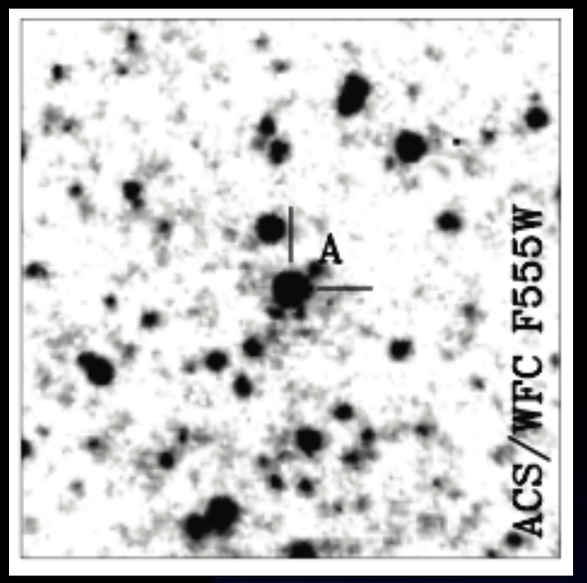


from Tomasella+ 2016 MNRAS 459, 1018

Type IIb: SN 2011dh

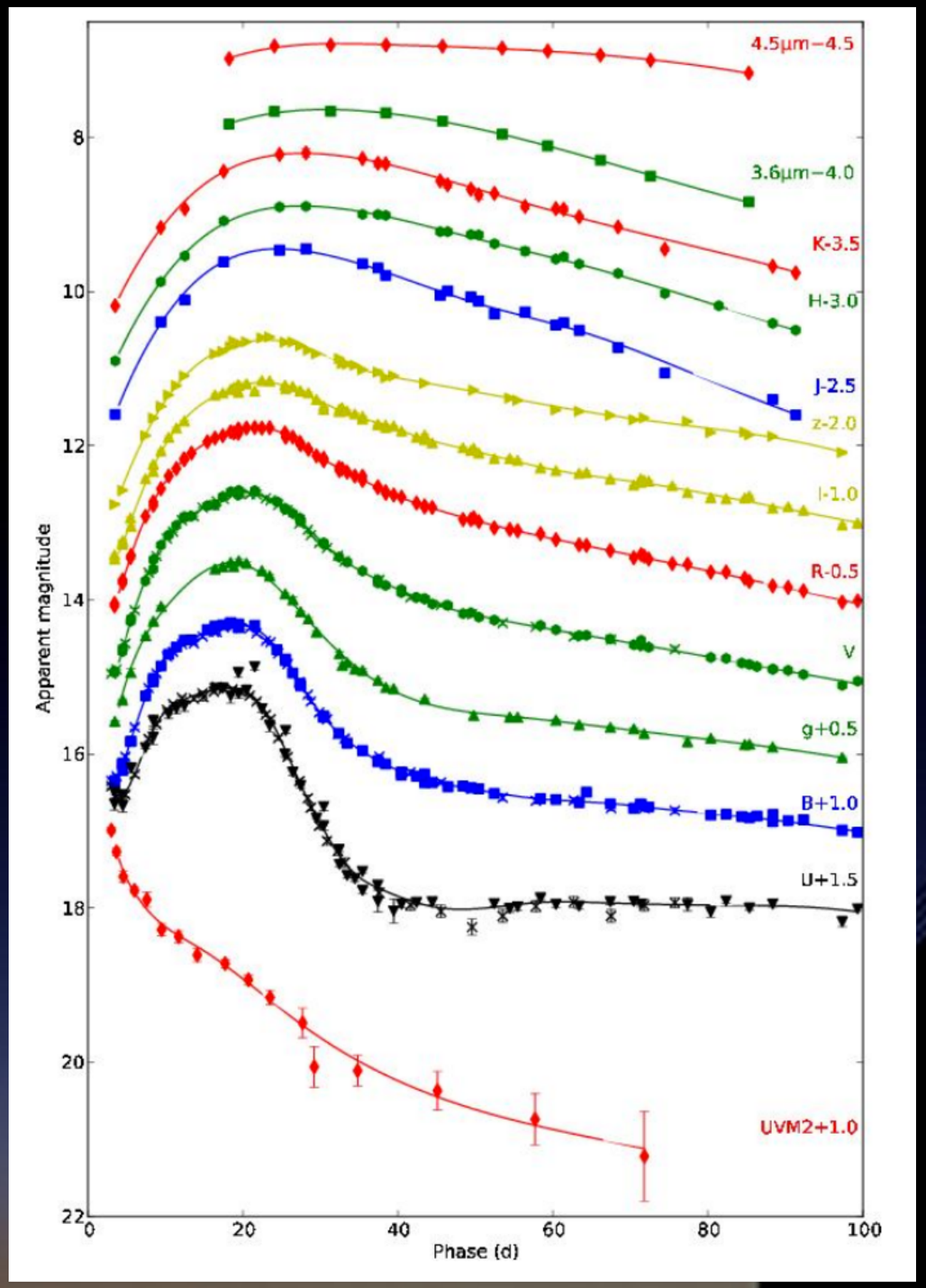


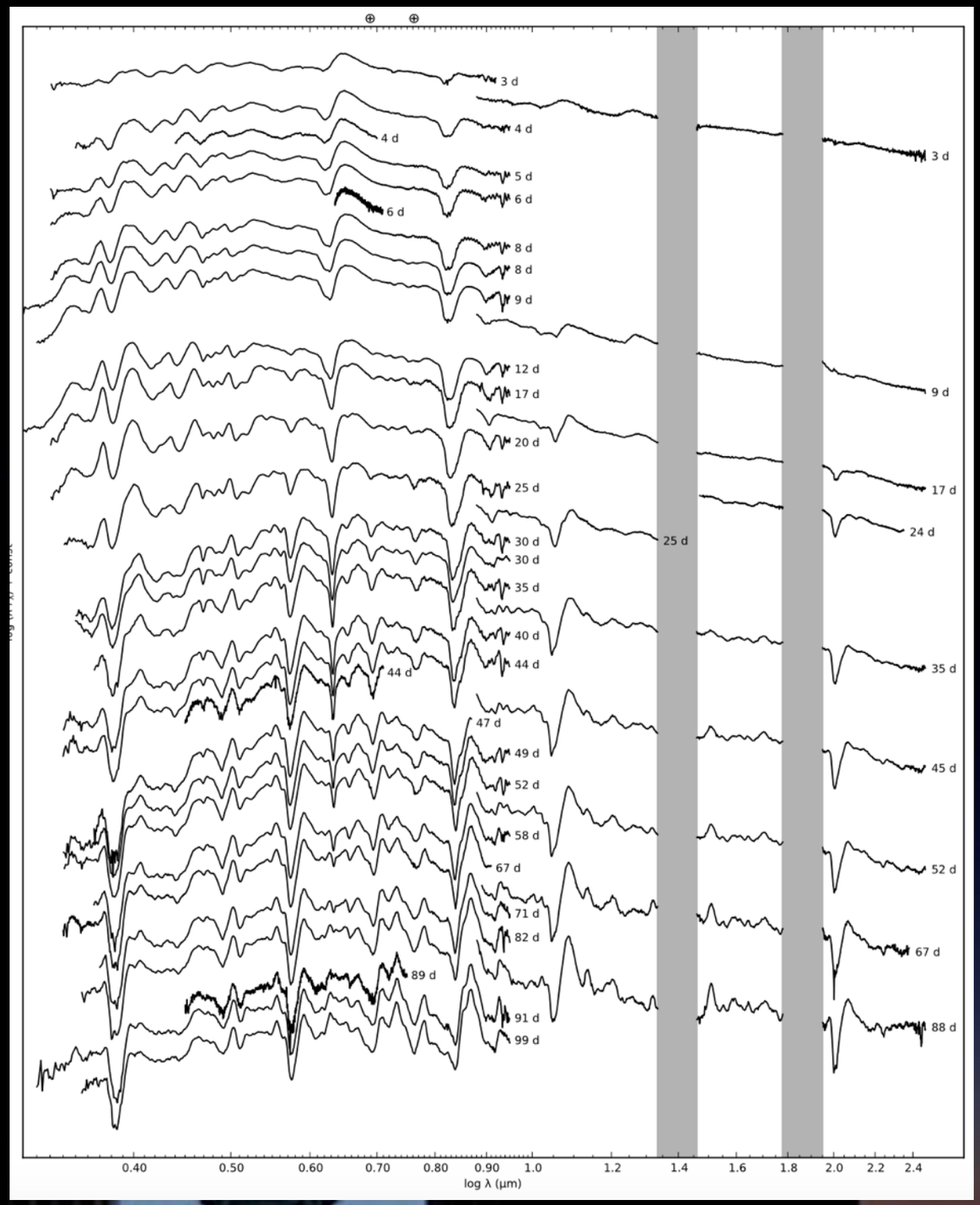
from Ergon+ 2014 A&A 562, 1636, 17



Pre-SN image from
Maund+ 2011 ApJ, 739, L37

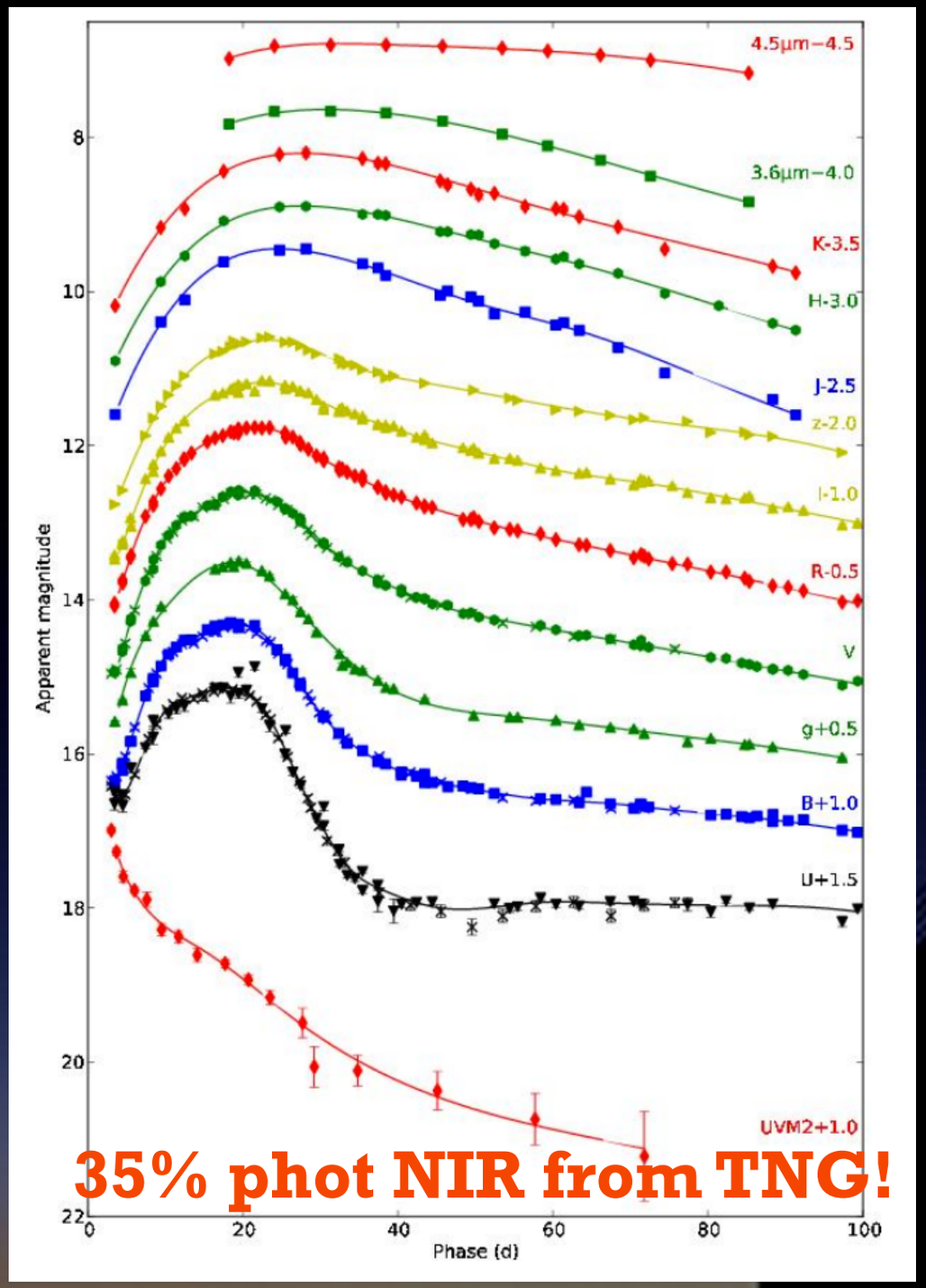
Type IIb: SN 2011dh



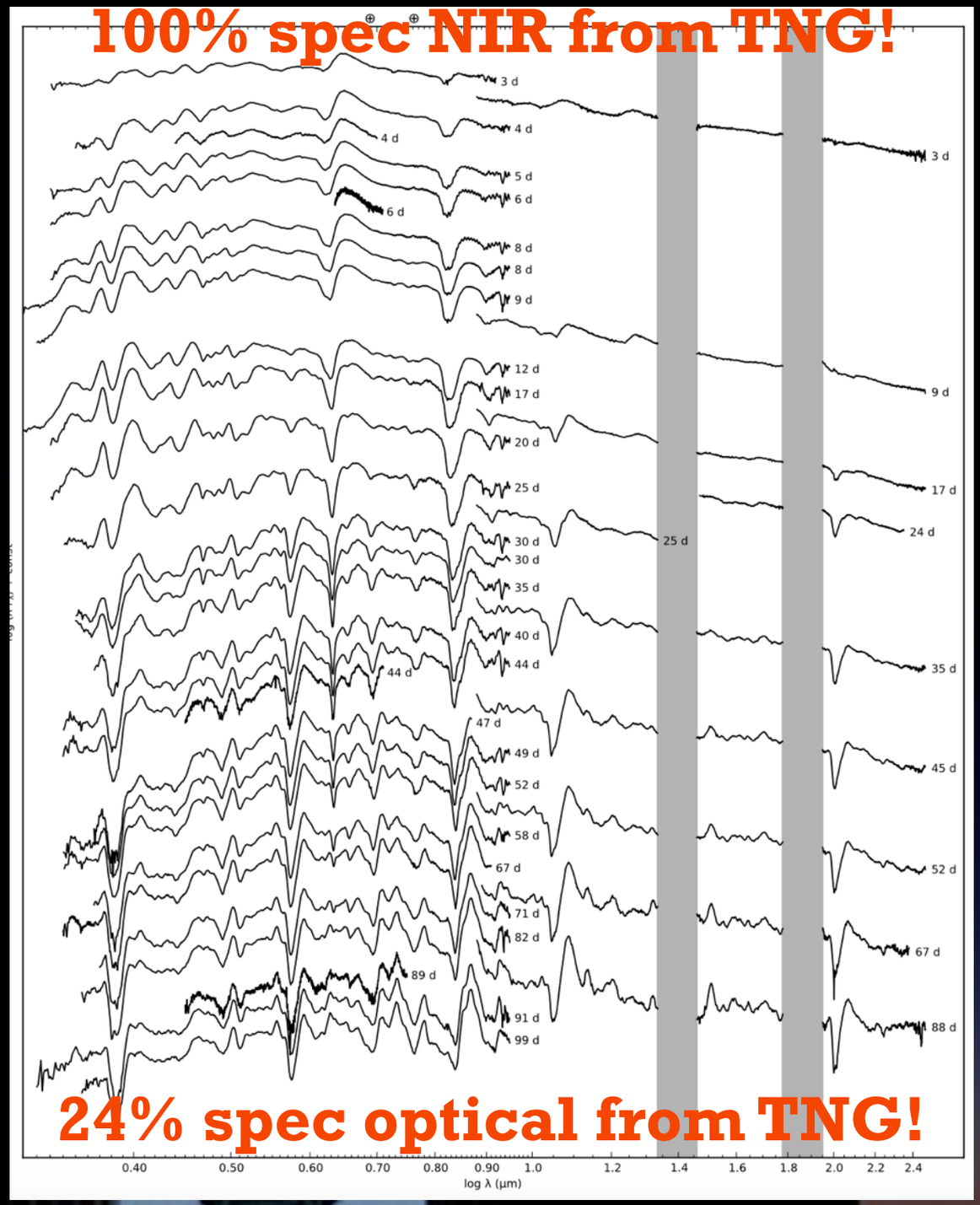


from Ergon+ 2014 A&A 562, 1636, 17

Type IIb: SN 2011dh



35% phot NIR from TNG!

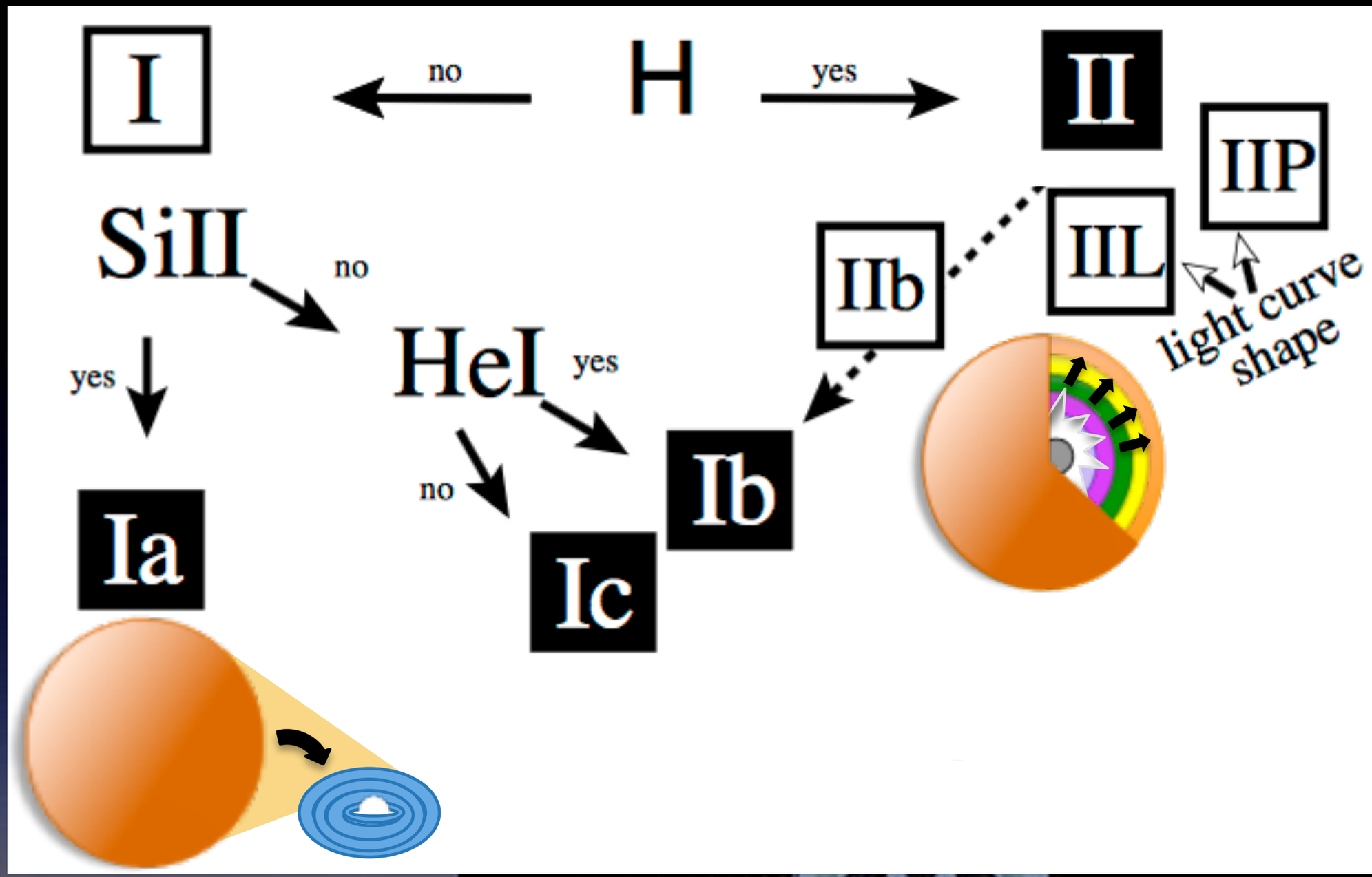


100% spec NIR from TNG!

24% spec optical from TNG!

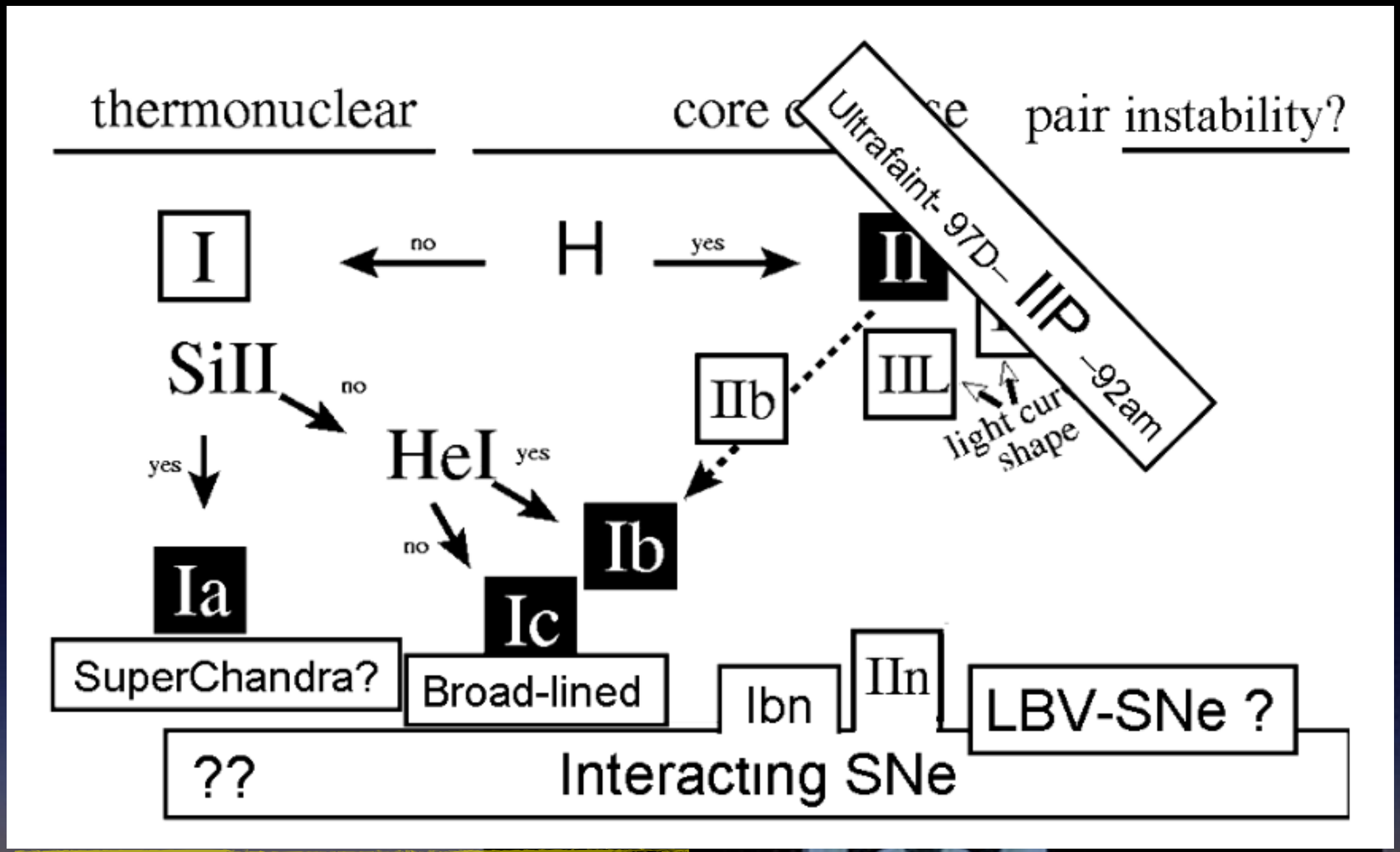
from Ergon+ 2014 A&A 562, 1636, 17

The SN zoo



from Turatto 2003 AIPC, 598, 21

The SN zoo



from Turatto+ 2007 AIPC, 937, 187

A longlasting cooperation

SUPERNOVA 1999cn IN MCG +2-38-043

S. Benetti, Telescopio Nazionale Galileo (TNG); C. Morossi, Osservatorio Astronomico di Trieste; and F. Bortoletto, R. Cosentino, D. Gardiol, A. Ghedina, F. Ghinassi, A. Magazzu, E. Marchetti, C. Pernechele, and A. Zacchei, TNG, report the discovery of a supernova (V about 17.9) on a V CCD frame taken with the TNG (+ Optical Imager Galileo) at La Palma on June 14.99 UT, while observing the galaxy MCG +2-38-043 (CGCG 077-007; R.A. = 15h06m46s.6, Decl. = +12o51'29", equinox 2000.0). SN 1999cn is located on a spiral arm and its offset from the galaxy center is 1".5 west and 8".3 north. Benetti also reports that an inspection of a preliminarily reduced spectrum (range 328-760 nm; resolution 0.35 nm) taken at the William Herschel Telescope (+ ISIS) by D. Axon, University of Hertfordshire; C. Packham, A. Humphrey, and J. Ray, Isaac Newton Group; and J. Smith, University of Hertfordshire, on June 15.14 shows that the supernova is of type Ic near maximum.

1st SN discovered with the TNG