

Some Current Events

Active CSP-II and CSP-II++ follow-up efforts

Maximilian Stritzinger

Aarhus University

Addition to today's agenda

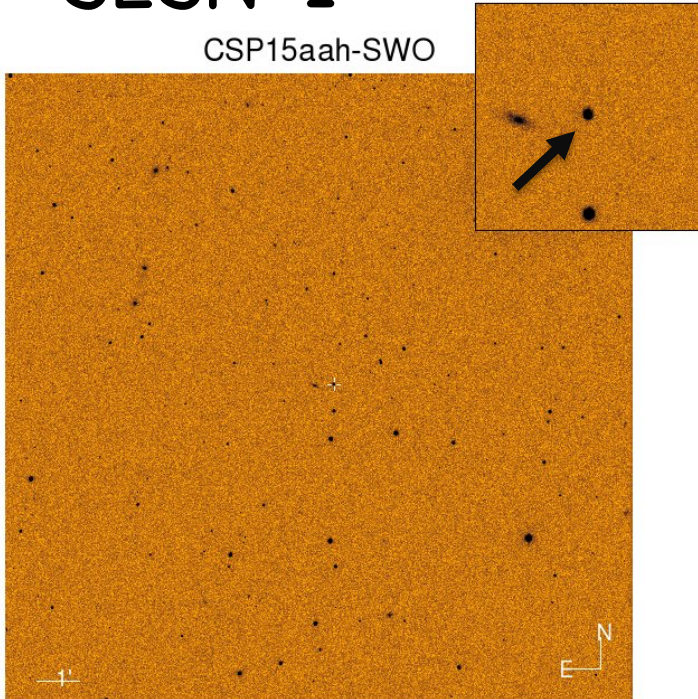
Armin Rest after lunch 10-20 minutes



Supernova PS15ae (2015bn) & 2016adj

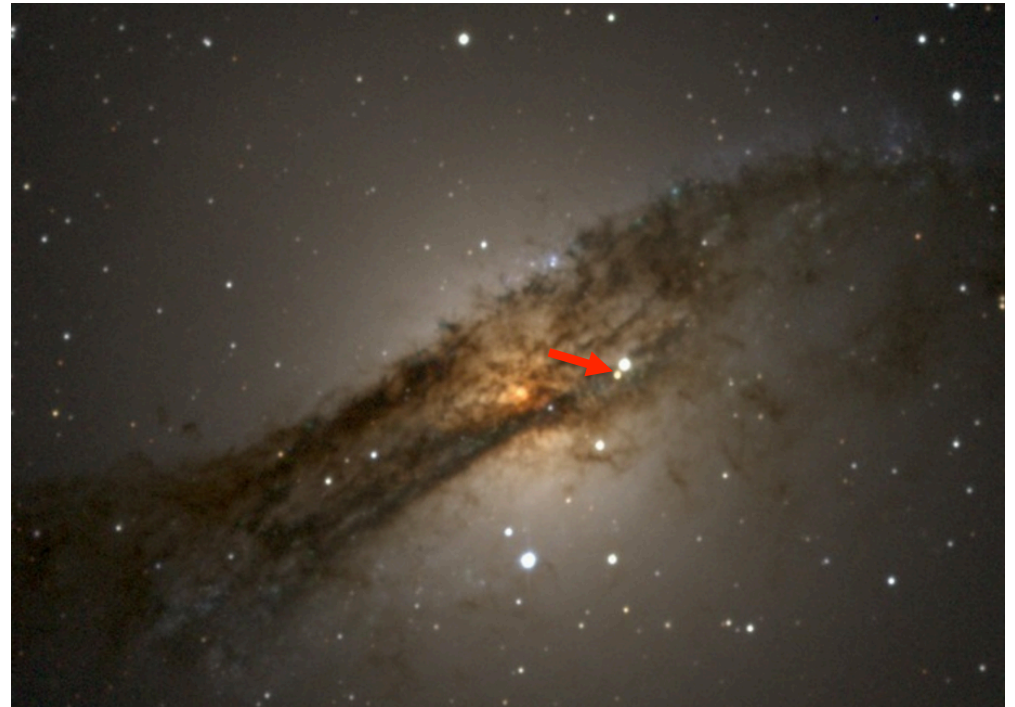
SLSN-I

CSP15aah-SWO



Carnegie Supernova Project

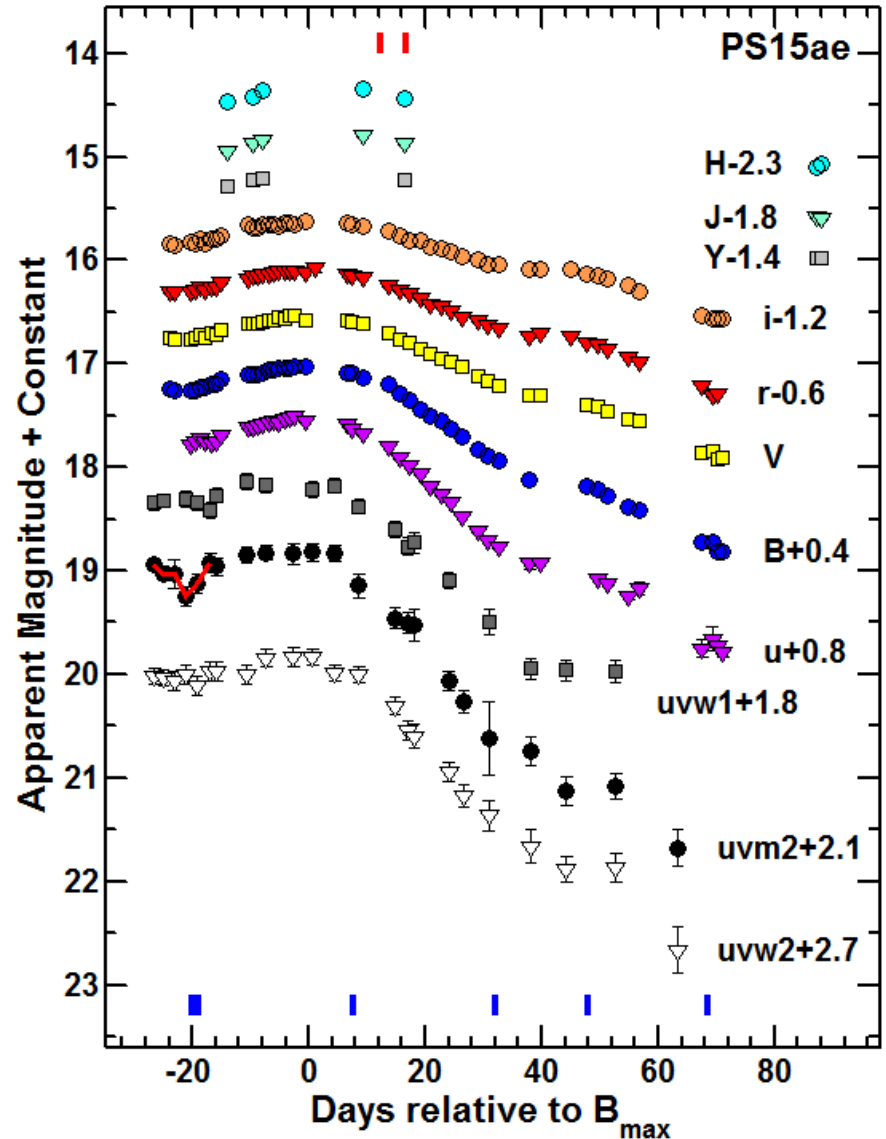
SN-IIb/Ib



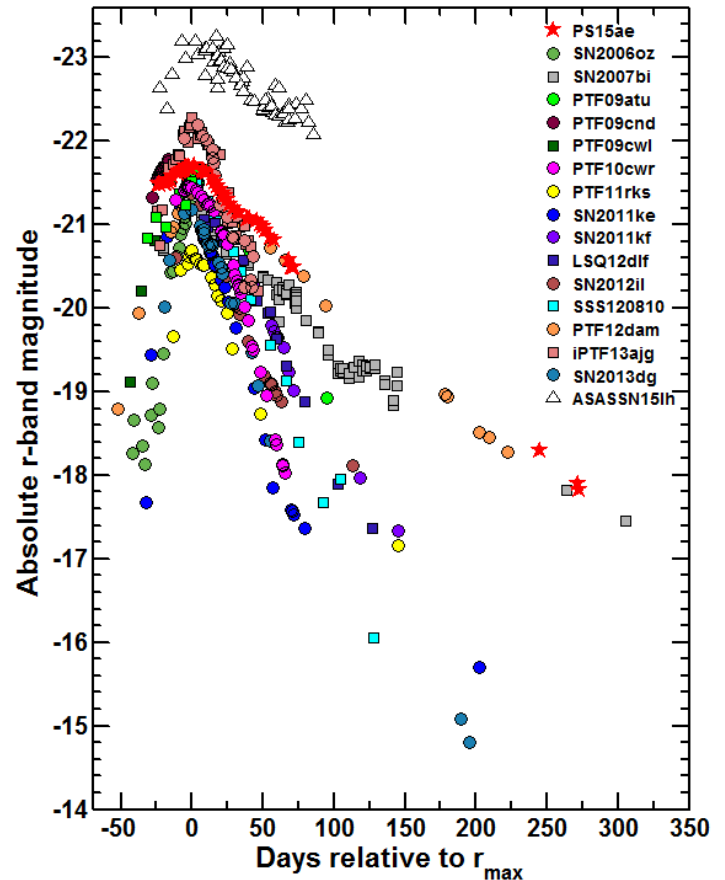
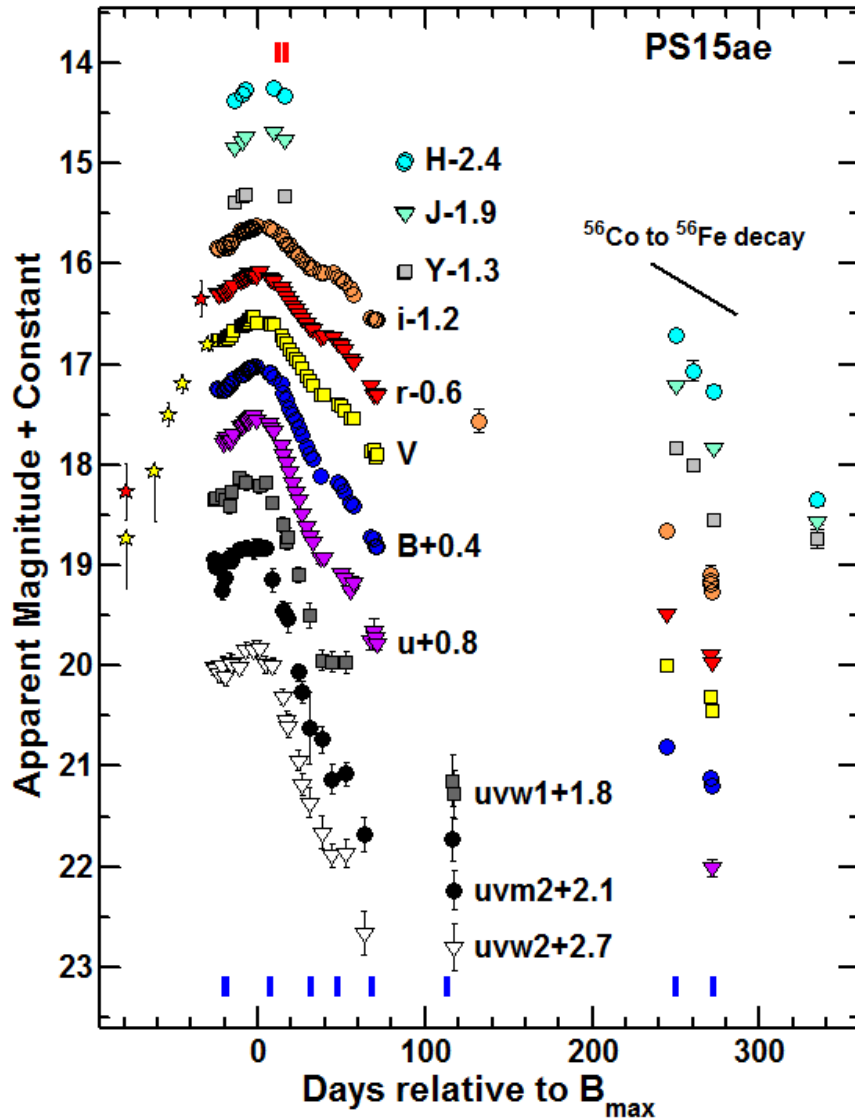
Nicholl et al. 2016, submitted

PS15ae: early light curve evolution

In collaboration with:
Rasmus Larsen
Takashi Moriya

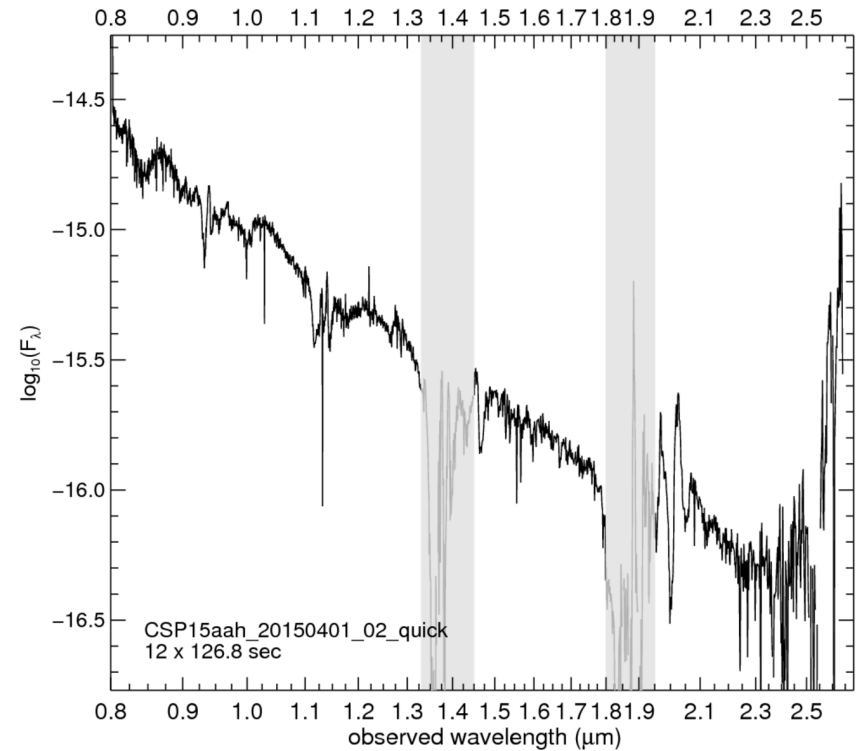
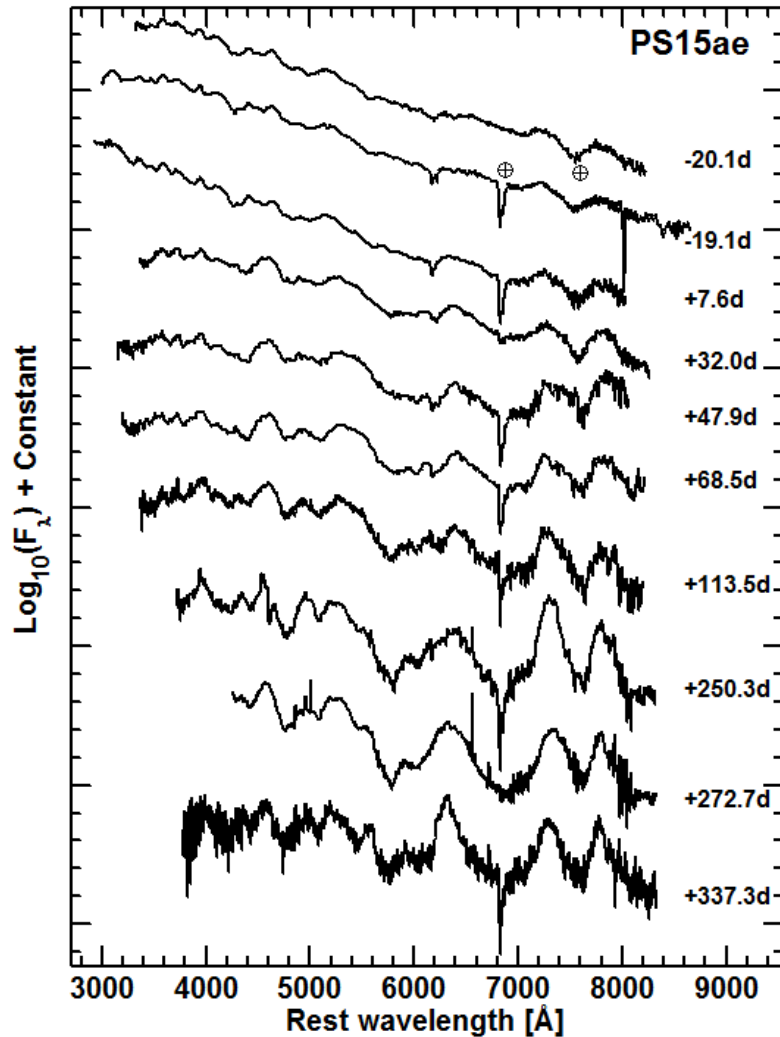


PS15ae: full light curve evolution

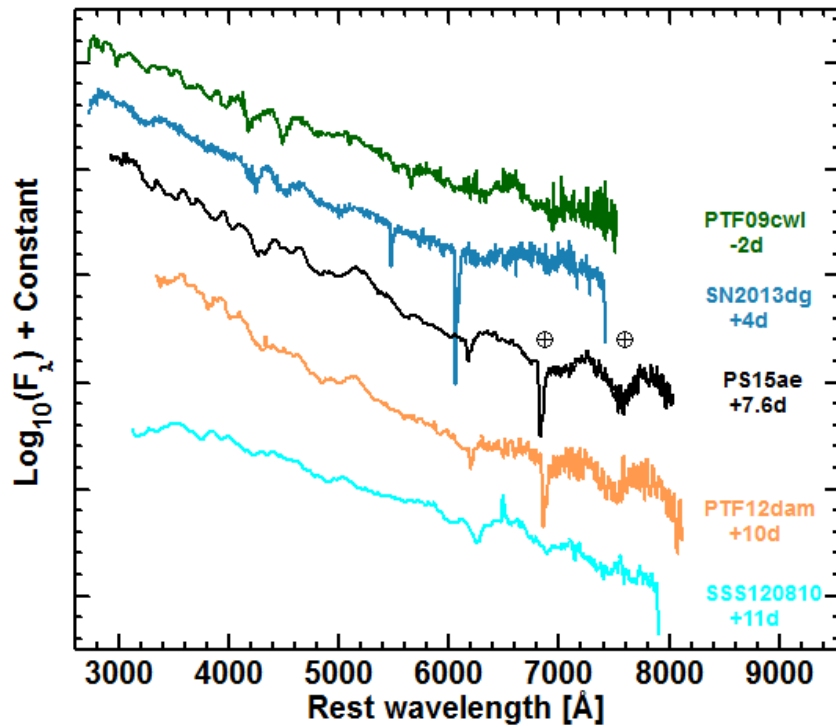


LC → "slow" SLSN-I

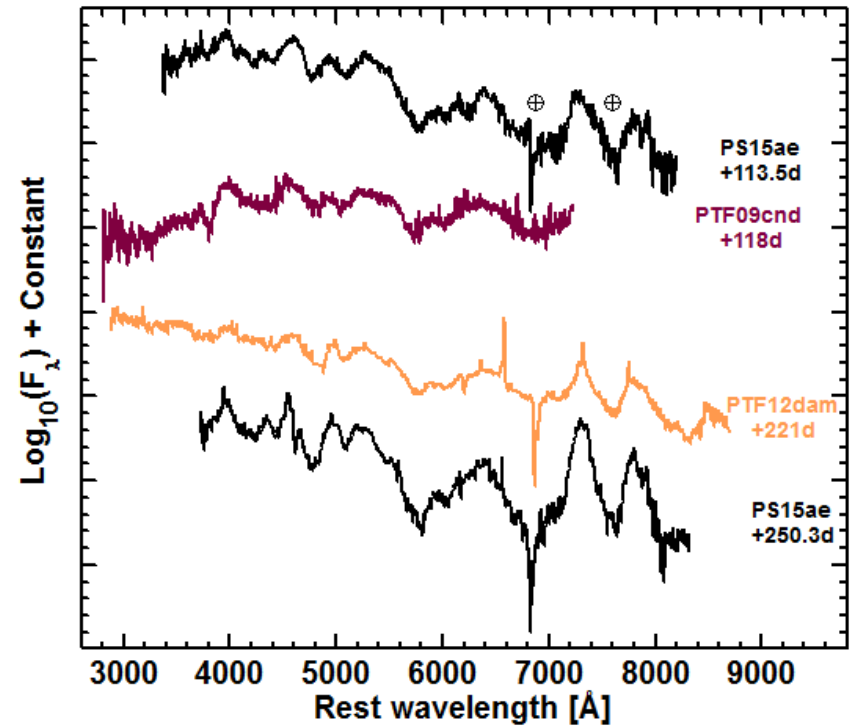
PS15ae: spectroscopy



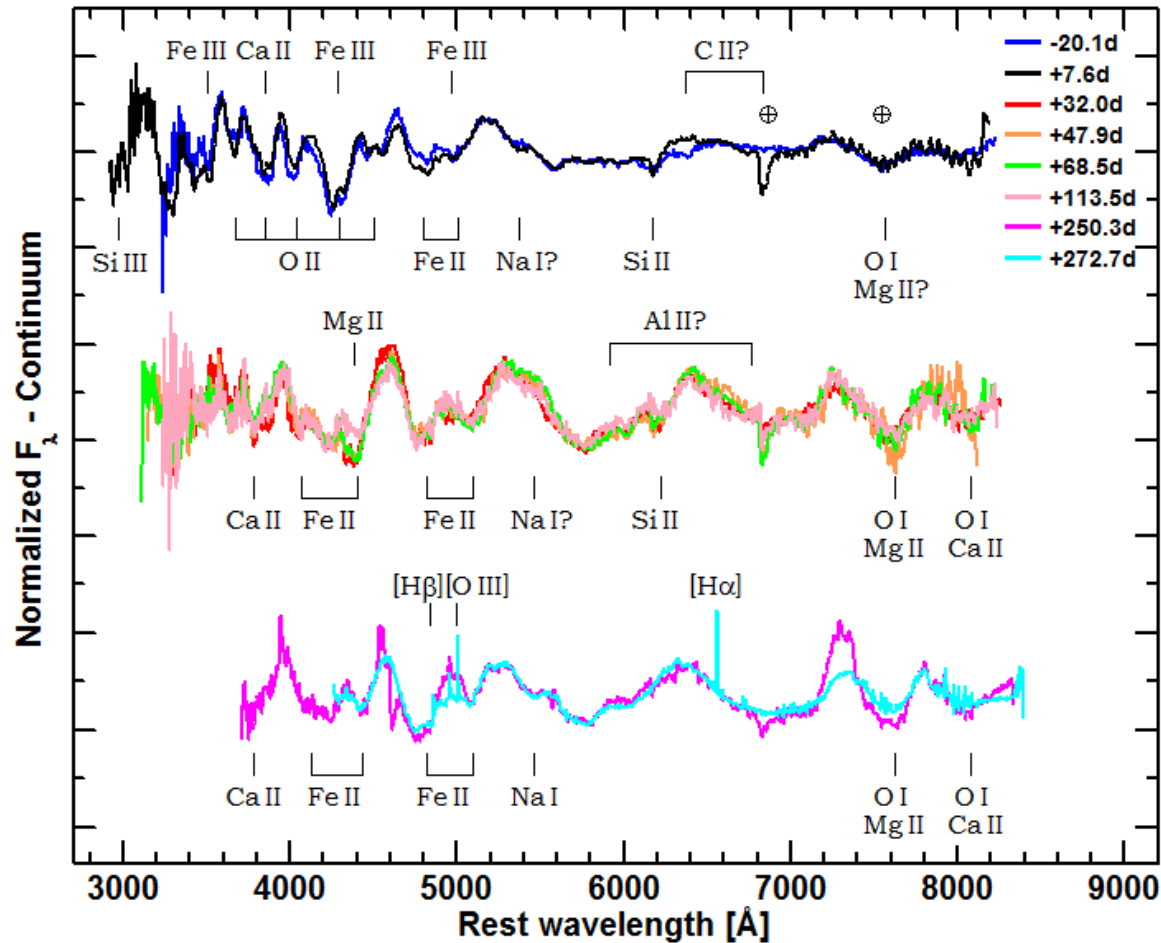
Near maximum SLSN-I



Late phase SLSN-I



PS15ae: Line identification

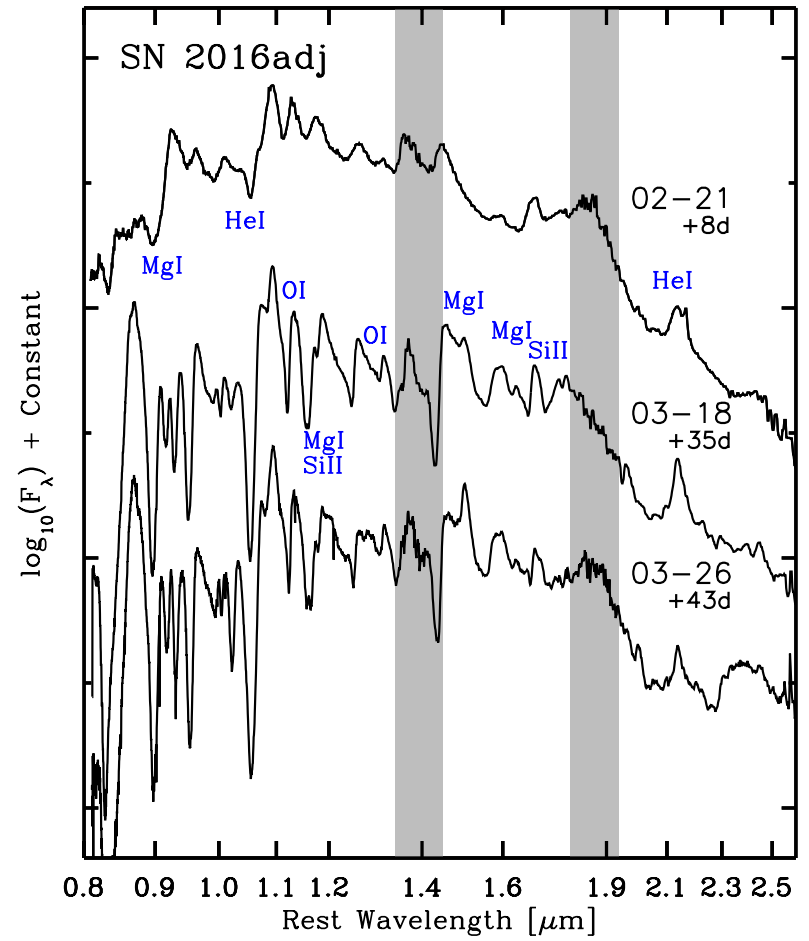
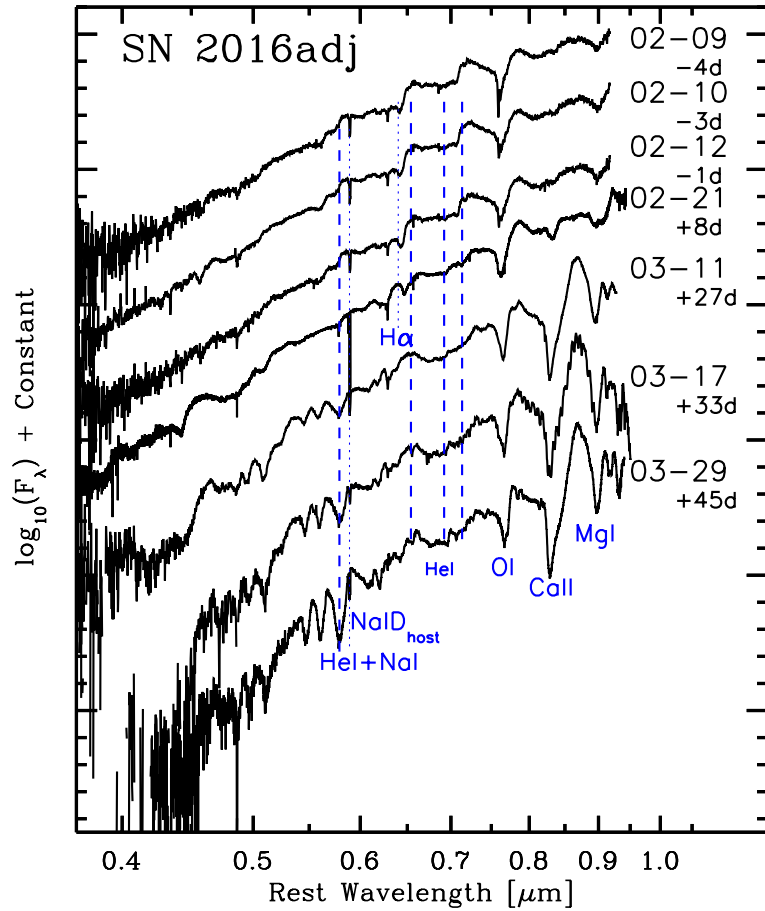


Tentative line IDs: from literature and SNYAPPs fits

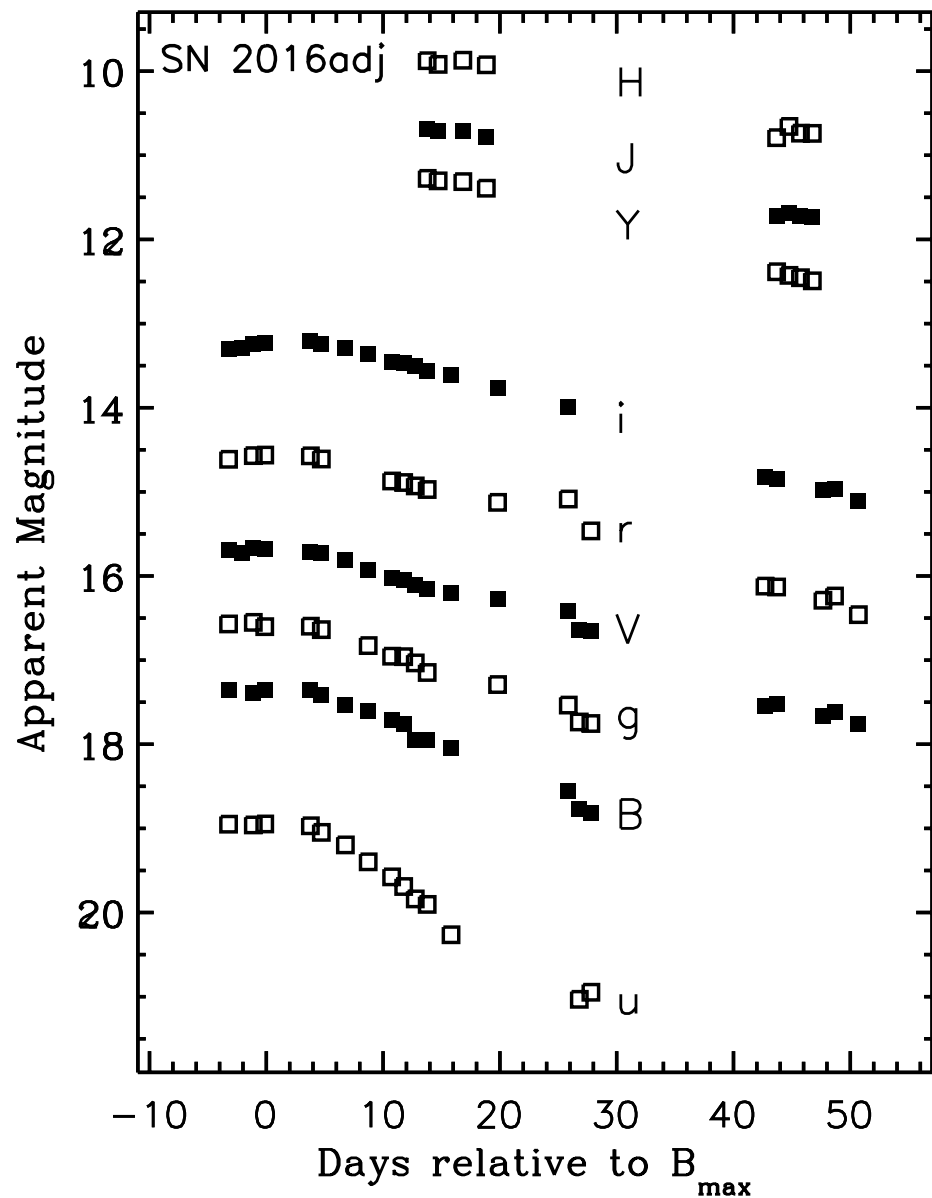
Supernova 2016adj



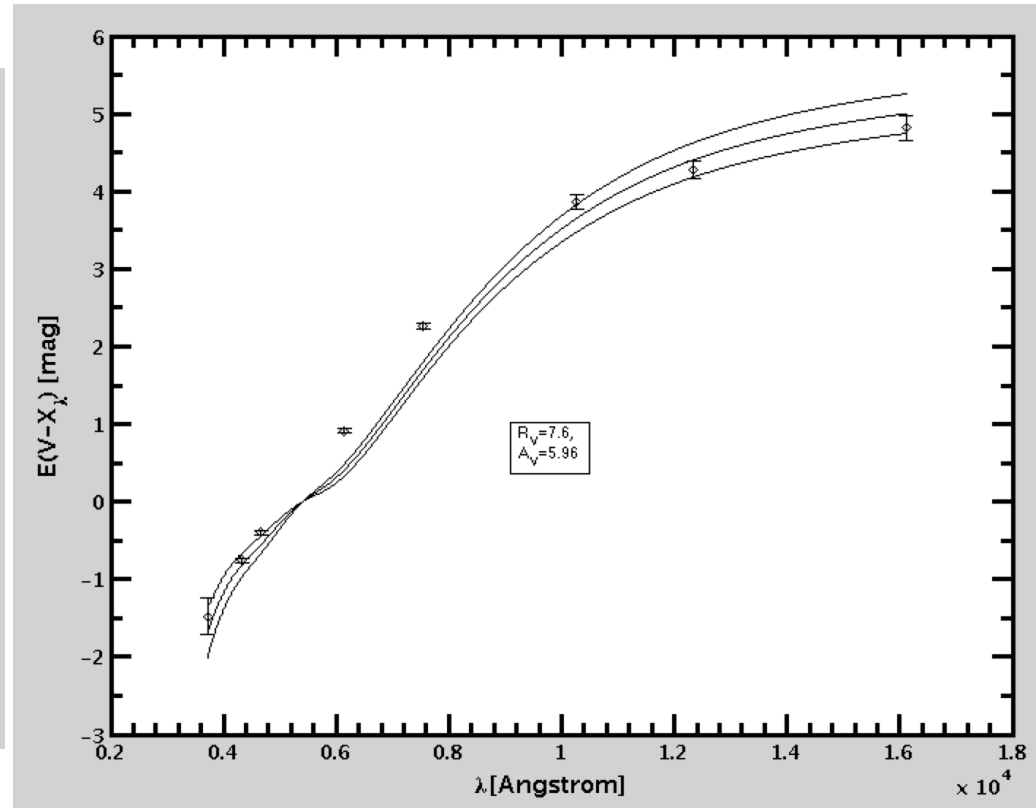
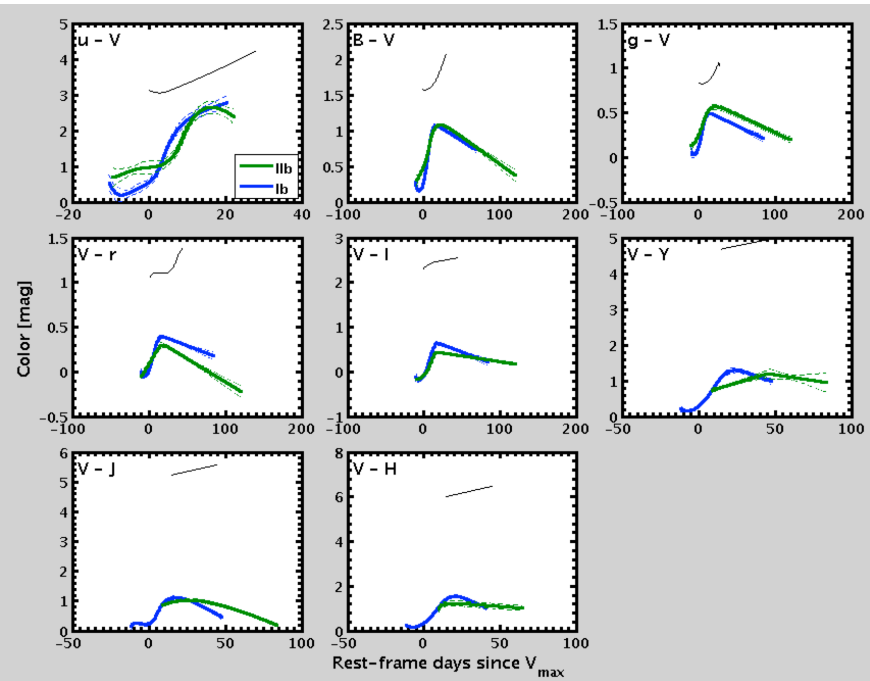
Spectroscopy



SN 2016adj: Photometry a la Las Campanas



SN 2016adj: color excesses and R_V



Best-fit Cardelli law indicates $A_V = 5.96$ and $R_V = 7.6$

Discovery of a Scattered-Light Echo around SN 2016adj

ATel #8890; *Ben Sugerman (Goucher College), Stephen Lawrence (Hofstra University)*

on 1 Apr 2016; 02:36 UT

Credential Certification: *Ben Sugerman (ben.sugerman@gmail.com)*

Subjects: Optical, Supernovae, Transient



SN 2016adj was imaged with the Hubble Space Telescope (HST) WFC3 UVIS camera on UT 2016 Mar 19.97-20.10 as part of DD-14487 (P.I. Sugerman). A four-point sub-pixel dither pattern was used to image the SN in F438W, F547M, and F814W with total exposure times of 1400 s, 1600 s, and 1320 s, respectively. Pipeline calibrated images were combined using AstroDrizzle to an enhanced resolution of 0.03 arcsec/pix. Empirical point-spread functions (PSF) were used to measure the photometry of the supernova, yielding approximate magnitudes of $B=20.25 \pm 0.04$, $V=17.40 \pm 0.04$, and $I_c=13.68 \pm 0.15$. These uncertainties do not include errors from converting HST fluxes to Johnson/Cousins magnitudes; including these errors, we estimate all B and V photometry to be ± 0.1 mag. Subtracting away the PSF in the F438W and F547M images reveals a nearly complete ring 0.18 arcsec from the SN; a clean PSF subtraction was not possible in the F814W images. This ring has an average surface brightness of 20.1 mag/arcsec² in B and 18.9 mag/arcsec² in V, and integrated fluxes of $B=22.4$ and $V=21.2$ mags. Near discovery, Kiyota et al. (ATEL #8654) reported the SN photometry as $B=17.3$ and $V=15.2$, while Stritzinger et al. (ATEL #8657) reported $B=17.40$ and $V=15.70$. This ring is therefore 5-6 mags fainter, and 0.5-0.9 mags bluer, than the SN at very early times. We propose that the ring is an echo of the early SN light pulse scattered off of pre-existing interstellar material along the line of sight. Adopting a distance of 3.42 Mpc (Ferrarese et al. 2007, ApJ, 654, 186), the ring is located 2.9 pc from the SN on the plane of the sky. SN 2016adj was discovered about 40 days before these observations (Marples et al., ATEL #8651), and the epoch of maximum light has been estimated as one week earlier by Stritzinger et al. This allows us to calculate that the ring material is located 105-125 pc in front of the SN. With this geometry, the color shift is consistent with the scattering properties of Galactic dust (Mathis et al., 1977, ApJ, 217, 425) although smaller grains cannot be ruled out (Sugerman, 2003, AJ, 126, 1939). There may also be a brighter echo 0.08 arcsec from the SN, however since this region may be confused with PSF subtraction residuals, we await confirmation from forthcoming observations as the SN continues to fade.

Status and Agenda

PS15ae

- VLT is slated to observe between April to August 2016
- Determine what late phase Swope imaging is good and what is crap (Max & Carlos)
- Modeling: UVOIR light curves (Moriya), Spectra (Mazzali?, Baron?)

SN 2016adj

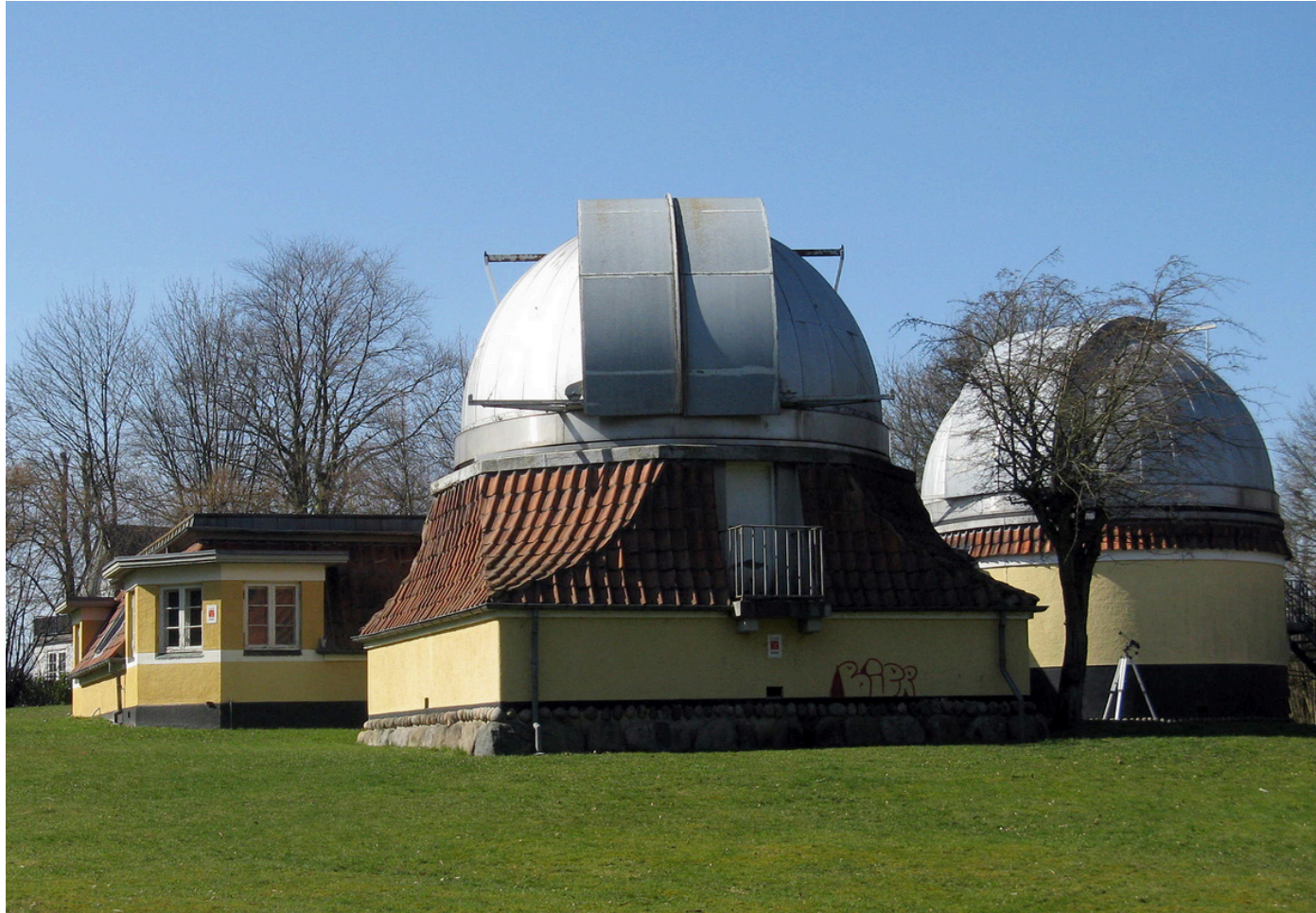
- VLT proposal submitted for P98A, late phase X-shooter spectrum and HAWK-I NIR imaging
- Extract extinction curve from spectrum (Max, Eric, others)
- Estimate color excess and R_v from colors (Francesco, Max)
- Discussion on light echo and related exotica

NUTS: NOT Unbiased Transient Survey



- 70 hours of ToO per semester
- 12+ half nights per semester
- Significant time via Italian collaborators
- Follow-up of young nearby SN & SN discovered by GAIA

Hilsner fra Aarhus



Ole Rømer Observatory