SALT Follow-up of Supernova Discoveries

2013-1/2-HET_OTH-001

progress report

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Abstract from proposal:
We propose target-of-opportunity observations of supernovae to obtain low dispersion spectra at appropriate time intervals, especially at early epochs. While any supernova may be of interest, we will concentrate on Type Ia and Type Ib/c at early epochs when circumstellar matter may be revealed and on the new category of superluminous supernovae recently discovered at Texas.

Report:
In the 2013-1-HET_OTH-001 proposal we were awarded a 25 ksec observing time distributed equally between dark and grey Moon phases, plus 6 ksec bright time. 50 percent of these observing time was Priority-0, while the other 50 percent was Priority-2. We used 97 percent of our awarded time, although the Pri-2 time turned out to be less useful for our Target-Of-Opportunity program. Therefore, in the next proposal, 2013-2-HET_OTH-001, we asked and awarded 30 ksec dark and gray time, plus 7 ksec bright time, all Pri-0. However, due to several unforeseeable reasons, mostly weather and instrumental issues, we were able to use only 20 ksec (55 percent) of the awarded time from the second proposal.

The list of the observed targets is as follows.

Proposal	Date	Object	SN type	Remark
2013-1-HET_OTH-001	2013-05-10	SN2013cg (PSN0926)	Ia	
2013-1-HET_OTH-001	2013-05-18	SN2013cs (LSQ13aiz)	Ia	
2013-1-HET_OTH-001	2013-05-24	SN2013cs		
2013-1-HET_OTH-001	2013-06-10	SN2013cs		
2013-1-HET_OTH-001	2013-06-23	SN2013dk (PSN1201)	Ib/c	
2013-1-HET_OTH-001	2013-07-01	SN2013dk		
2013-1-HET_OTH-001	2013-07-16	SN2013dk		
2013-2-HET_OTH-001	2014-02-26	SN2013dk		target not visible
2013-1-HET_OTH-001	2013-07-09	CSS130530	poss SLSN	low S/N
2013-1-HET_OTH-001	2013-08-23	SN2013ex (ASASSN-13cc)	Ia	
2013-1-HET_OTH-001	2013-09-03	SN2013fc (PSN0245)	SLSN IIn	06gy-type
2013-1-HET_OTH-001	2013-09-22	SN2013fc		
2013-2-HET_OTH-001	2013-11-10	SN2013fc		
2013-1-HET_OTH-001	2013-09-21	SN2013fq (PSN1959)	IIb	
2013-2-HET_OTH-001	2014-01-02	LSQ13dsm	Ia	premax w/o HV CaII
2013-2-HET_OTH-001	2014-02-02	LSQ14mo	poss SLSN	low S/N
2013-2-HET_OTH-001	2014-04-17	SN 2014ao (PSN083433)	Ia	near max, reddened

Our standard observing setup consists of the Robert Stobie Spectrograph (RSS) in longslit mode,

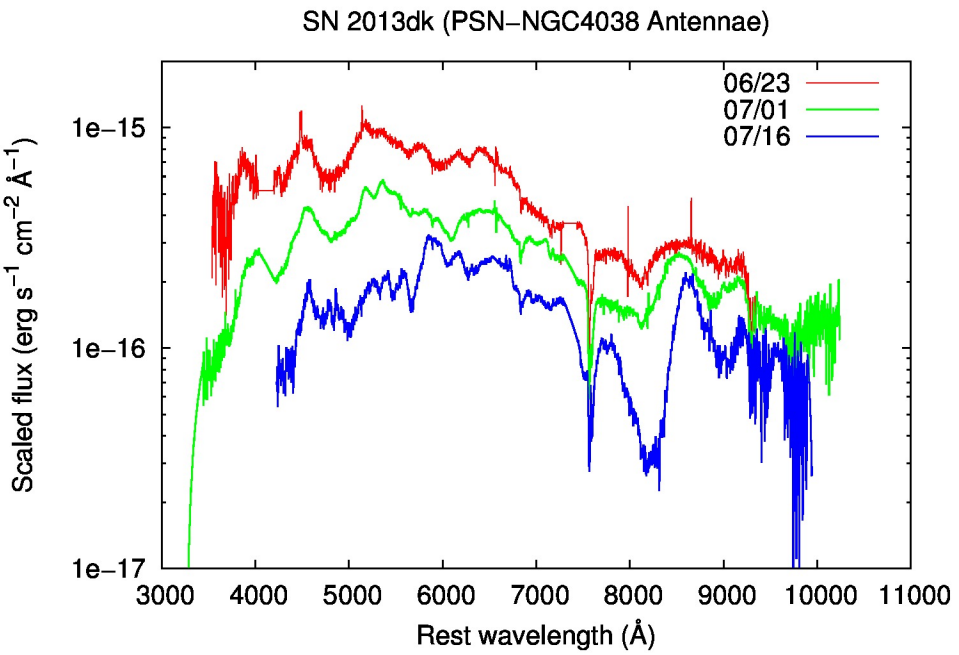
applying the 1.25” width longslit “PL0125N001” and the 300 lines/mm grating “pg0300” centered on 5750 A. The 2D spectral images are binned by 4 in the direction perpendicular to the dispersion axis to enhance signal-to-noise and reduce frame sizes. For acquisition images we apply SALTICAM with short exposures (~ a few seconds) through a single V or R filter. The spectroscopic setup above allows us to get low-resolution spectra on a faint (~20 mag) supernova target with decent S/N within one hour of exposure time.

Below we present details on the most interesting targets observed during these two semesters.

SN 2013dk (NGC 4038, Type Ib/c)

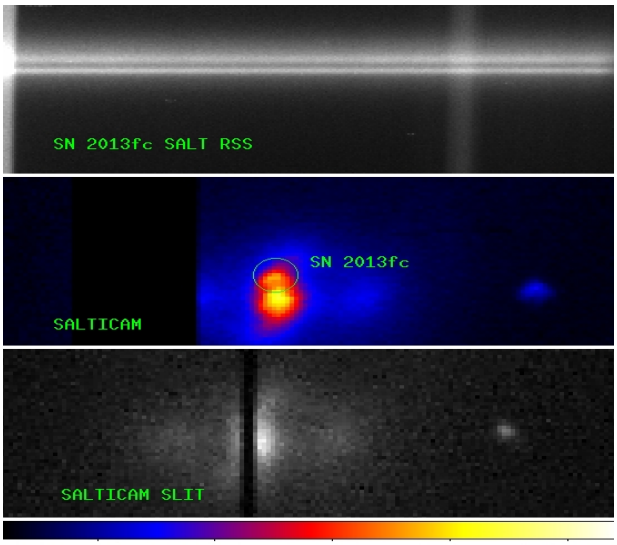
This SN occured in the famous Antennae pair of interacting galaxies. We obtained three spectra with SALT during the photospheric phase. The SN turned out to be an interesting, hydrogen-free Type Ib/c event.

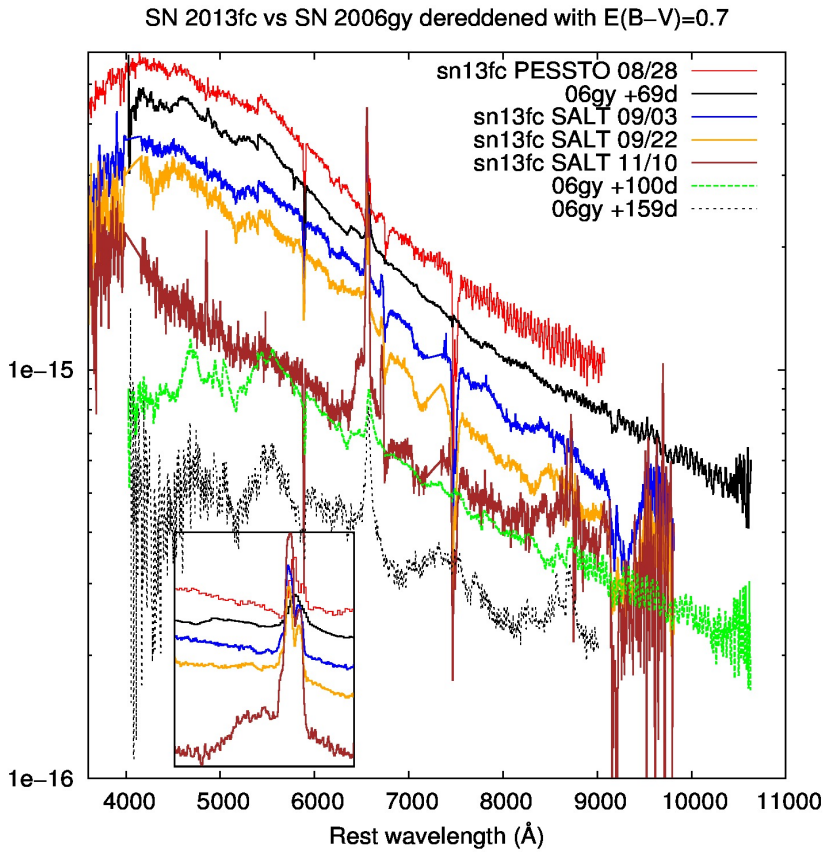
We are combining our data with others obtained at different epochs and different wavelength regimes by collaborating with a larger group of institutes. The analysis of the data is underway.



SN 2013fc (ESO 154 - G010, Type SLSN IIn)

This peculiar SN occured very close to the nucleus of its host galaxy, thus, it was difficult to extract the SN spectrum. The SN spectrum is very similar to that of the super-luminous (SL) SN 2006gy. It provides a unique opportunity to compare the spectra and study the evolution of this rare type of SLSN events.





The evolution of the H-alpha profile from the SALT spectra revealed interesting differences with respect to SN 2006gy.

We are collaborating with LCOGT and iPTF in the study of this SLSN.