

See poster 180.05 by
Ben Dilday (Thursday)



The SDSS-II Supernova Survey

Masao Sako ( /Stanford)

Fermilab: J. Frieman (U Chicago), F. DeJongh, J. Marriner, G. Miknaitis

University of Chicago: B. Dilday, R. Kessler, M. Subbarao (Adler Planetarium)

University of Washington: A. Becker, C. Hogan

Ohio State University: D. Depoy, J. Marshall, J. Prieto

University of Tokyo: M. Doi, K. Konishi, T. Morokuma, N. Takanashi, K. Tokita, N. Yasuda

University of Portsmouth: R. Nichol, M. Smith

South African Astronomical Observatory: B. Bassett, E. Elson, K. van der Heyden

Rochester Institute of Technology: M. Richmond

Apache Point Observatory: J. Barentine, H. Brewington, J. Dembicky, M. Harvanek, J. Krzesinski, B. Ketzeback, D. Long, O. Malanushenko, V. Malanushenko, R. McMillan, K. Pan, S. Snedden

KIPAC/Stanford University: R. Blandford, S. Kahn, R. Romani, C. Zheng

New Mexico State University: T. Gueth, J. Holtzman

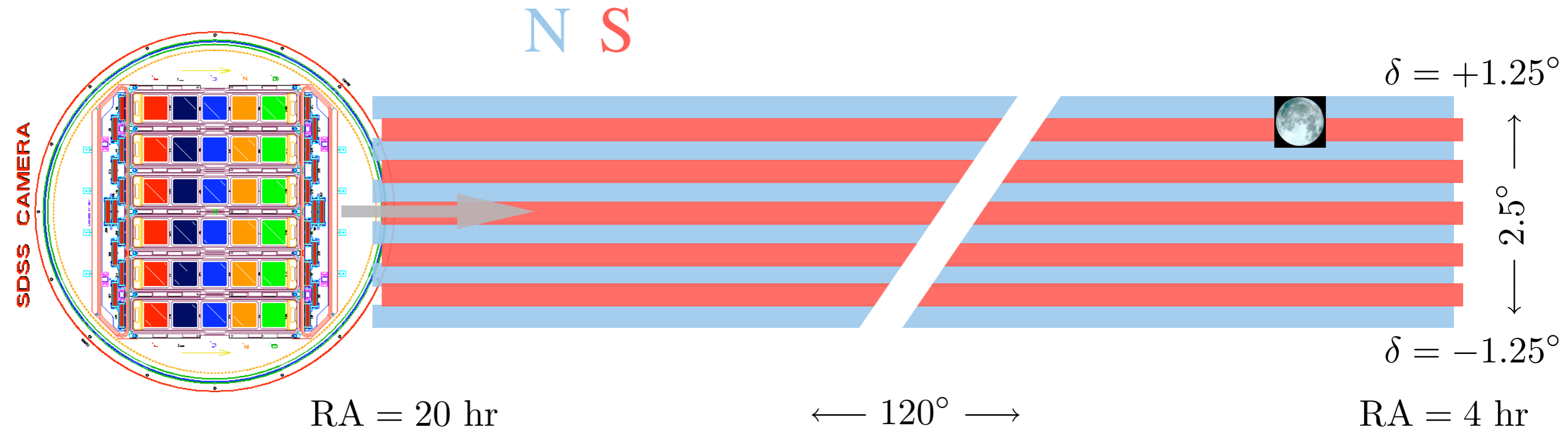
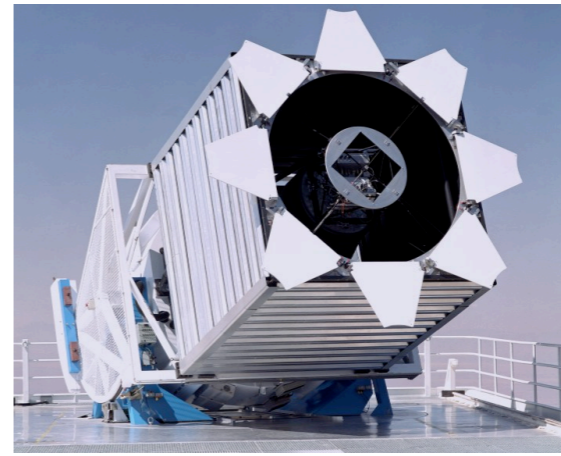
HET Partners: Goettingen (W. Kollatschny), Munich (R. Bender, U. Hopp), PSU (D. Schneider), U Texas (C. Wheeler, P. Hoefflich)

University of Notre Dame: P. Garnavich

Space Telescope Science Institute: A. Riess, H. Lampeitl

Sloan Digital Sky Survey II Collaboration

Survey area = “stripe 82”
(southern equatorial stripe)

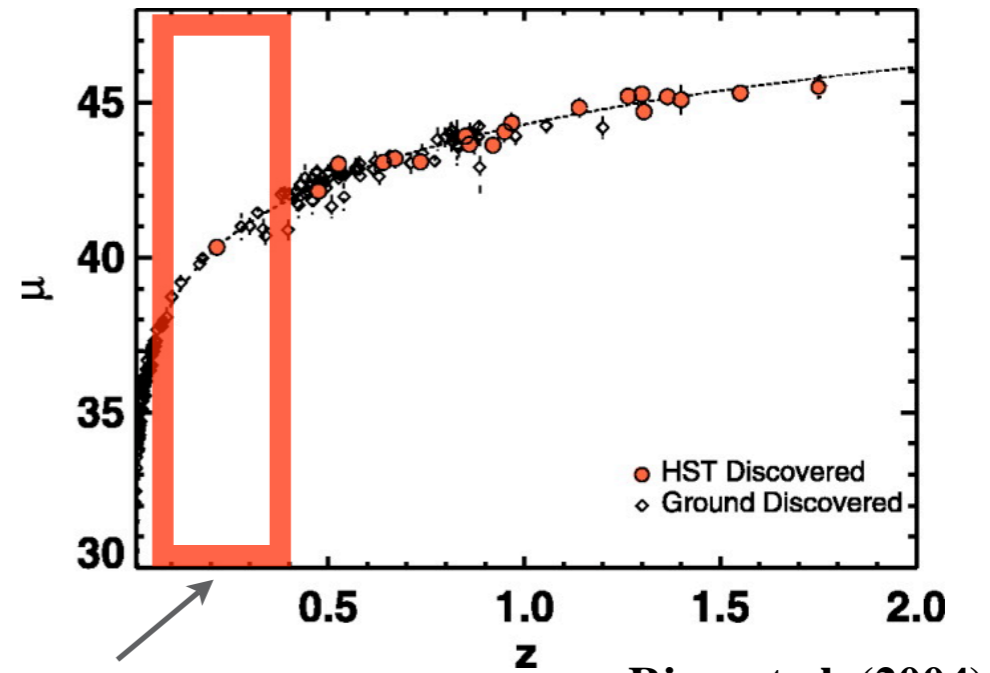


- Use the SDSS 2.5m telescope
 - during September 1 - November 30 of 2005-2007
 - to scan 300 square degrees of the sky every 2 days
 - discover supernovae and obtain multi-color light curves

Follow-up	
ARC	UH88
HET	NMSU
MDM	VATT
WHT	(CSP)
Subaru	(Keck)

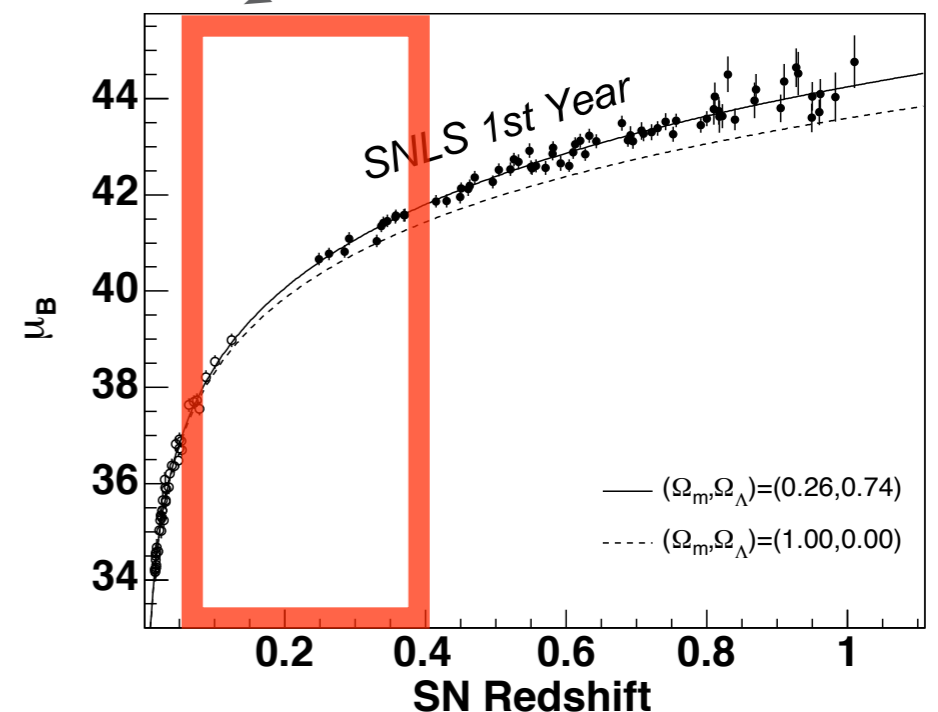
Science goals

- Type Ia supernovae (SNe)
 - spectroscopically confirm and obtain “well-measured” light curves of ~ 200 SN Ia from $z = 0.05 \sim 0.4$
 - bridge low- z ($z < 0.05$; LOSS, SNF) and high- z ($0.3 < z < 1.0$; ESSENCE, SNLS) sources
 - understand and minimize systematics of SN Ia as distance indicators
- SN Ib/c, II, rare types
- Other transients



redshift desert

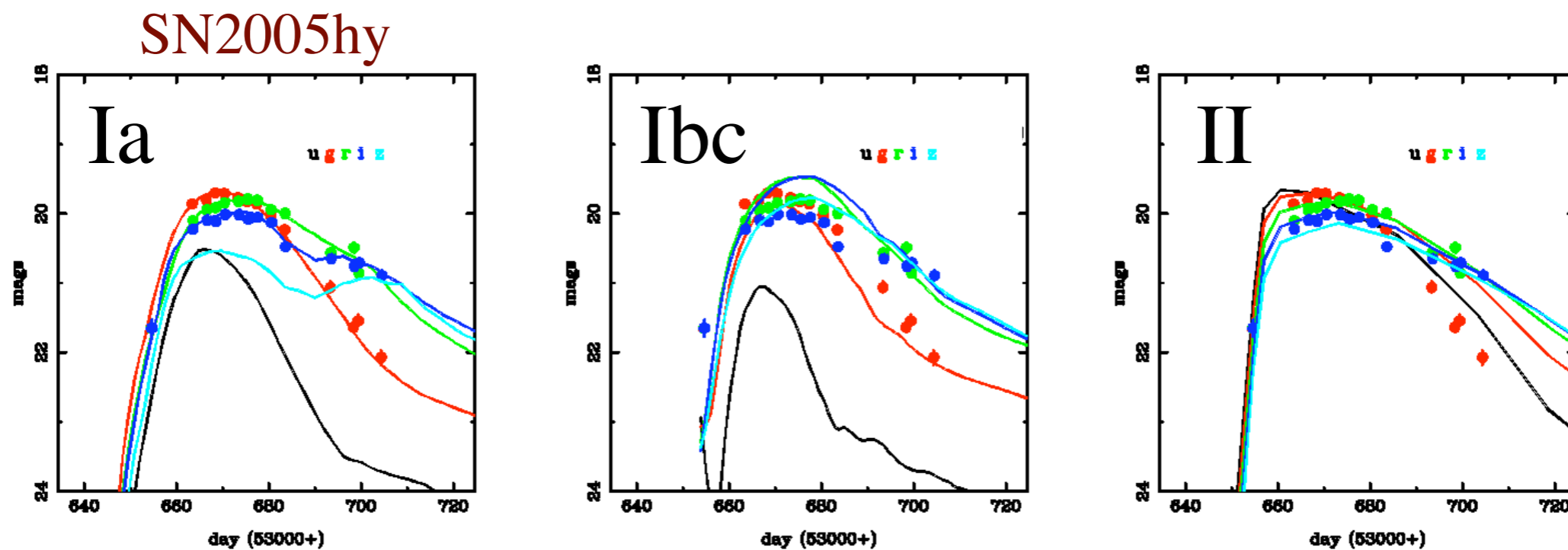
Riess et al. (2004)
compilation



Astier et al. (2005)

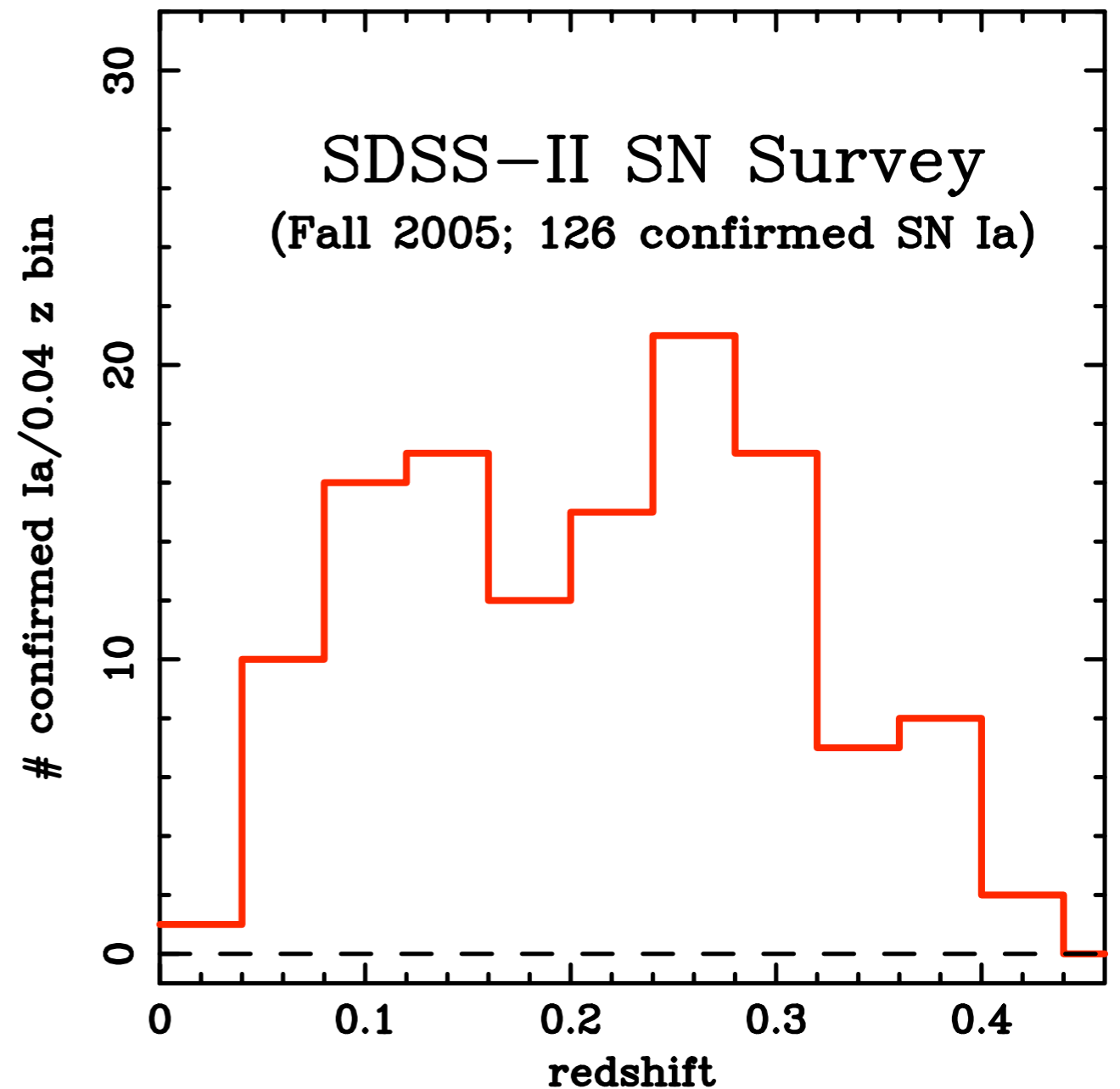
Photometric Typing

- Color-type SN candidates using nightly *gri* data:
 - make template light curves from multi-epoch spectra (Peter Nugent) and other sets of spectra of well-observed historical SNe (SUSPECT database)
 - Ia, Ia-pec, II-P, II-L, IIb, Ibc, Ibc-hypernova
 - fit for redshift, extinction, stretch for Ia $[z, A_z, \Delta m_{15}(B)]$
- Able to type with **>90%** efficiency after $\sim 2 - 4$ epochs

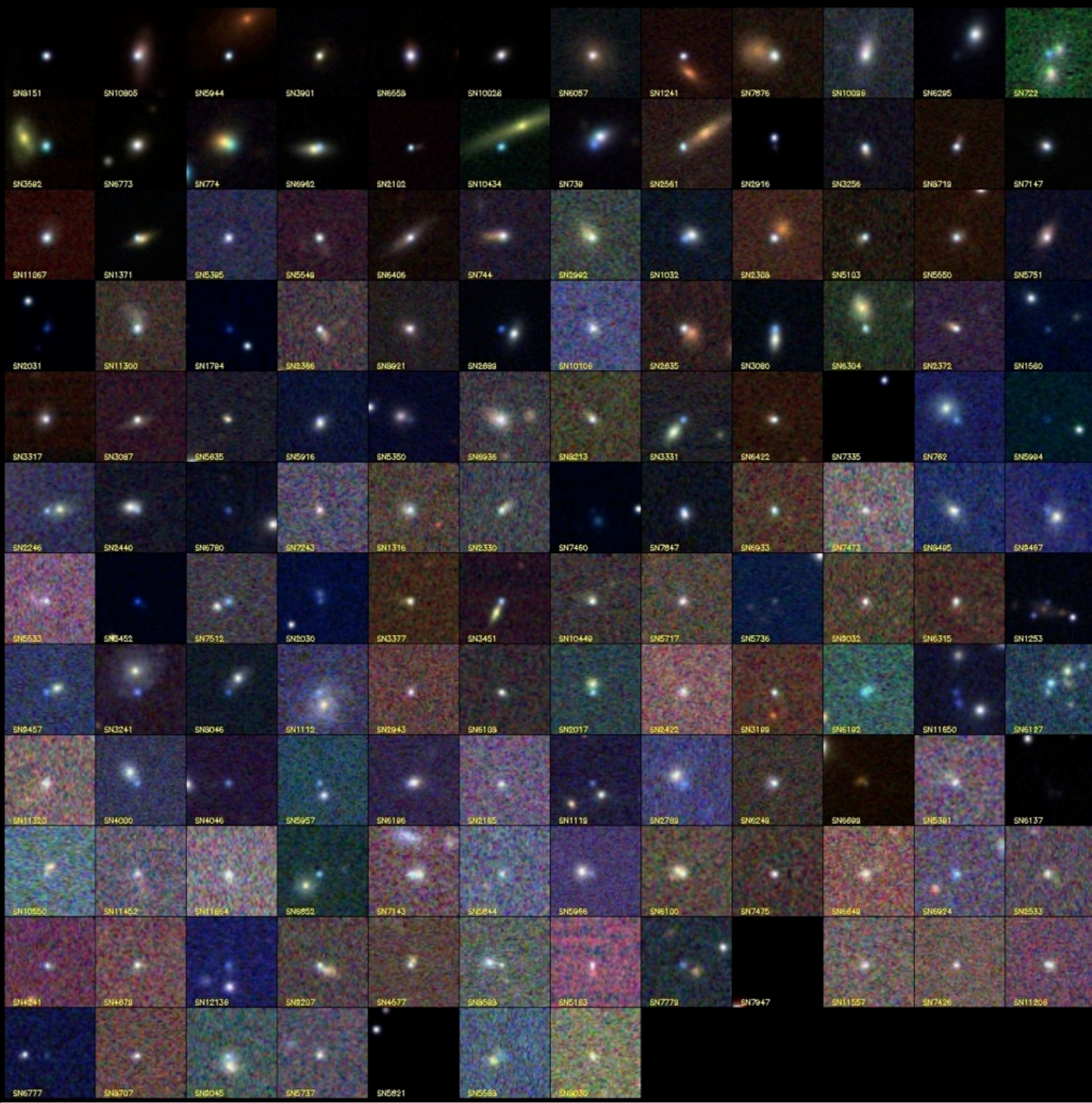


Results from Fall 2005

- **126** spectroscopically confirmed SN Ia
- **13** spectroscopically probable SN Ia
- **6** SN Ib/c (3 hypernovae)
- **10** SN II (4 type II_n)
- **5** AGN
- **~hundreds** of other unconfirmed SNe with good light curves (galaxy spectroscopic redshifts measured for ~25 additional Ia candidates)
- Focused primarily on Ia

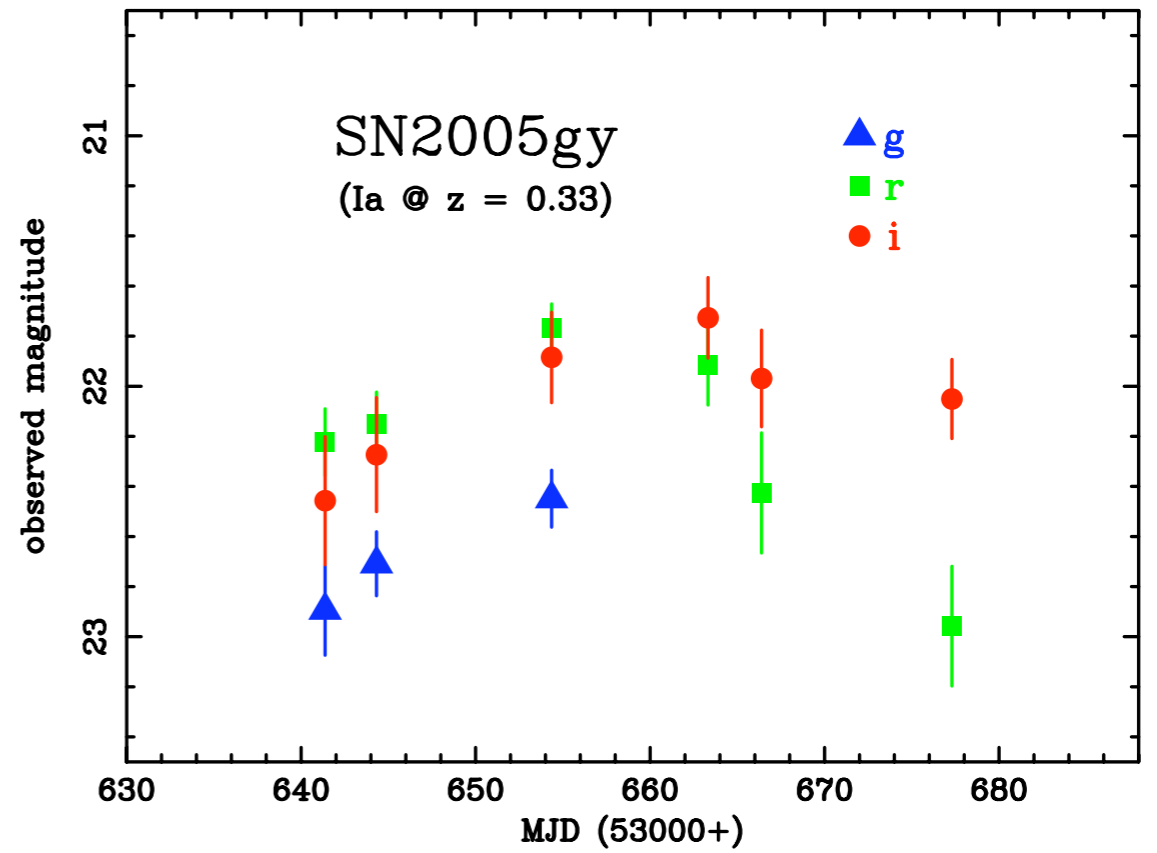
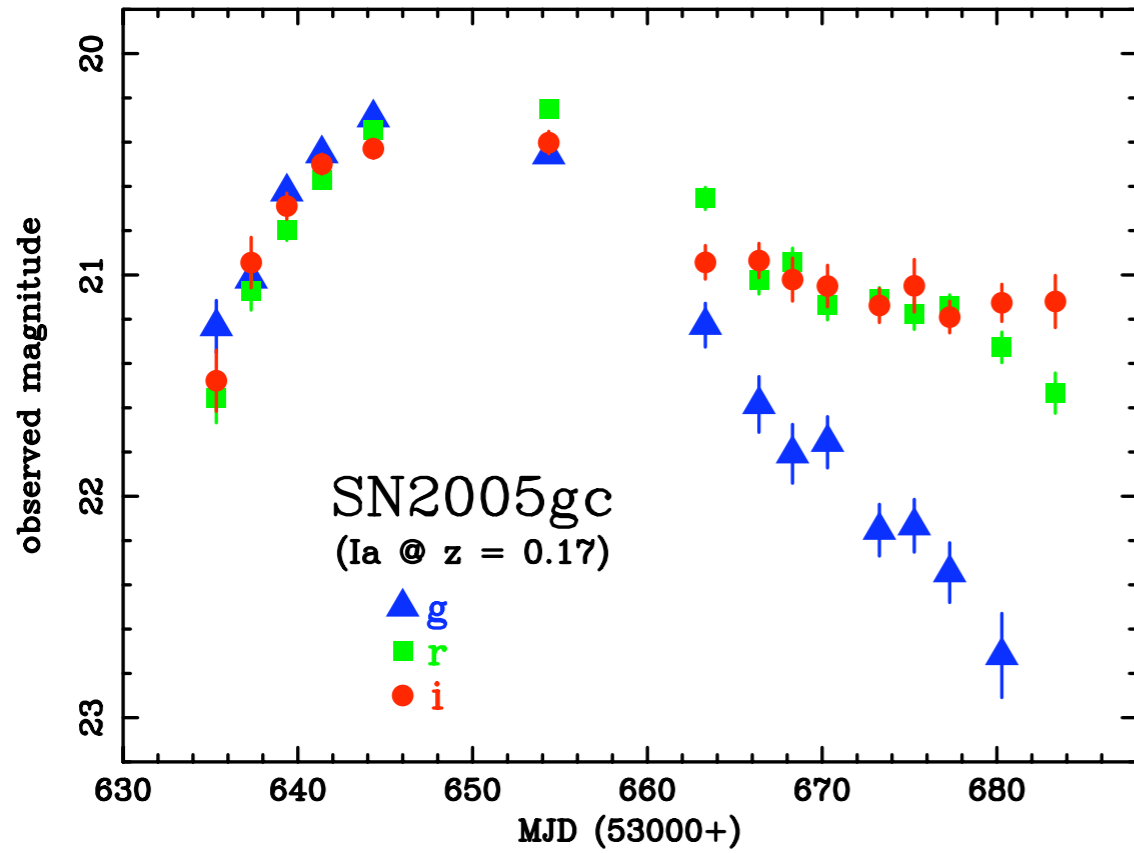
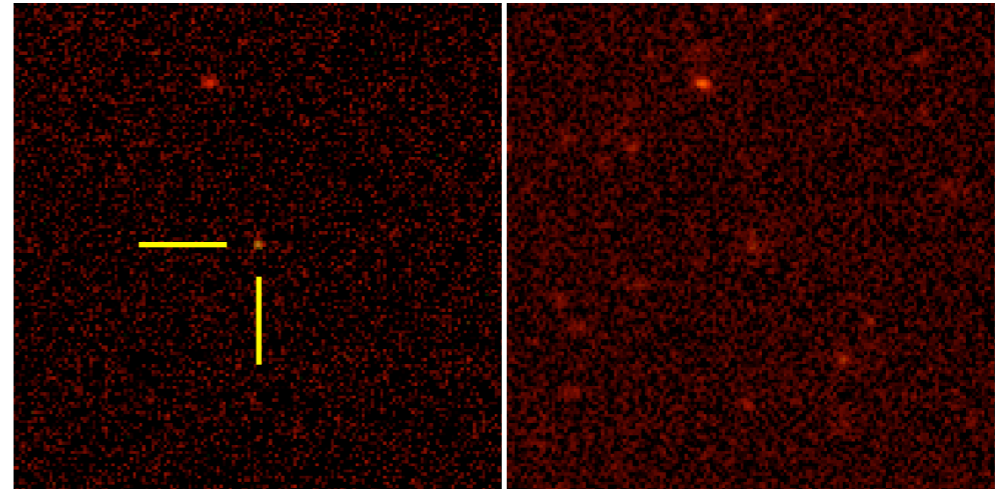
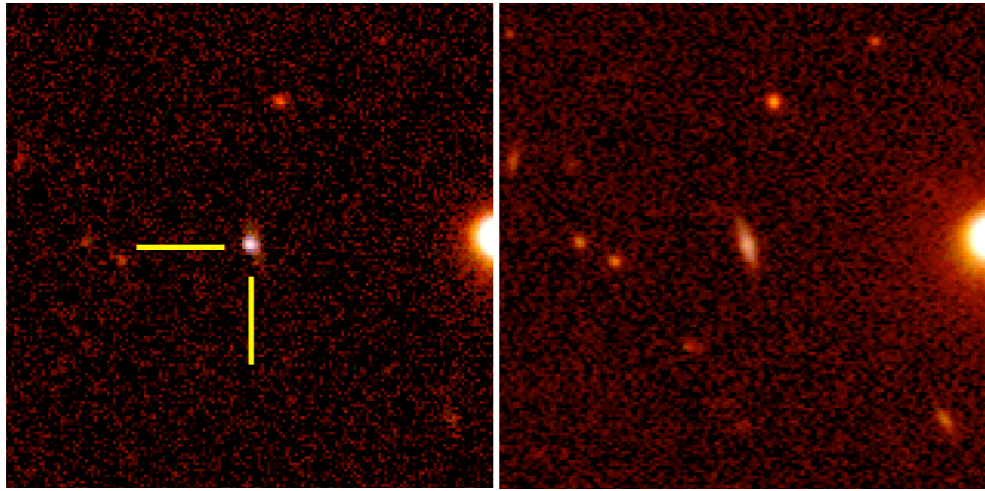


2005 spectroscopically confirmed



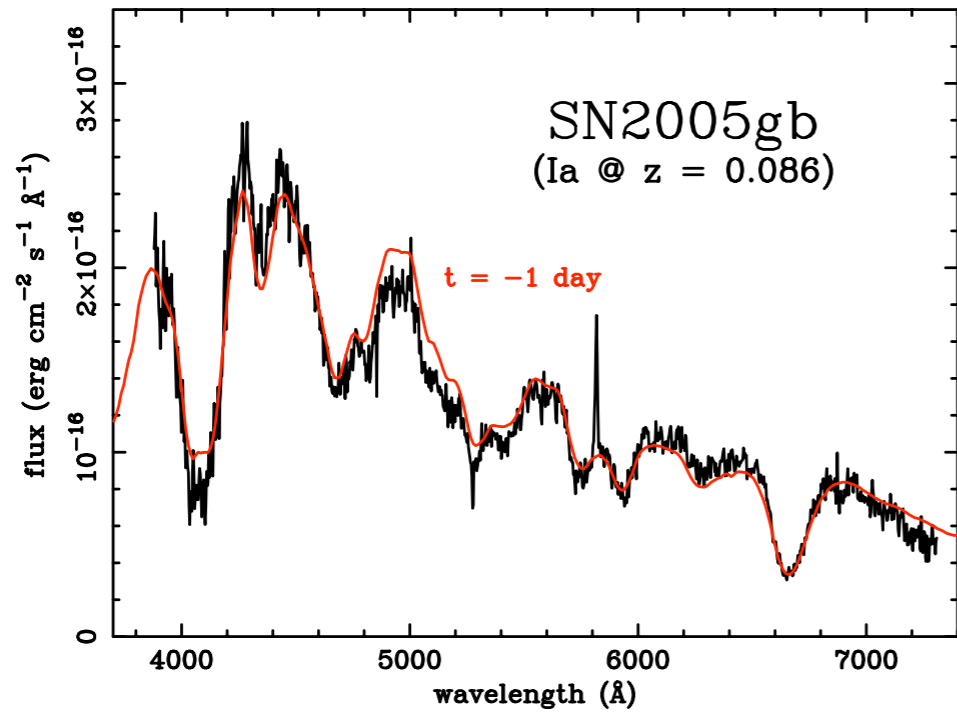
search image

deep co-added
reference image

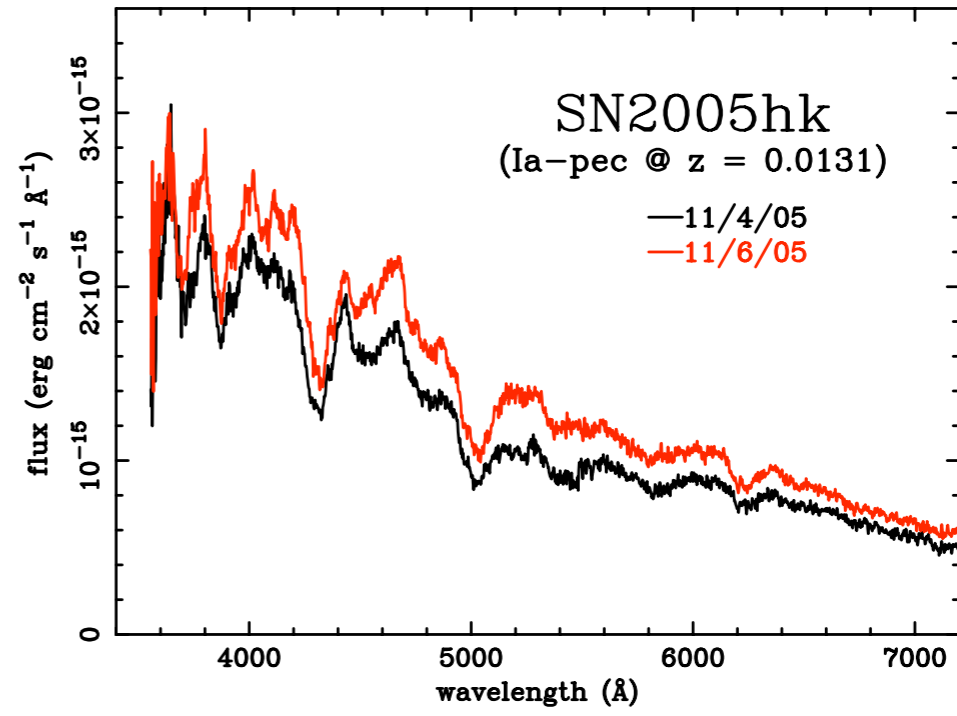


preliminary light curves

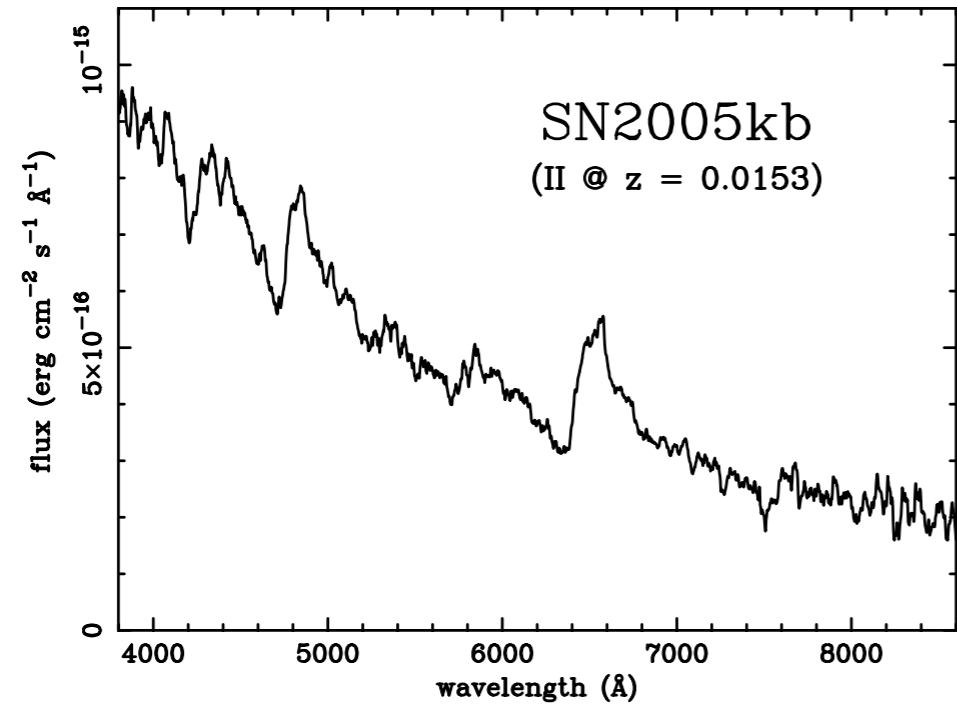
MDM



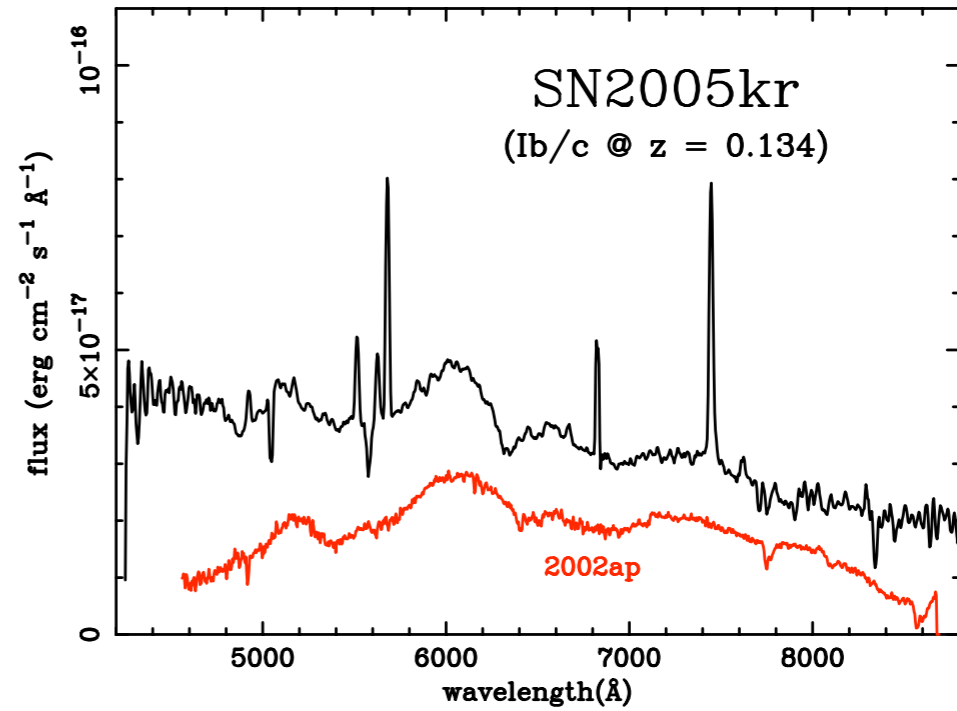
ARC



ARC



HET



Current Status and Plans

- 2005
- Final photometry, light curve analysis underway
 - Host properties, SN rates
 - Investigate photometric candidates for cosmology
 - Other transient science

- 2006
- Find and actively follow up other types of SNe: II-P, Ibc and hypernovae, Ia-pec
 - Multi-wavelength - e.g., with *Swift*
 - Densely-sampled multi-epoch spectroscopy of selected nearby targets
 - spectral sequence, systematics, rare types

2007