The Amazing SN 1999as

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Spring 1999 Search

Objectives:

- More well observed supernovae -discovered in an unbiased way
- All supernovae caught before peak brightness
- Excellent follow-up both spectroscopically and photometrically

Results:

- Over 40 supernovae discovered
- 20 Type Ia supernova which met the stated criteria
- Manpower - 10+ FTE's for 3 months
- Computing - 8 Sparc Stations and 32 nodes on a Linux Cluster
- 3 of us worked 18+ hour days to keep the data flow going and follow-up on schedule and on target

(only 2 casualties..)

Sky Coverage

Nearby Supernova Campaign: Survey Parameters

Search	Type	Aper (m)	FOV (deg^{-2})	Scale (”/pixel)	Exp (sec)	Time (hrs)	Filter	Coverage (deg^2)	Ia	II	Ic	Untyped (faint)
EROS	Staring	1.0	1.00	0.60	300	125	B & R	~450	11	3	0	10
MOSAIC/CTIO	Staring	0.9	1.00	0.43	240	48	R	~175	6	2	0	1
NEAT	Staring	1.0	2.54	1.40	60	15	open	~425	3	1	1	0
Spacewatch	Drift Scan	0.9	$0.57\times t$	1.05	430	140	OG515	~150	3	0	0	2
QUEST	Drift Scan	1.0	$2.30\times t$	1.00	550	4	V	~140	0	0	0	1
Other Searches	IAUC								6	2	0	0
Totals								~1340	29	8	1	14

Follow-up

Photometry:

- Lick 1-m
- YALO 1-m
- CTIO 0.9-m, 1.5-m
- Danish 1.5-m
- and all the search facilities

Spectroscopy:

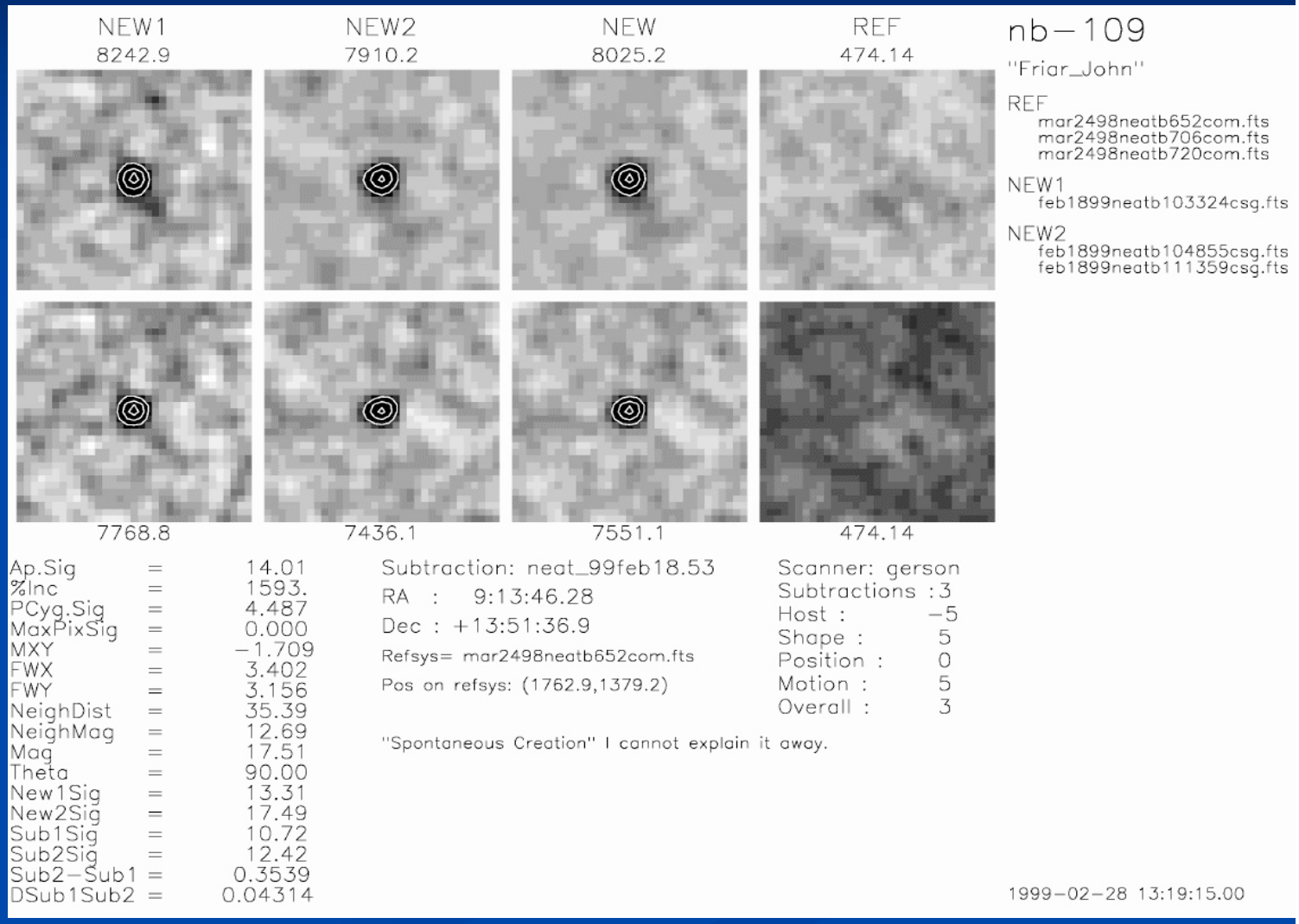
- Lick 3-m
- KPNO 4-m, 2.1-m
- CTIO 4-m, 1.5-m
- ES0 3.6-m

Discovery

Date:
Feb 18.43

Magnitude:
R~17.5

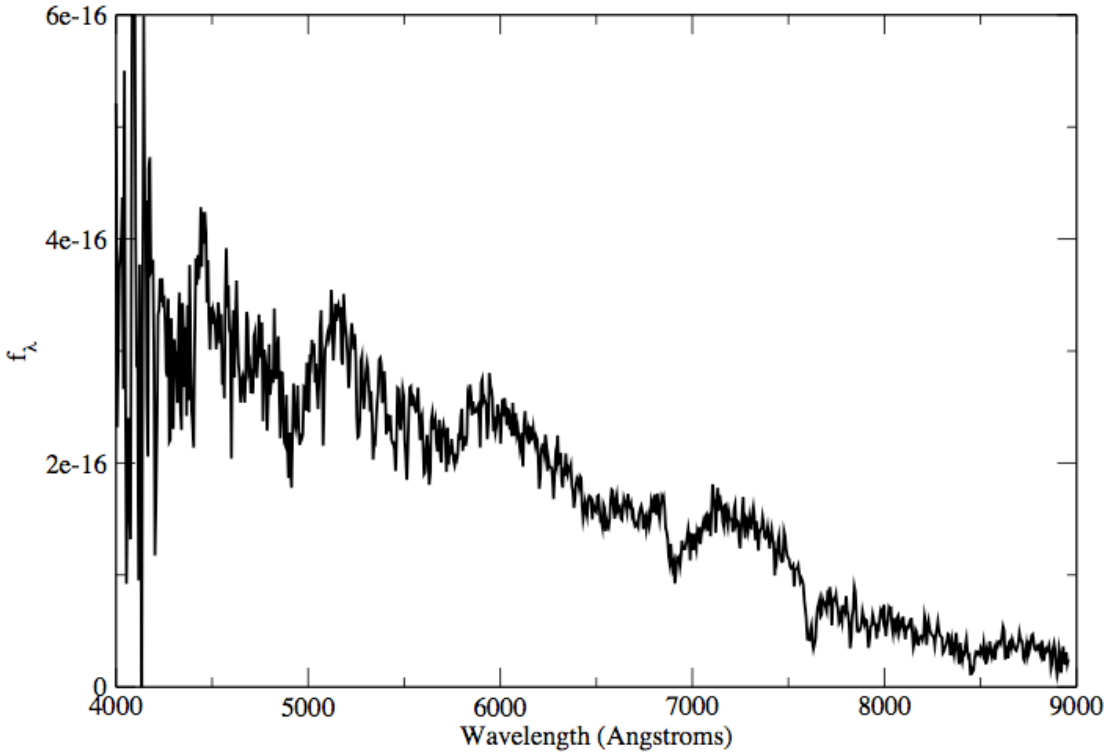
Host:
zip



First Spectrum

Mar 6.4 was the first spectrum.

MDM

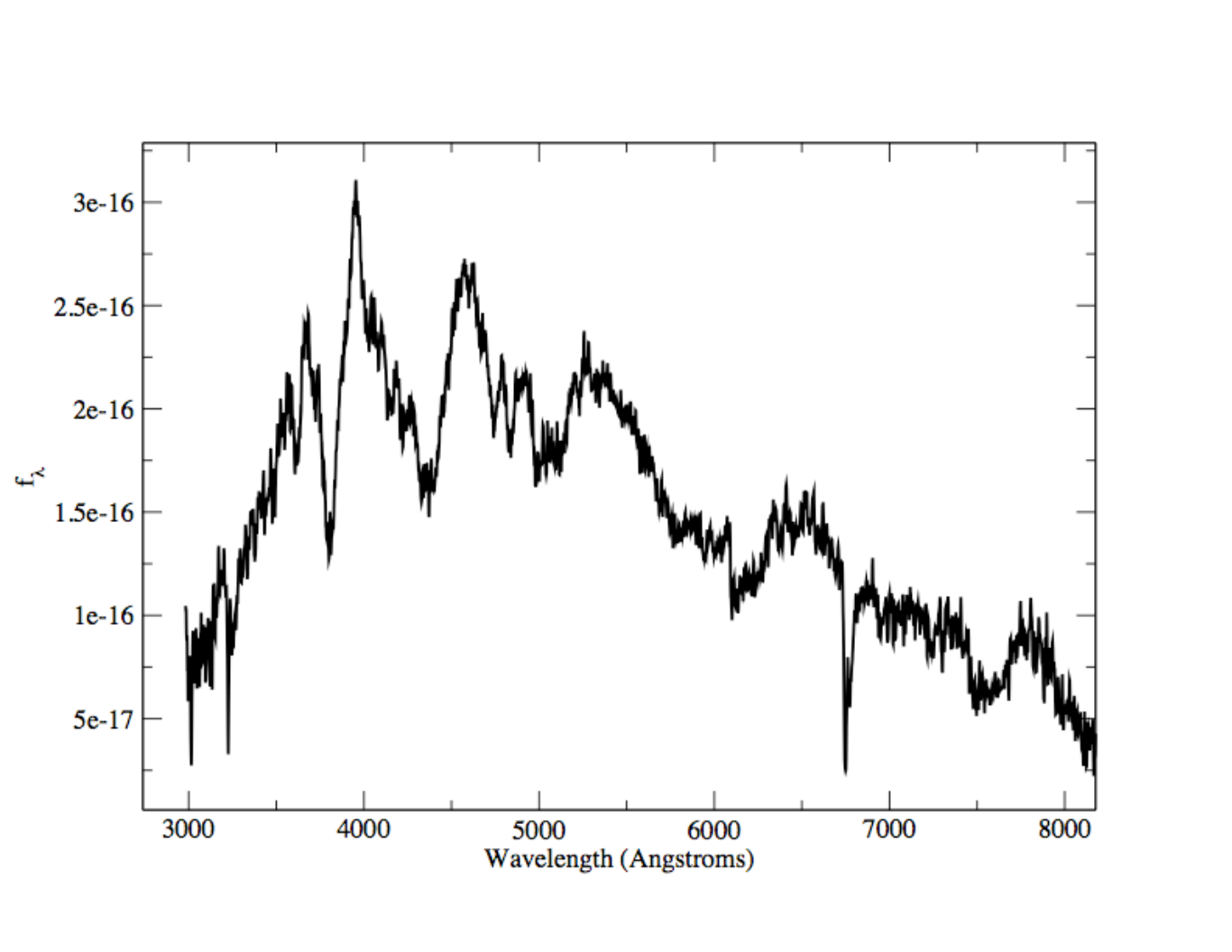


First Interesting Spectrum

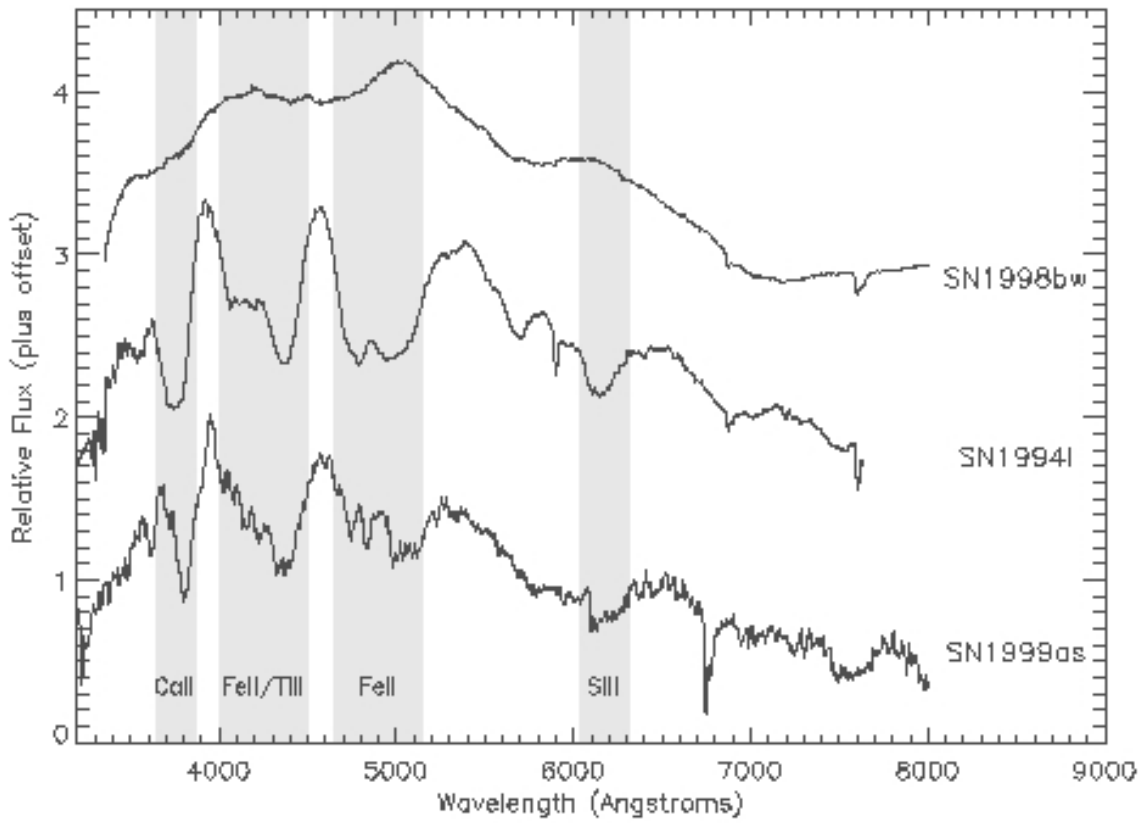
Mar 16.4 was the first good spectrum.

Clearly a Ib/c but with some very interesting narrow features.

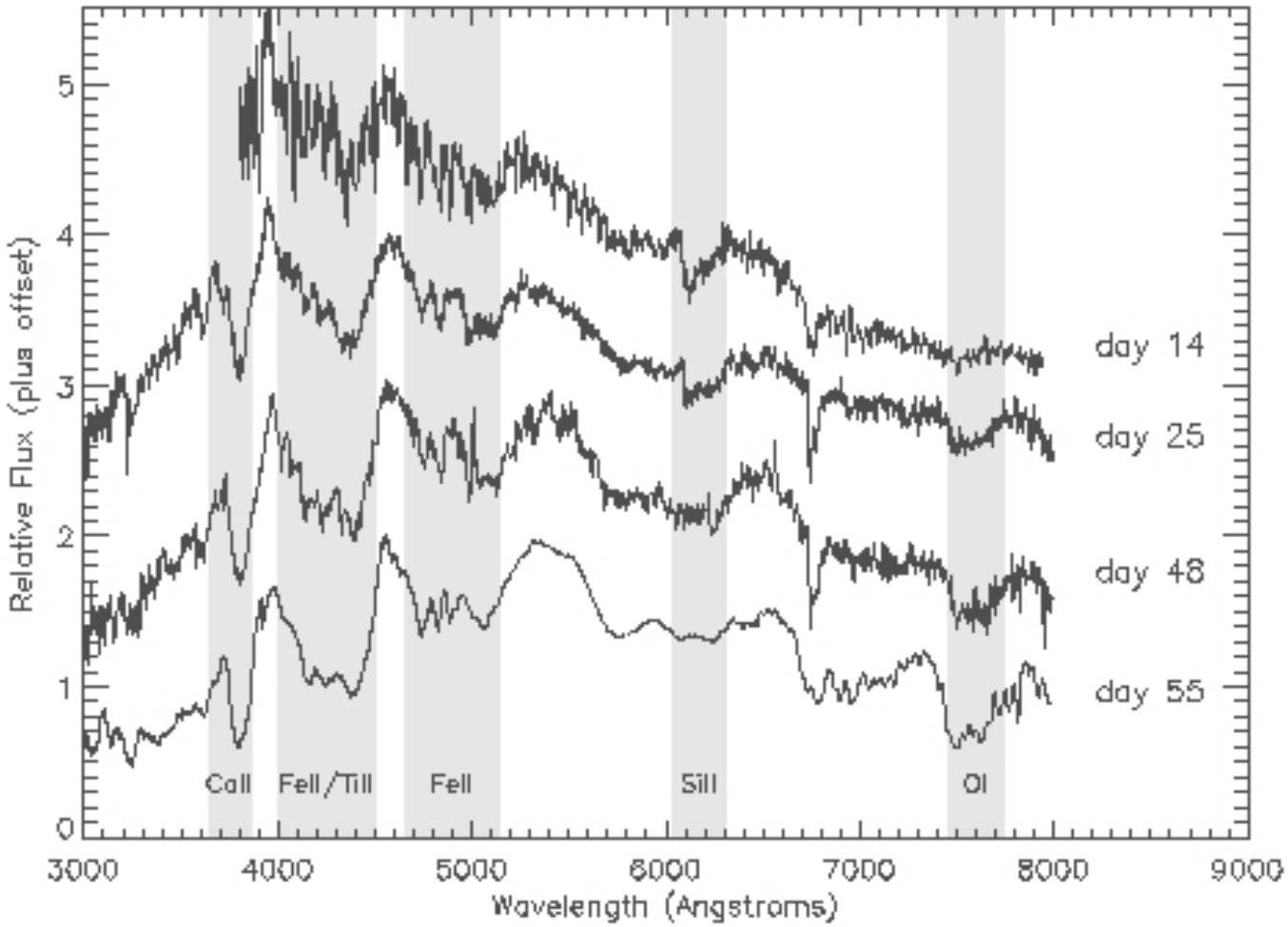
Redshift z=0.127
M_V=-21.2



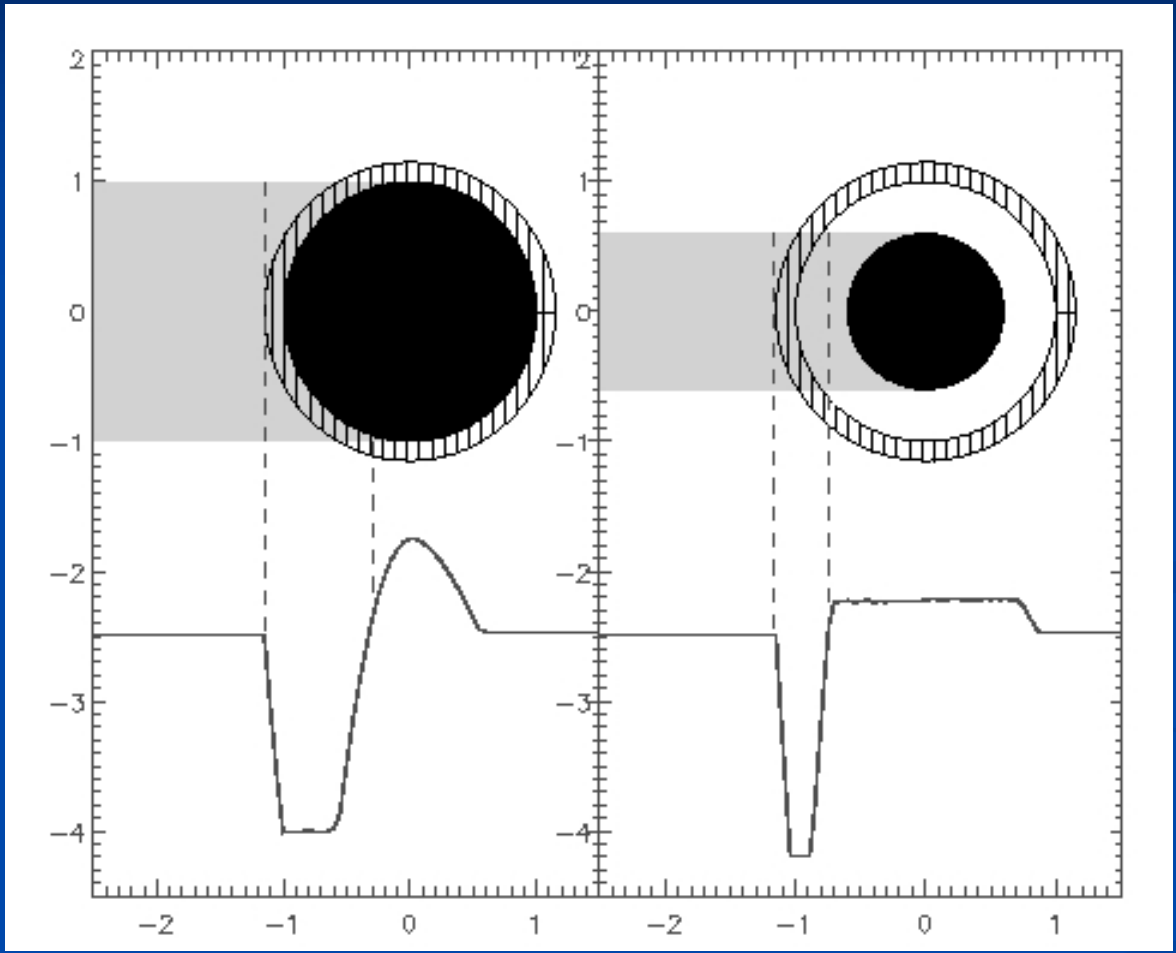
Comparison Spectra



Spectral Evolution

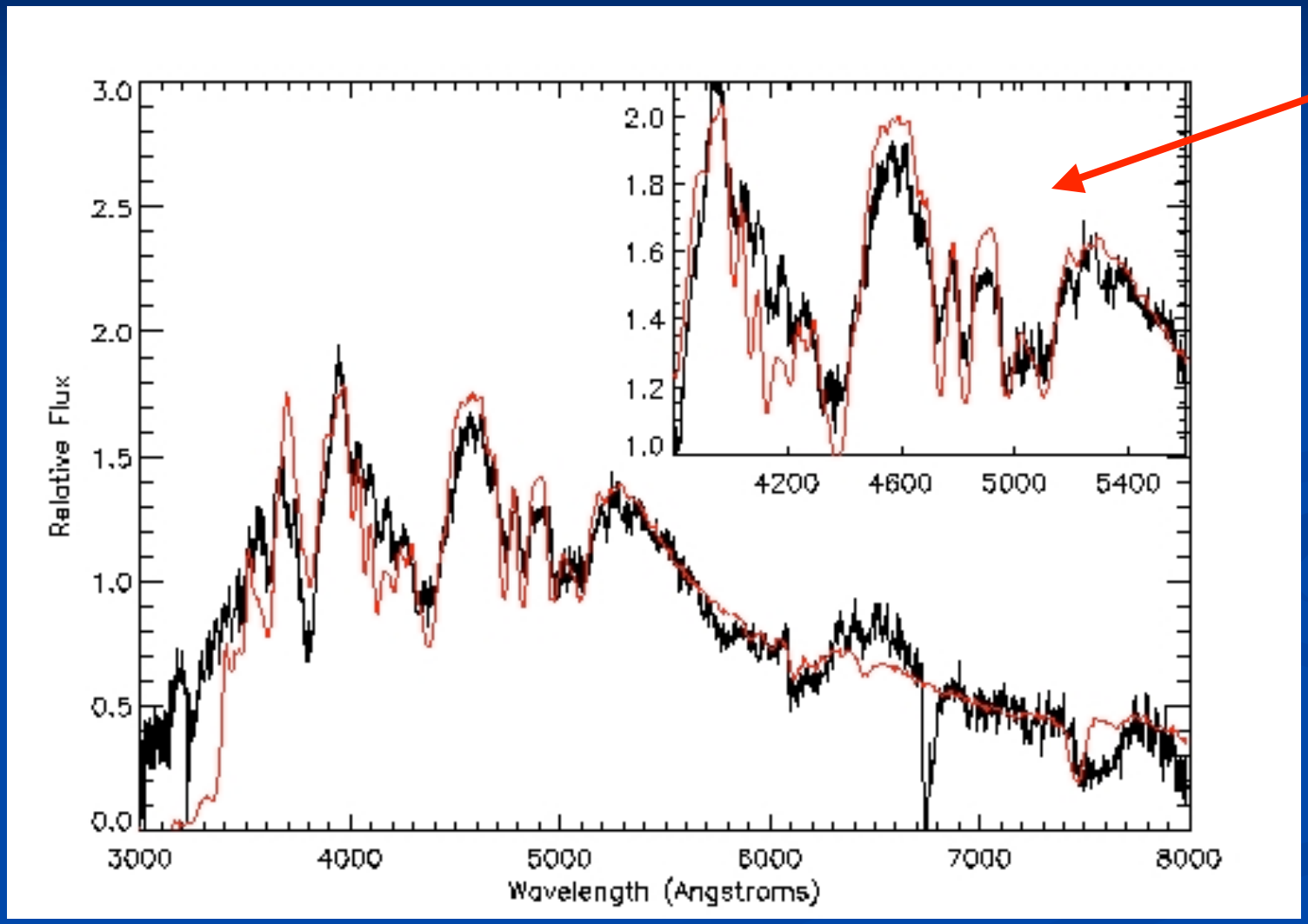


Shell Model



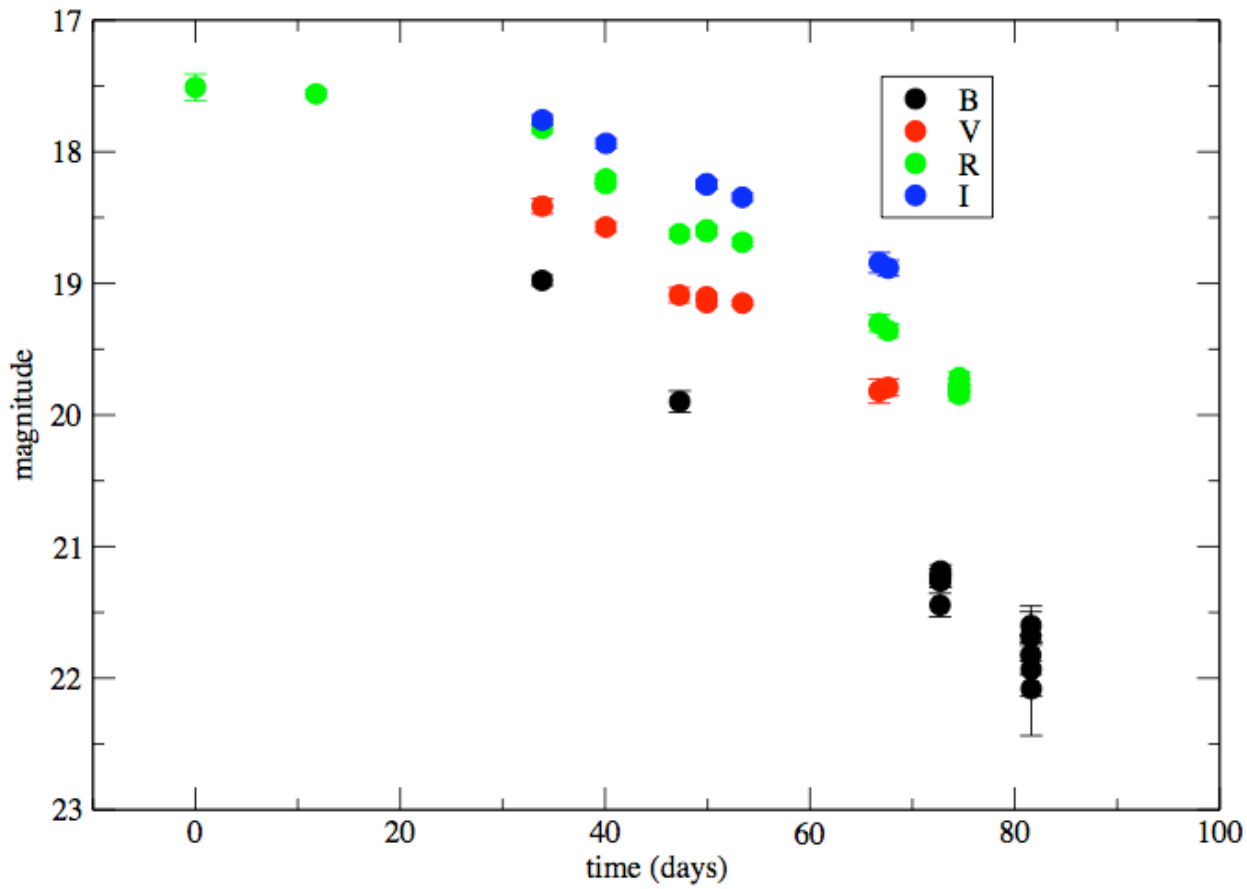
A detached shell is the only way to explain the narrow lines.

Spectral Fits

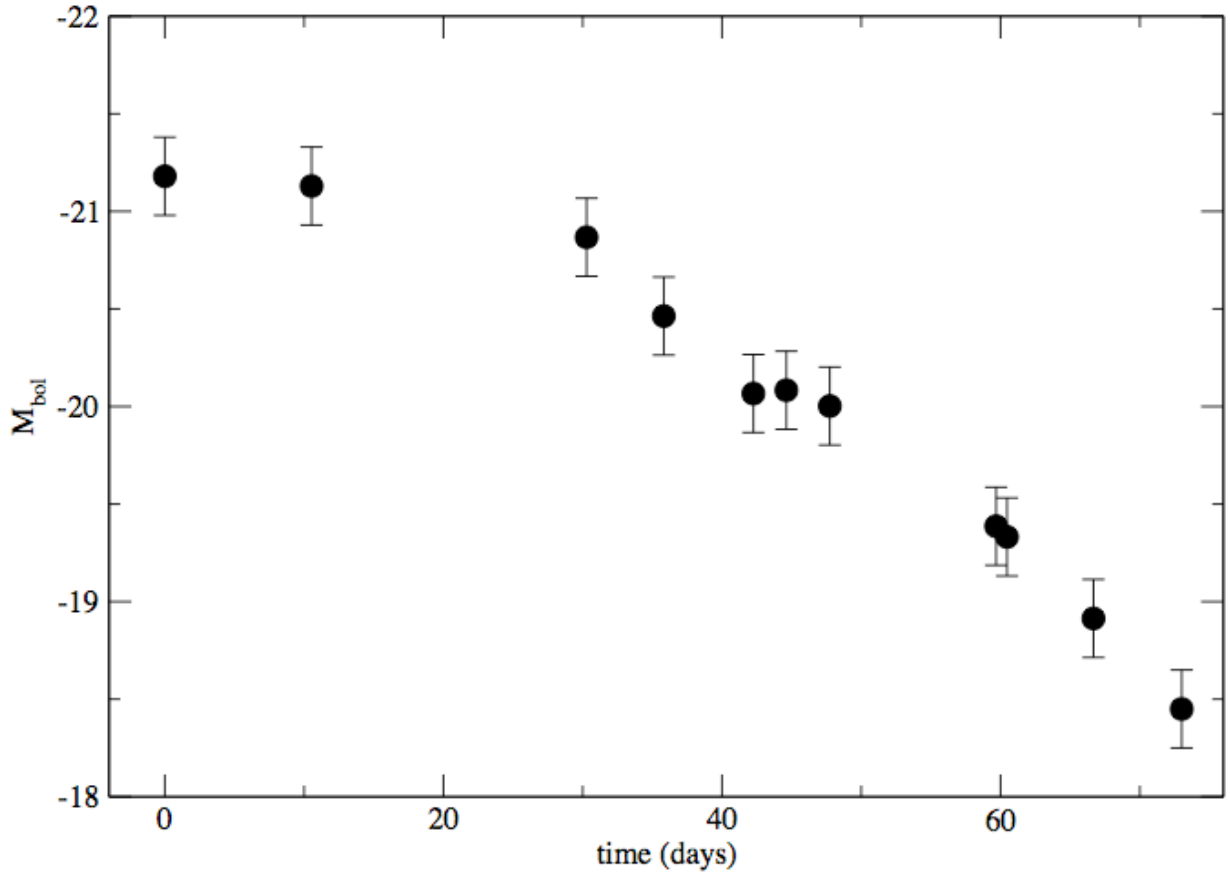


Fe II
Ti II

Lightcurve

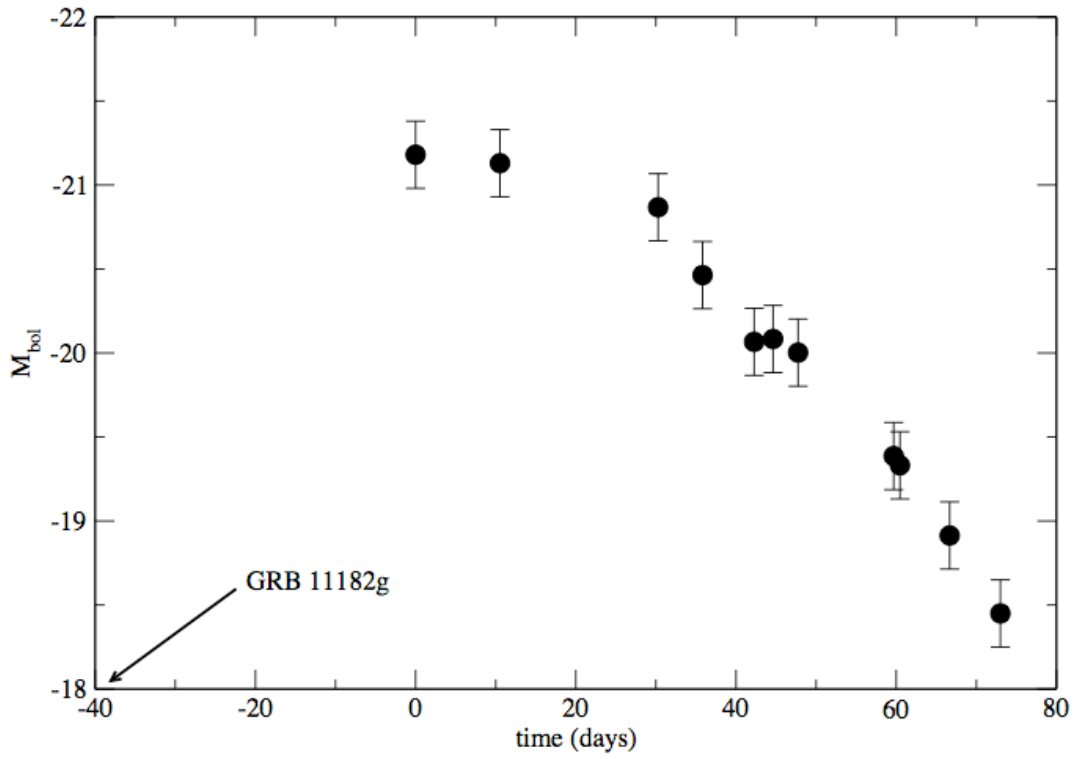


Bolometric LC

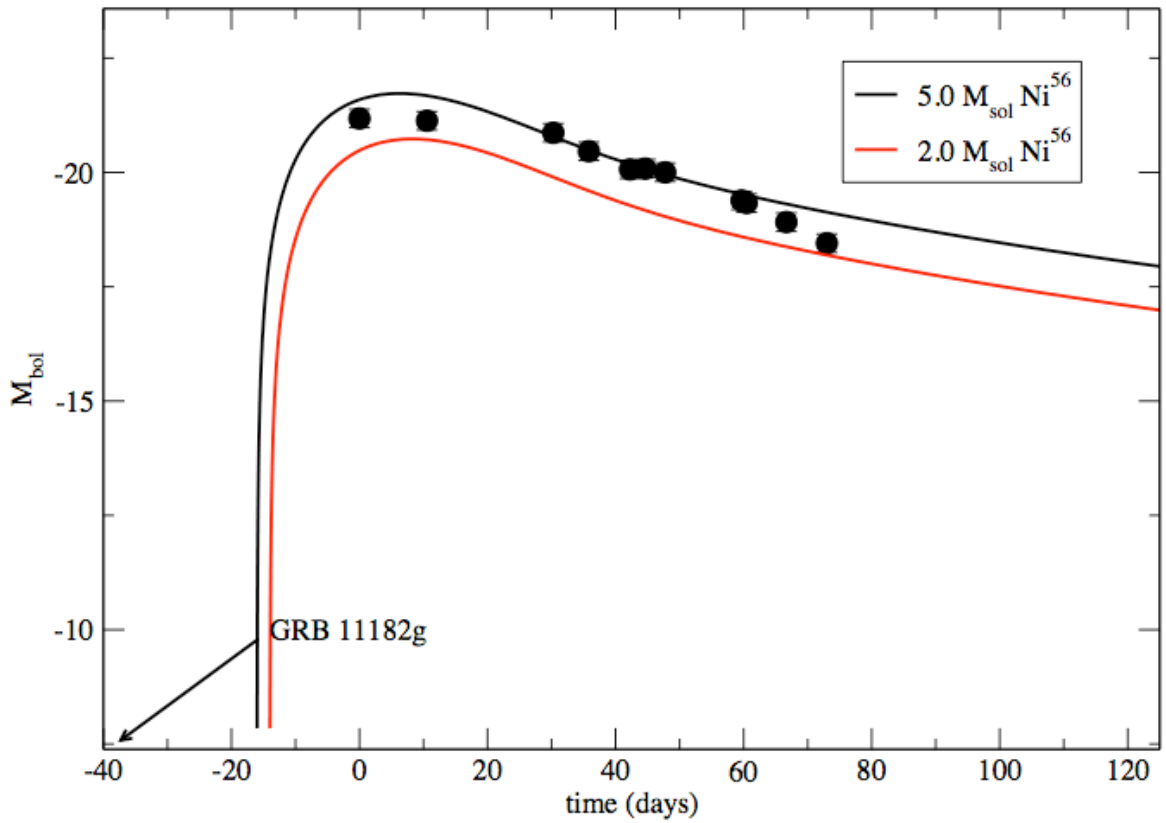


Possible GRB....

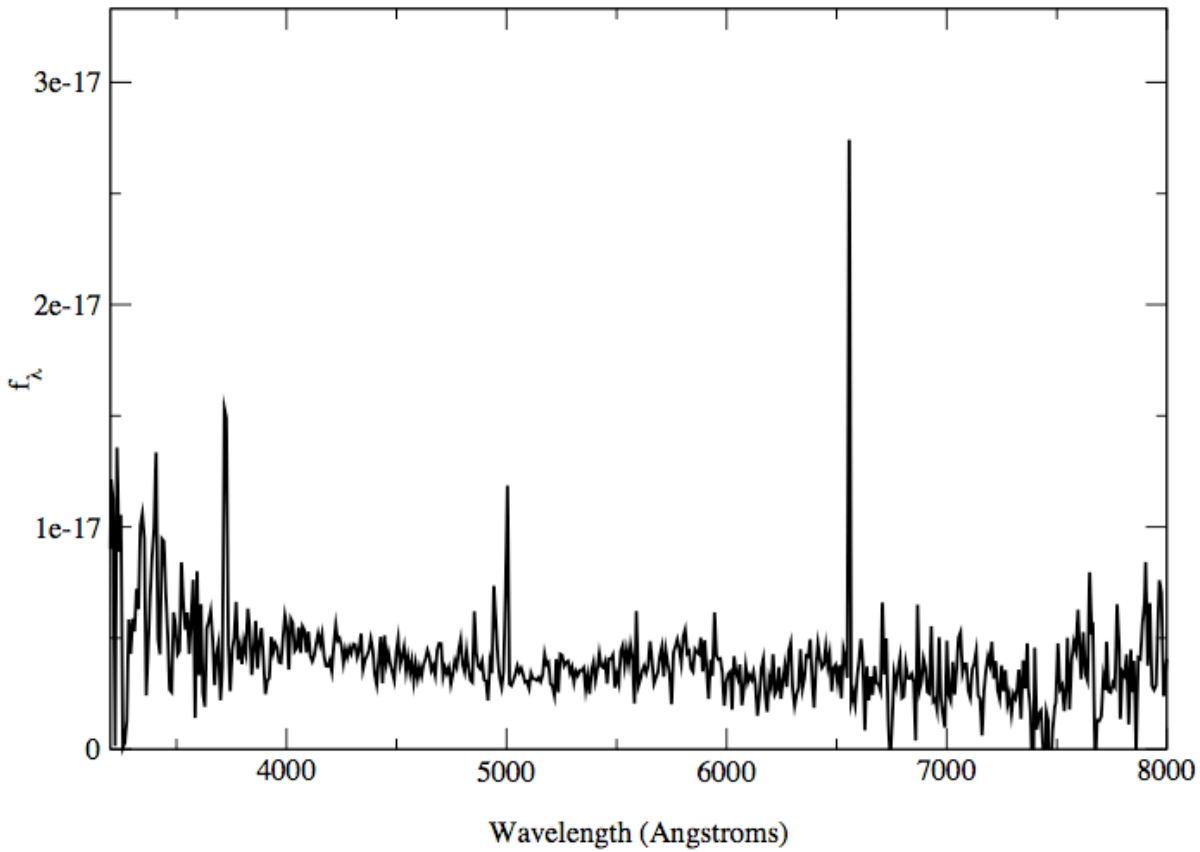
Name	TJD	Peak Flux	RA	Dec	sig(deg)
11182g	85552.	0.236	131.7	3.5	30.9



Models

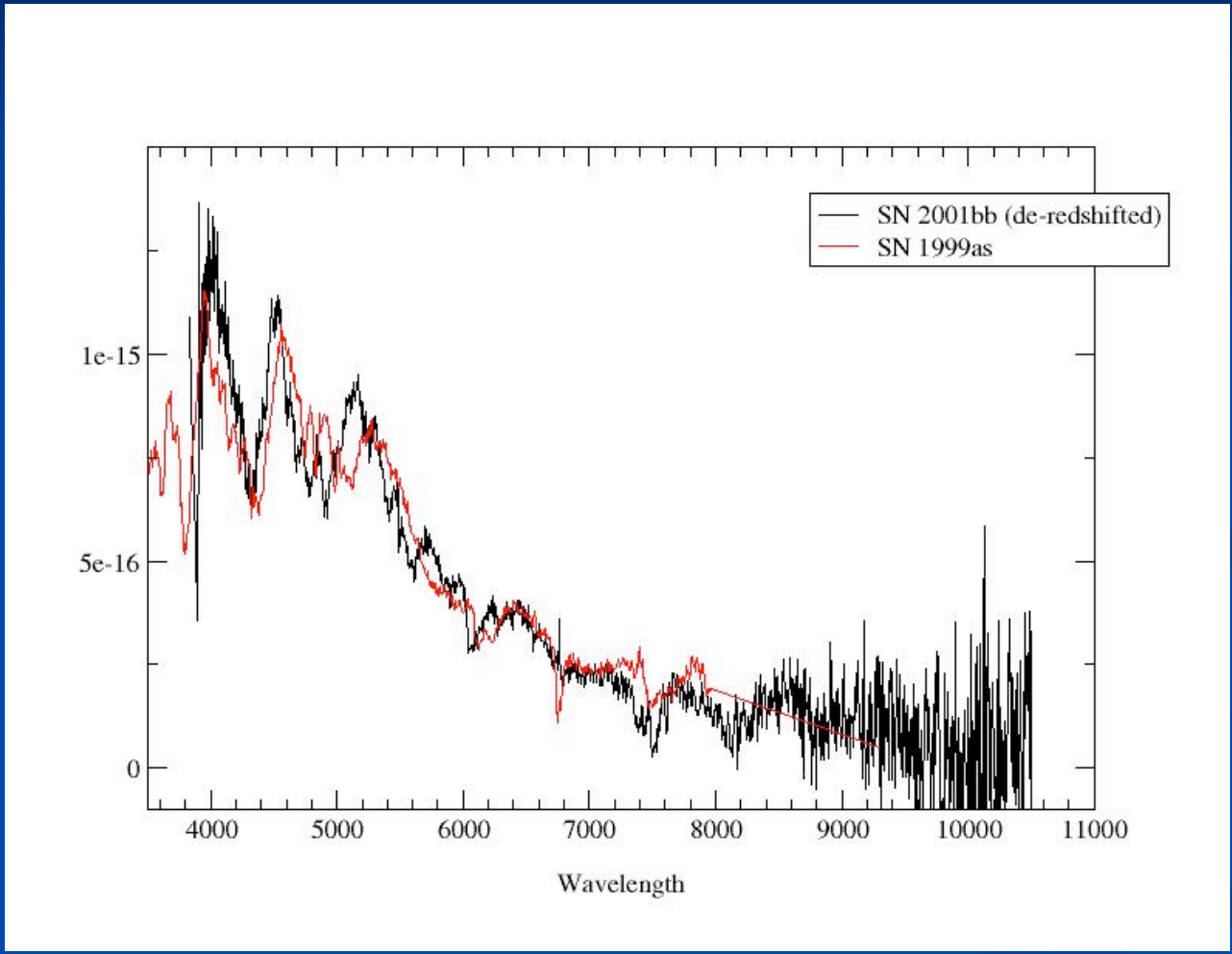

5.0 M_{sol} Ni^{56}
2.0 M_{sol} Ni^{56}
GRB 11182g
M_{bol}
-20
-15
-10
-40
-20
0
20
40
60
80
100
120
time (days)

Host Spectrum



Preliminary measurement of the host has the metallicity at < 1/3 solar.

Other SNe like this?



SN 2001bb was caught < 5 days after explosion.

Other SN 1999as events

No event like SN 1999as has been found in over ~200 SCP high-z supernovae, ~200 SNLS Supernovae, or during the first year (159 supernovae) for the SN Factory.

Even though the effective volume for finding these objects and the length of it lightcurve make it much more easy to discover.

It is a very rare event…..