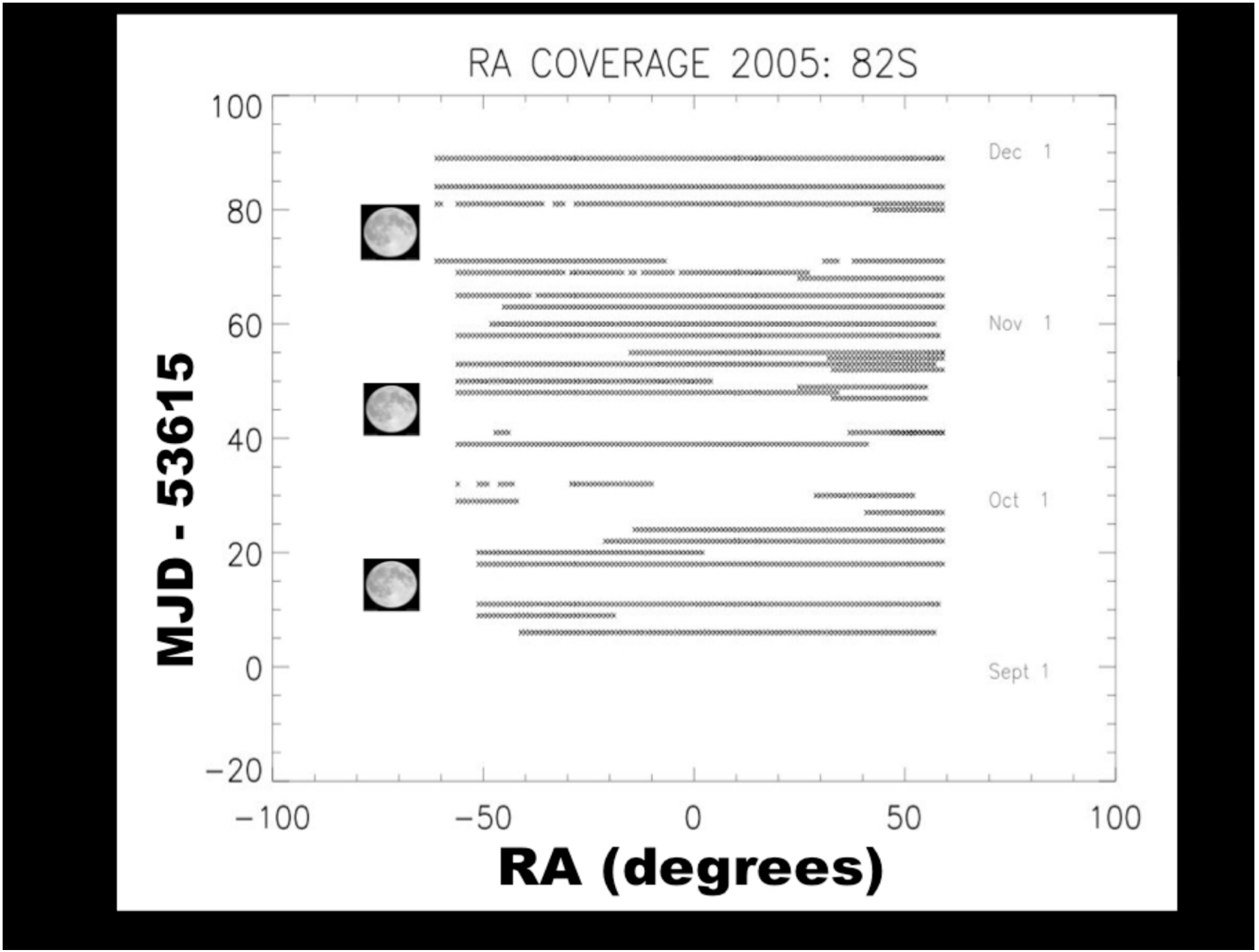
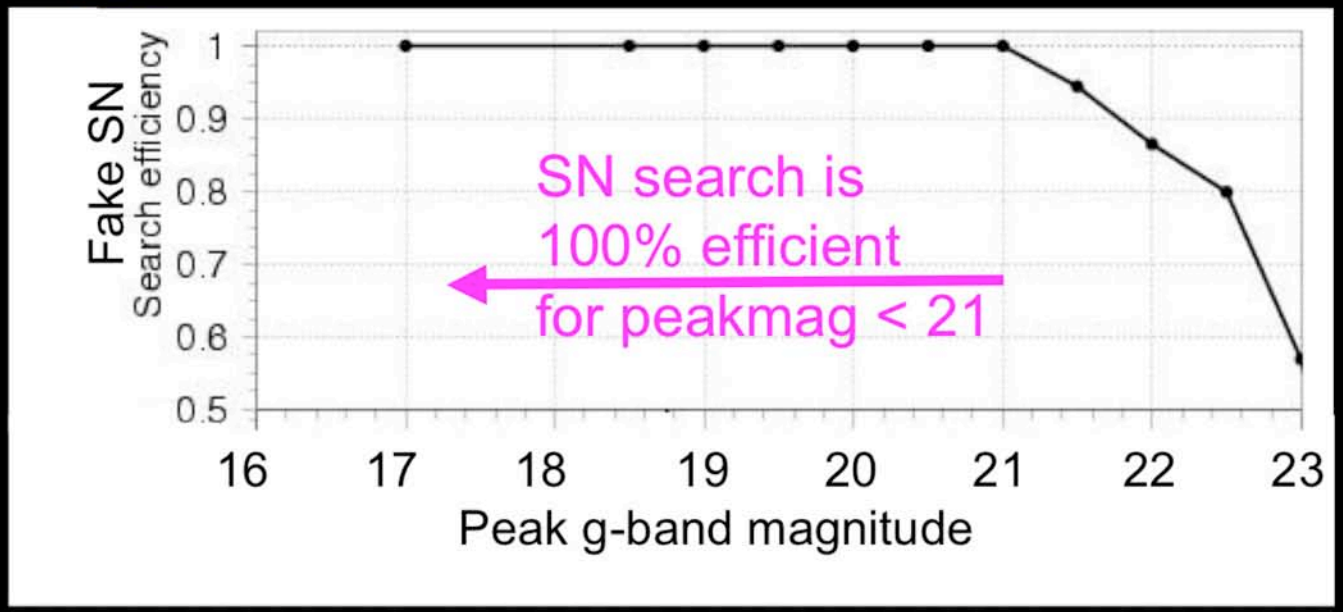
SDSS Rates:

Ben Dilday and Rick Kessler (U. Chicago)

- AAS meeting in Jan 2007 (Seattle)
- >100 SNIa from 2005
- Placed fakes in the search to get completeness
- Simple approach: use only SN up to completeness limit
- 16 SNIa with g<21


RA COVERAGE 2005: 82S
MJD - 53615
RA (degrees)
100
80
60
40
20
0
−20
−100
−50
0
50
100
Dec 1
Nov 1
Oct 1
Sept 1

Search Efficiency During Fall-2005 Survey (from fake SN inserted into images)



g=21 at z=0.12 => absolute mag of -17.5

Fall-2005 Data Sample (unconfirmed, $z < 0.12$)

- Post-survey analysis of ~1000 candidates lightcurves with improved photometry and improved (MLCS2k2) lightcurve model:

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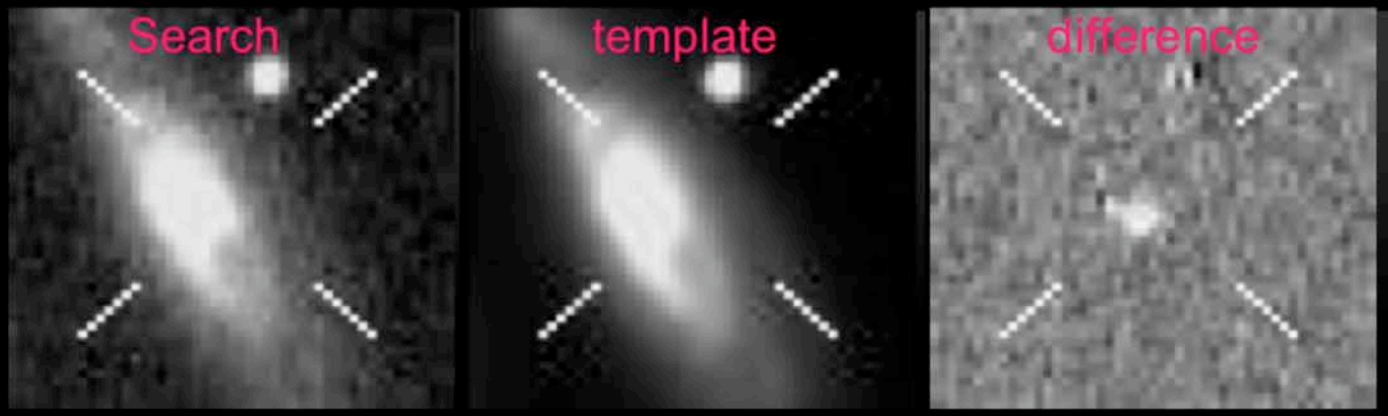
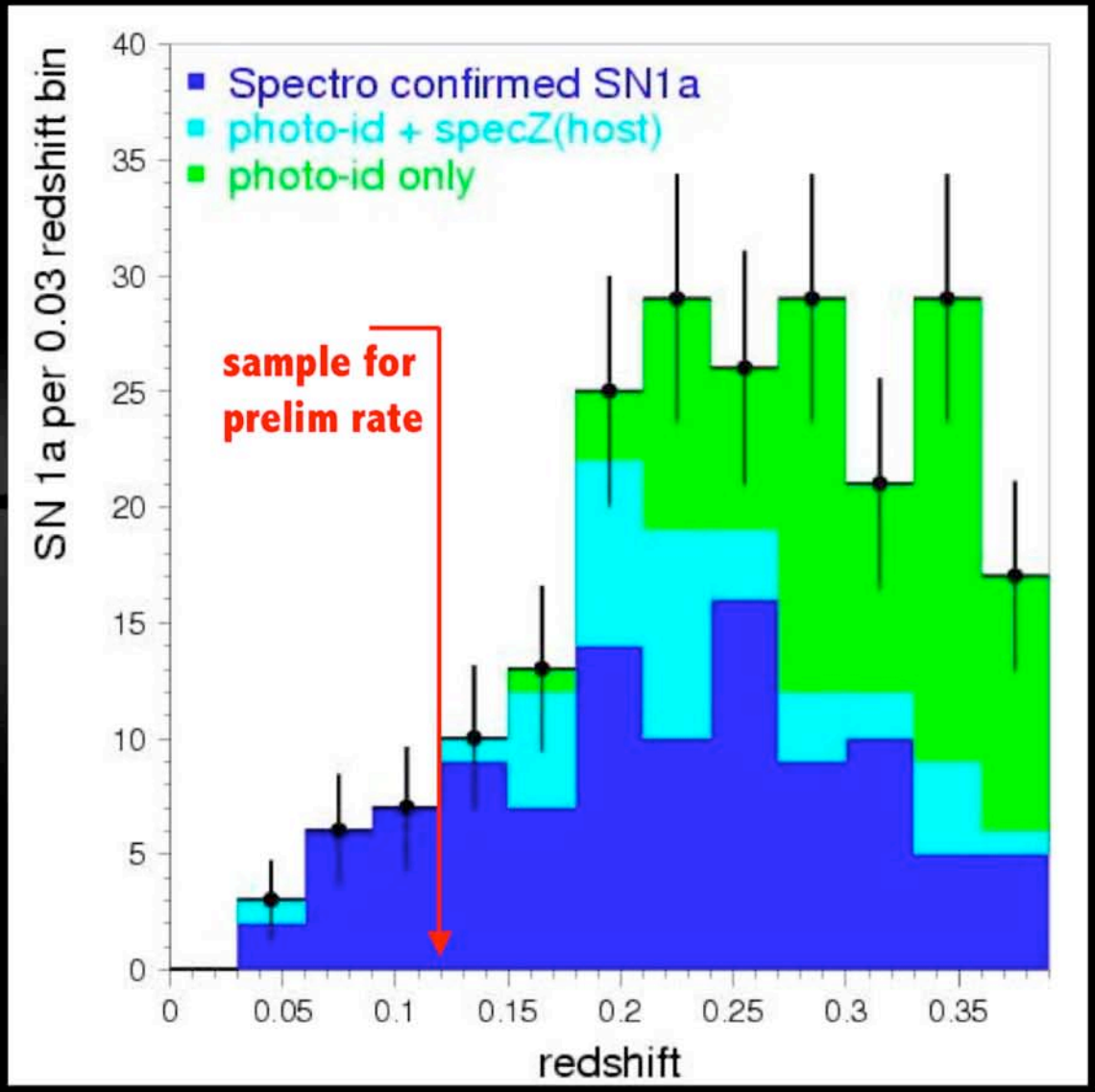
recovered one highly extincted SN 1a at $z=0.036$, $A_V \sim 4$!



Still have ~1000 more candidate lightcurves to process.
Systematic error for unconfirmed SN Ia sample: 2.

Preliminary SDSS Redshift Distribution



Photometric Selection of SN Ia:

- pre-max epoch
- rest-frame epoch past 18 days
- 5 or more epochs
- max SNR > 5 (g,r,i)
- MLCS fit-prob > 0.01
- sane luminosity parameter (Δ > -0.6)

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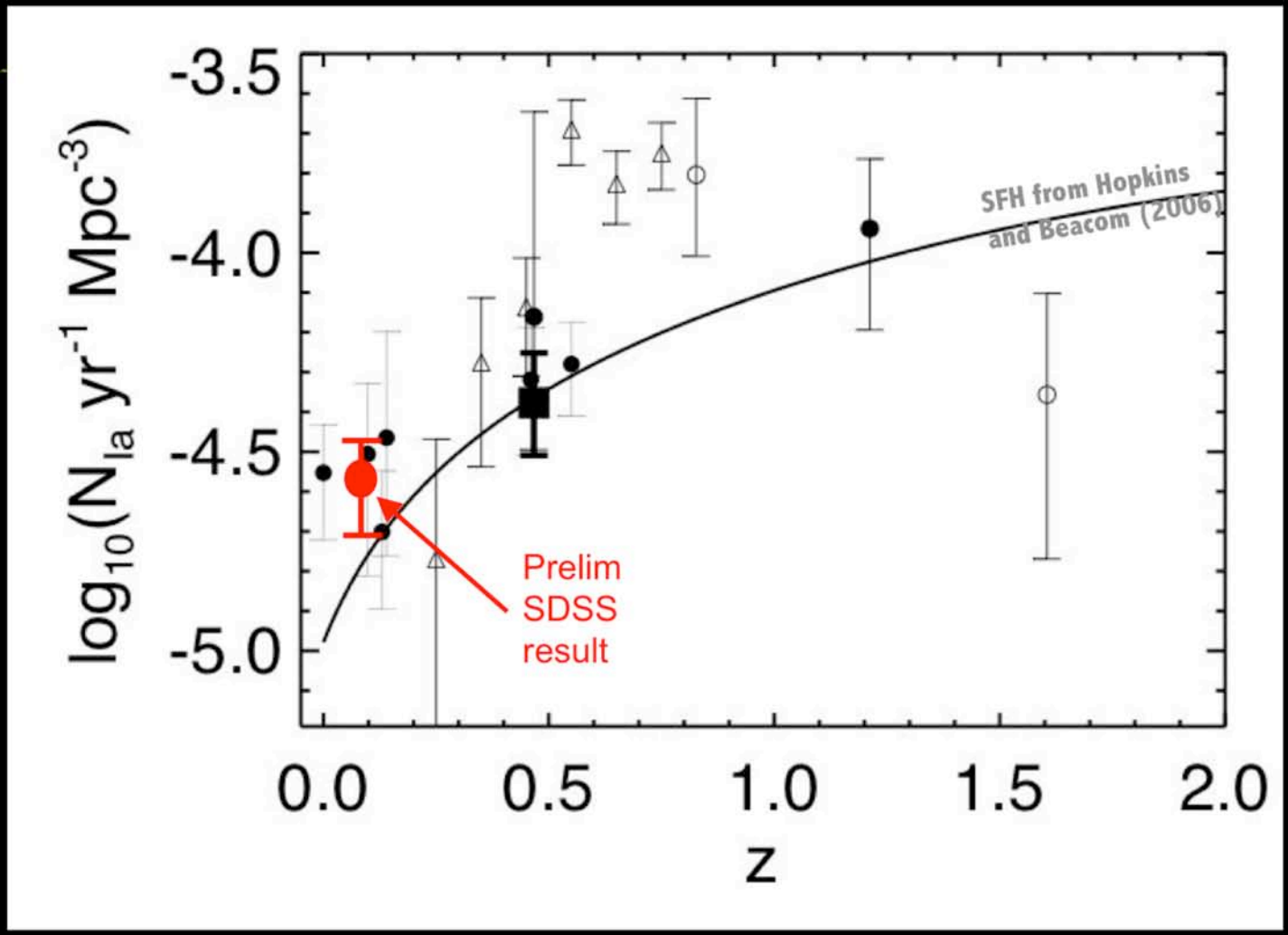
Rejects all 13 confirmed non1a-type SN (2006 sample has 30 more non1a to test cuts)

SN Ia Rate Comparisons

Figure from SNLS: astro-ph/0605148
(see Fig 1 caption for list of measurements

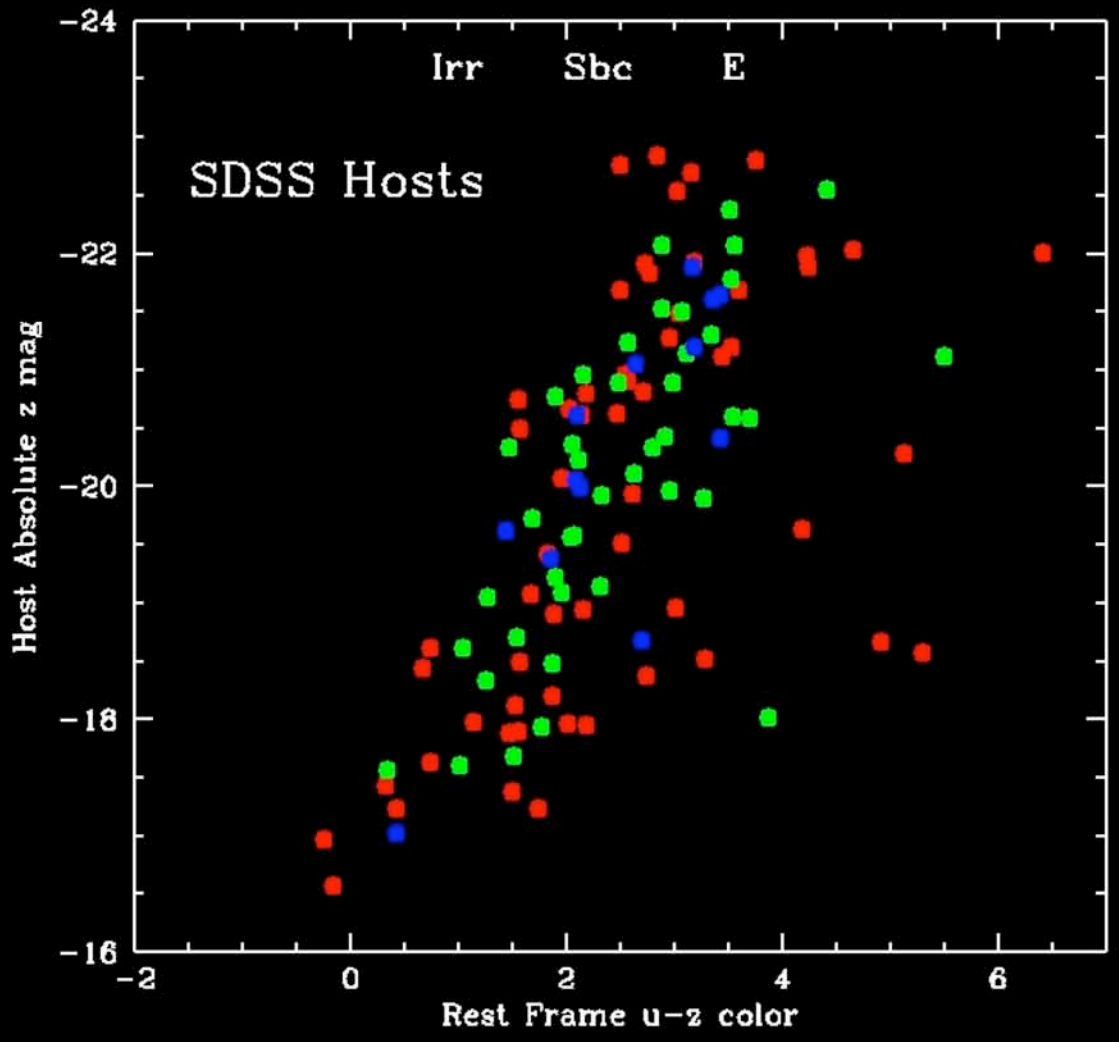


Host Color-Magnitude Diagram:

Number of stars in the host versus Specific Star Formation Rate.

Highest specific SFR hosts are also the smallest hosts.

How do these hosts compare with field galaxies in the SDSS?



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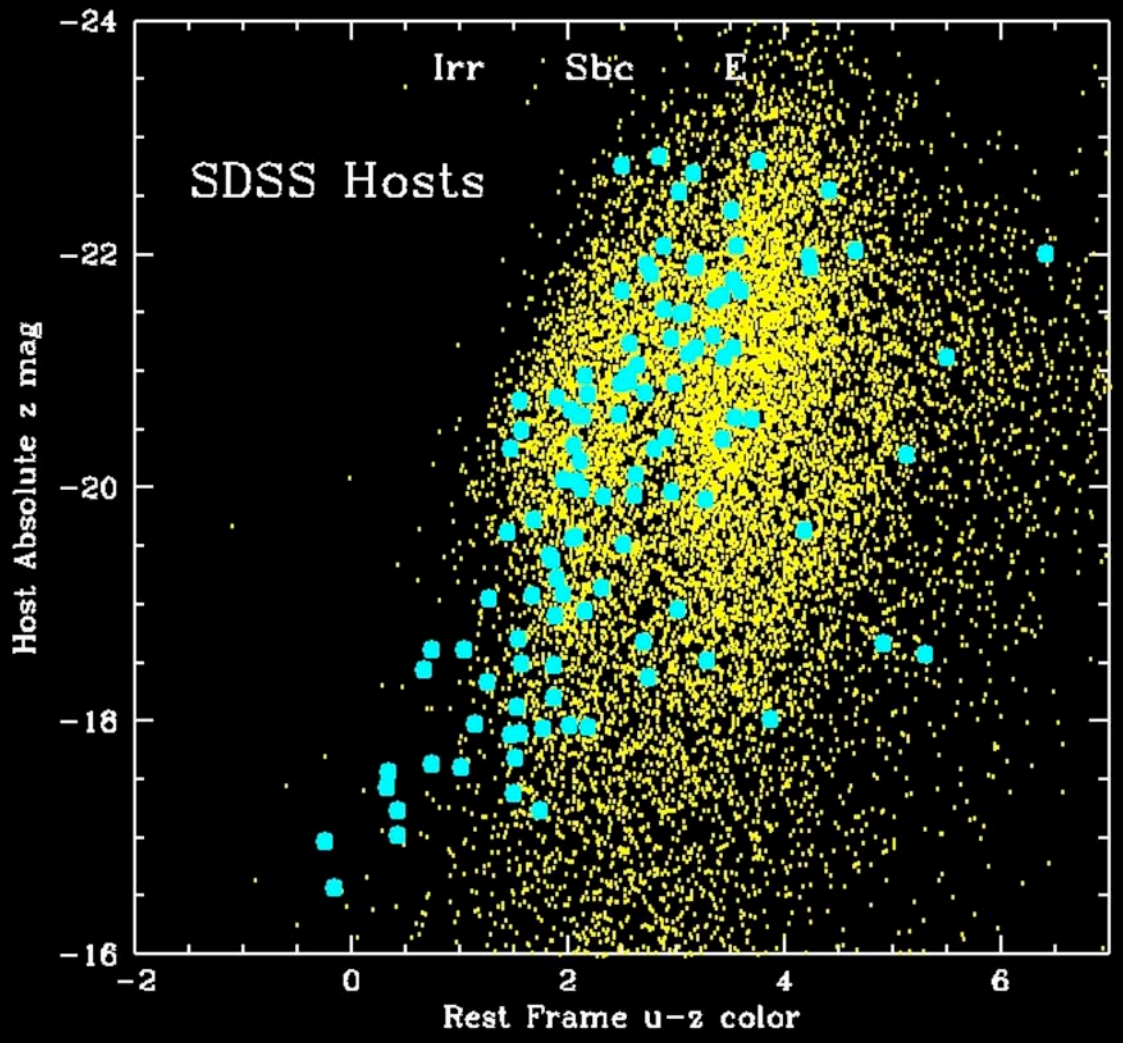
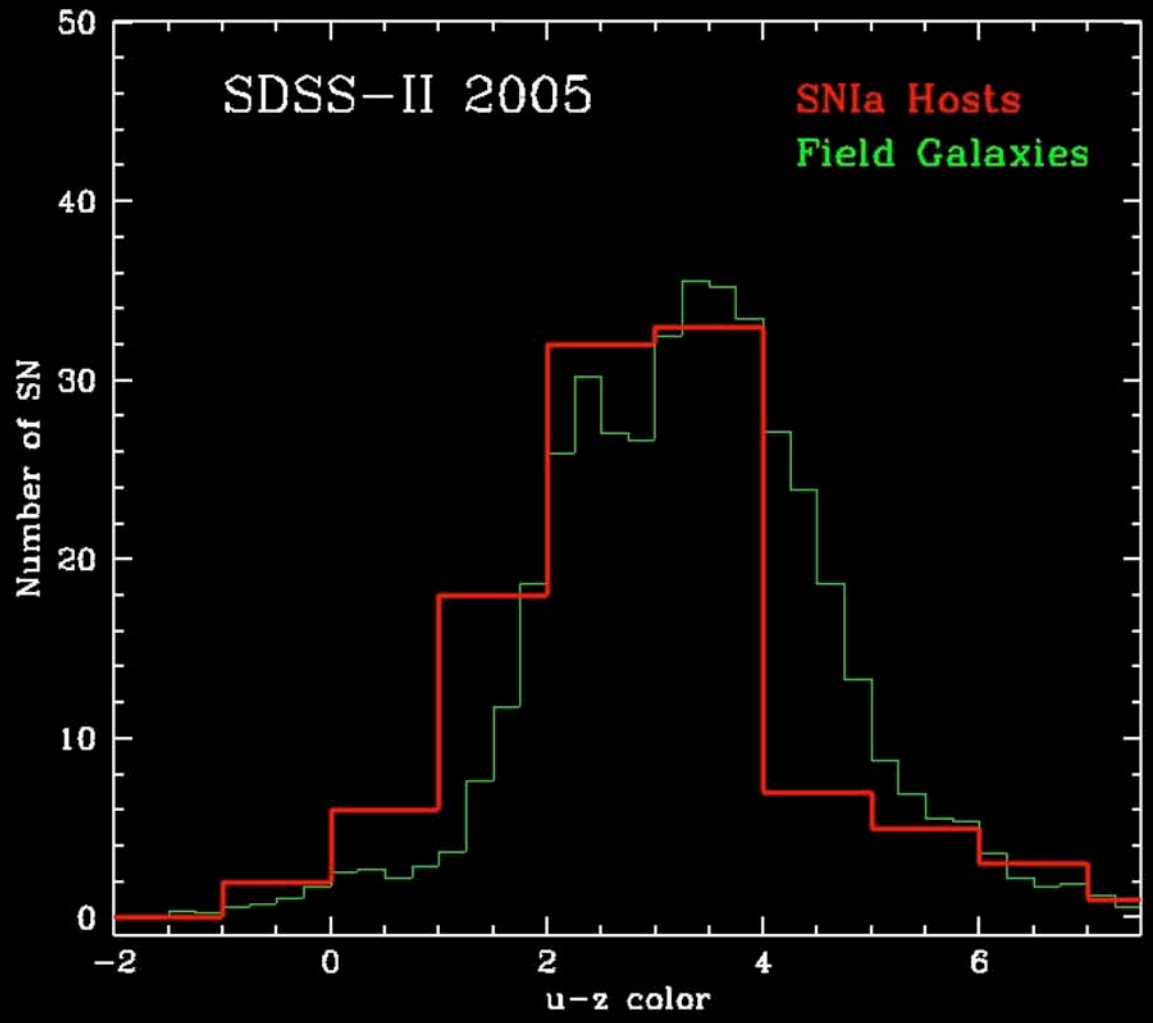
15000 SDSS galaxies out to photo-z <0.35



SNIa Host versus Galaxy/Stellar Frequency:

SNIa host frequency versus field galaxy frequency => SNIa rate per galaxy.

For u-z <2, the SNIa rate goes like the number of galaxies.



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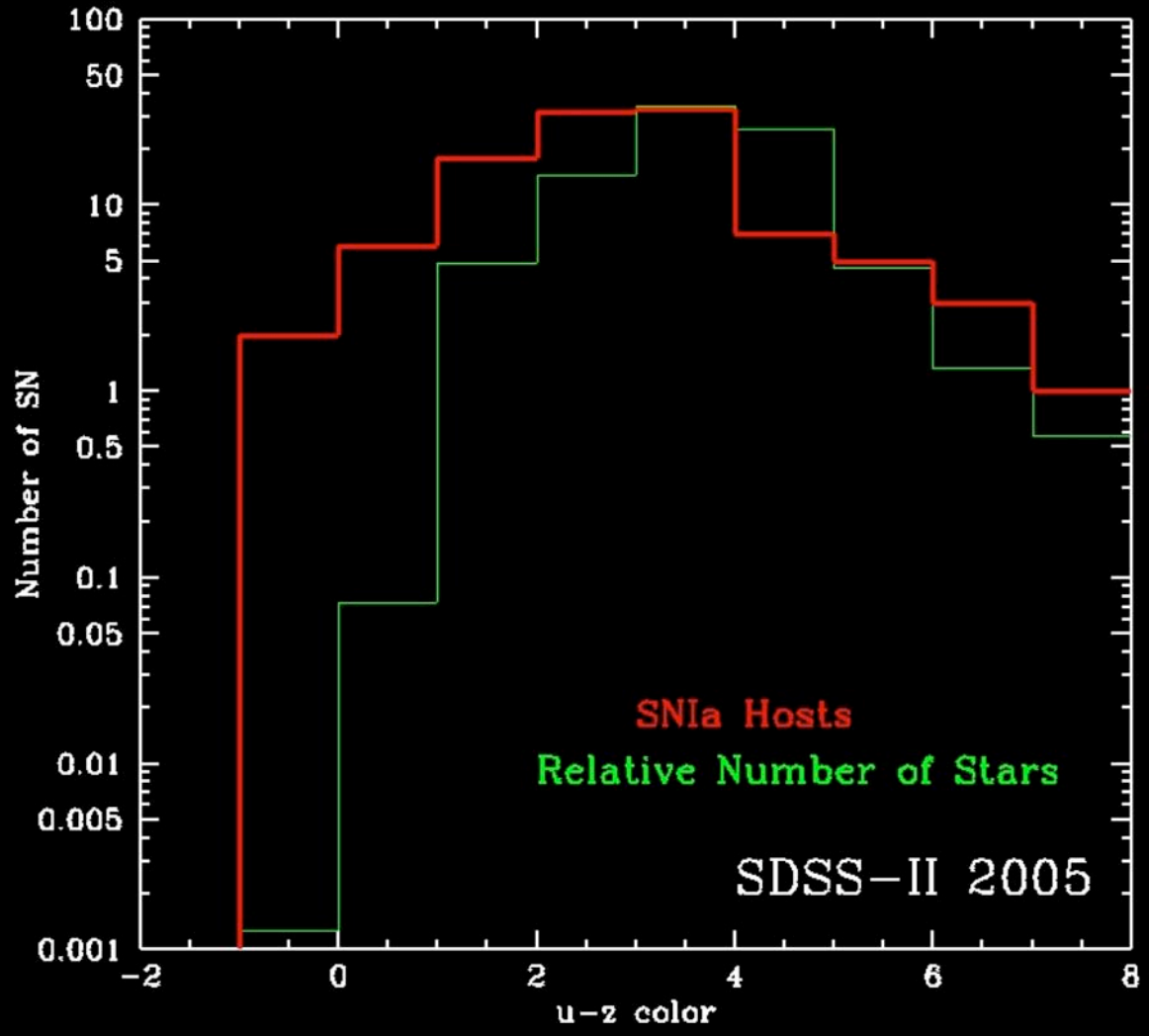
Convert the relative number of galaxies to the relative number of stars by summing over the z absolute magnitude

For u-z >4, the SNIa rate goes like the number of stars.

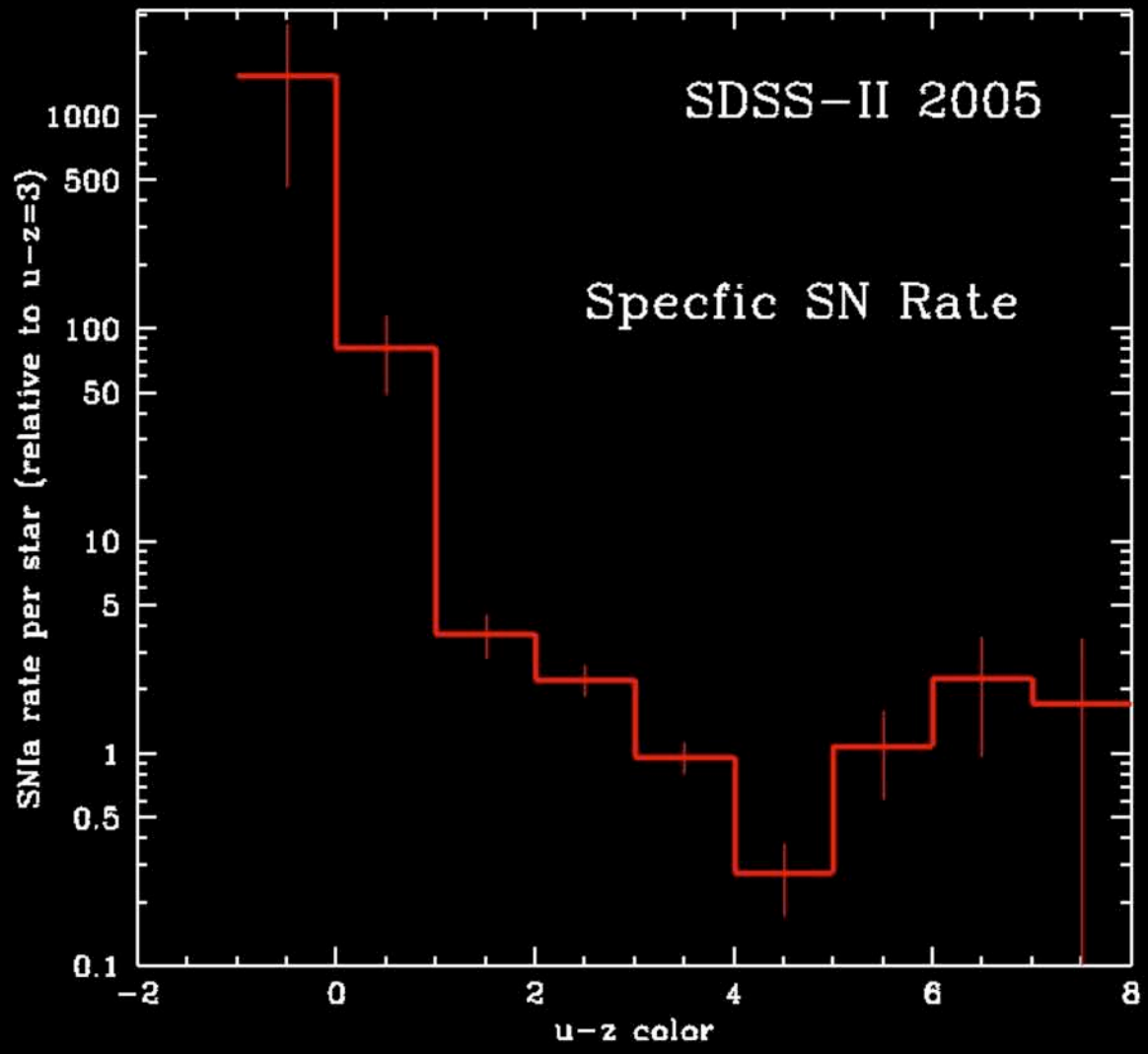


Specific SNIa Rate versus Specific SFR:

Divide the number of SNIa detected divided by the number of stars per SSFR bin.

Normalize to the rate at the u-z =3 bin.

Log (SNIa rate/star) goes as 0.9(u-z) for blue galaxies and is flat for red galaxies



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SN rate/star = $0.8+10^{-0.9(u-z)+2.3}$

See:
Mannucci et al. 2006
Sullivan et al. 2006
Scannapieco & Bildsen 2006