Albinoni Analysis Status

Albinoni (1998eq) a SNIa at z=1.2 .

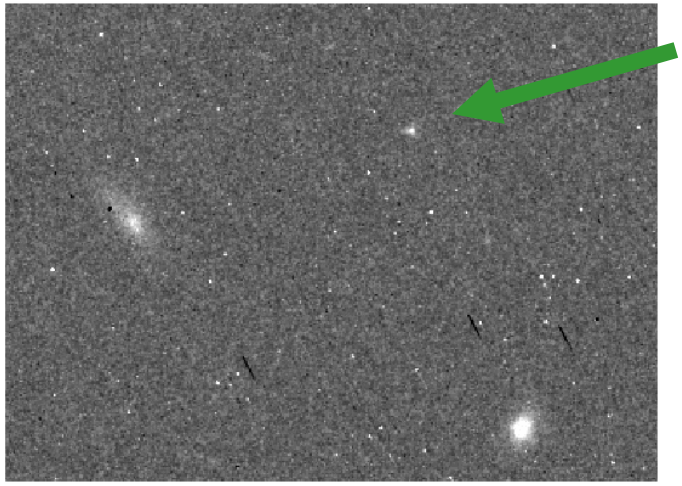
Datasets (1)

Dataset	N(exposures) x Time	Obs. Dates	Comments
LRIS data, I-band	4 epochs 2 to 8 Ksec	1 2 3 4 09/15, 10/15, 11/03, 11/04	Calnights: 09/15, 10/15, 11/04
WFPC2 data, I-band	4 epochs, 1.5 to 7.5 Ksec	1 2 3 4 10/26, 11/09, 11/19, 11/30	
NICMOS data, J-band	1 epoch, 10 Ksec	11/18/1998	

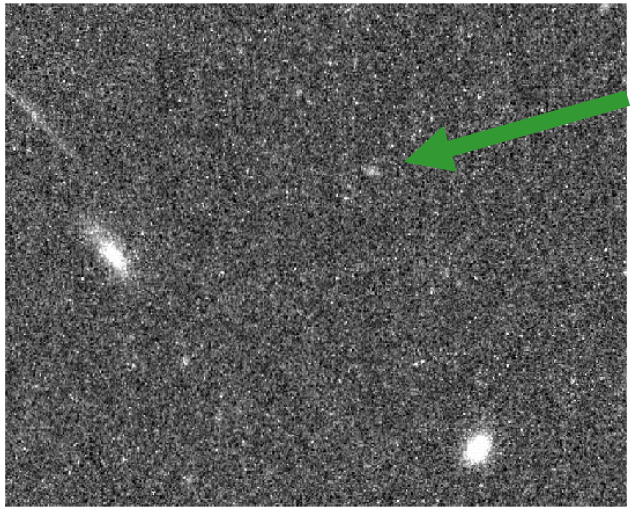
Datasets (2)

Albinoni is in close proximity to the host galaxy!

WFPC2 (PC) signal data

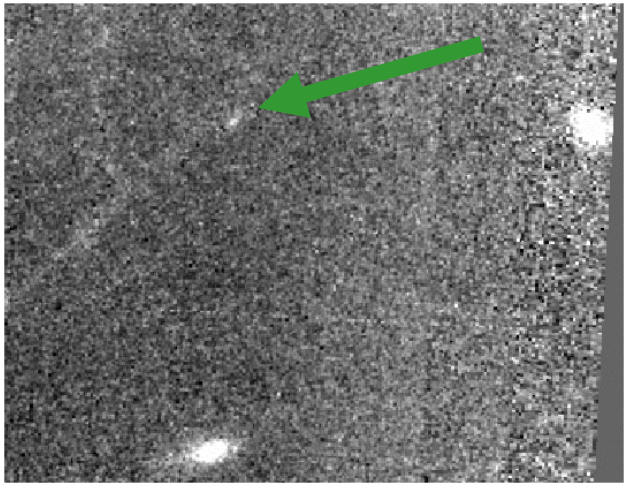


WFPC2 (PC) final ref



NICMOS signal data

NICMOS final ref



Procedure

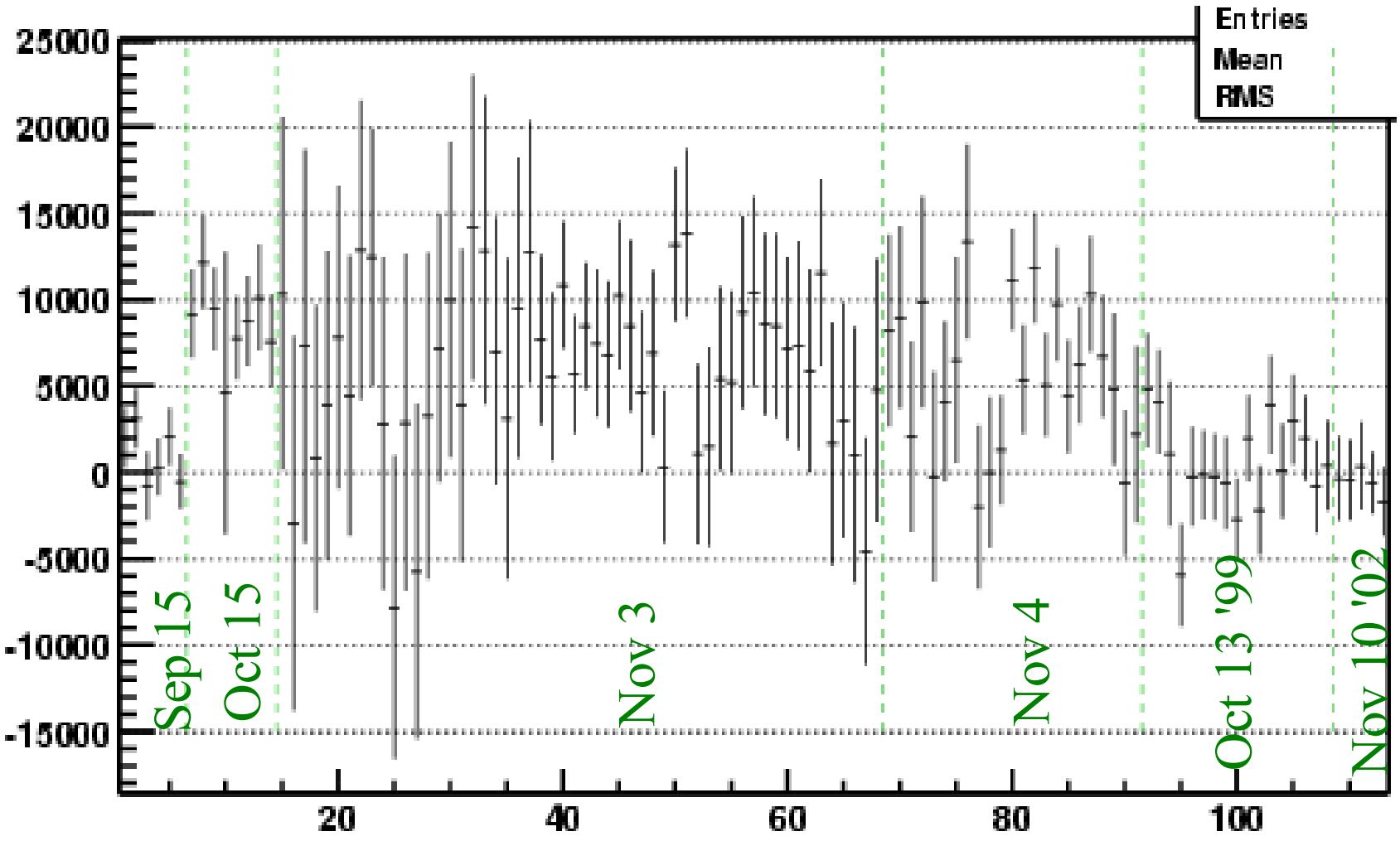
Use SCP standard procedures, with extentions:

-- Ground. Image calibration handwork. “Ivanlight” aperture photometry code. ZP is propagated from the calibration measurements. Multiple SN position iterations.

-- WFPC2/PC. Standard HST processing with CRREJ. Use Rob's HST photometry package with an extention for the case of variable background.

-- NICMOS. Custom data processing. Use ideologically similar PSF fitting code for NICMOS data, with derived errors, bad pixel masks.

Ground-based “lightcurve”



Photometry as a function of measurement number

Galaxy Flux Parameterization

The galaxy flux is parameterizations are:

1) F = A * exp(- R / R0) / R0^2 / a / (1-a),

R = sqrt($(x'/a)^2$ + $(y'/(1-a))^2$),

x' = x cos(*alpha*) + y sin(*alpha*),

y' = y cos(*alpha*) - x sin(*alpha*).

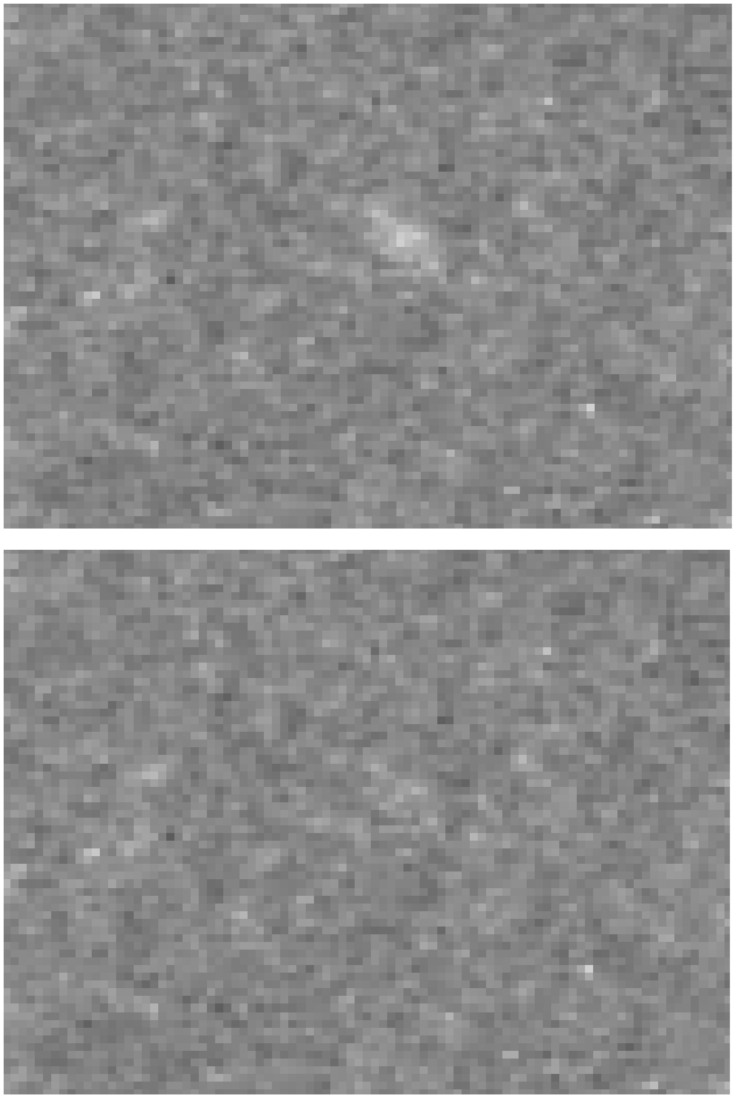
(This is an ellipsoidal shape with semimajor distance a, rotated by angle *alpha*, exponentially damped with characteristic distance R0)

2) F = A * exp(- R^2 / R0^2 / 2) / R0^2 / a / (1-a), ...

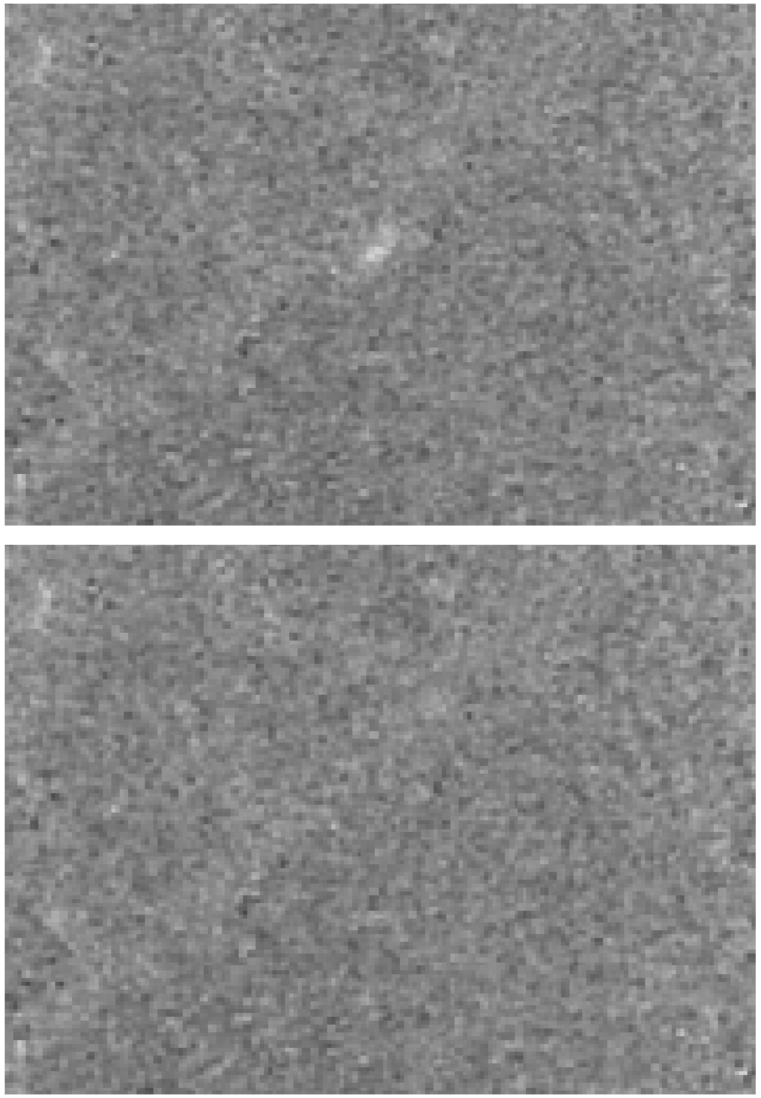
(This is a gaussian...)

The total of 6 independent parameters: A, R0, a, *alpha* + the central position.

Parameterization Residuals



WFPC2



NICMOS

WFPC2 data analysis

Standard Rob's package for WFPC2 data analysis with background galaxy parameterization extention.

The galaxy flux and position are free parameters in the fit.

The galaxy is faint, at the limit of CTE corrections applicability. The fit amplitude is 28% larger than the parameterized one, consistent with rough CTE estimates.

The galaxy/SN position errors are 0.3 WFPC2/PC pixels.

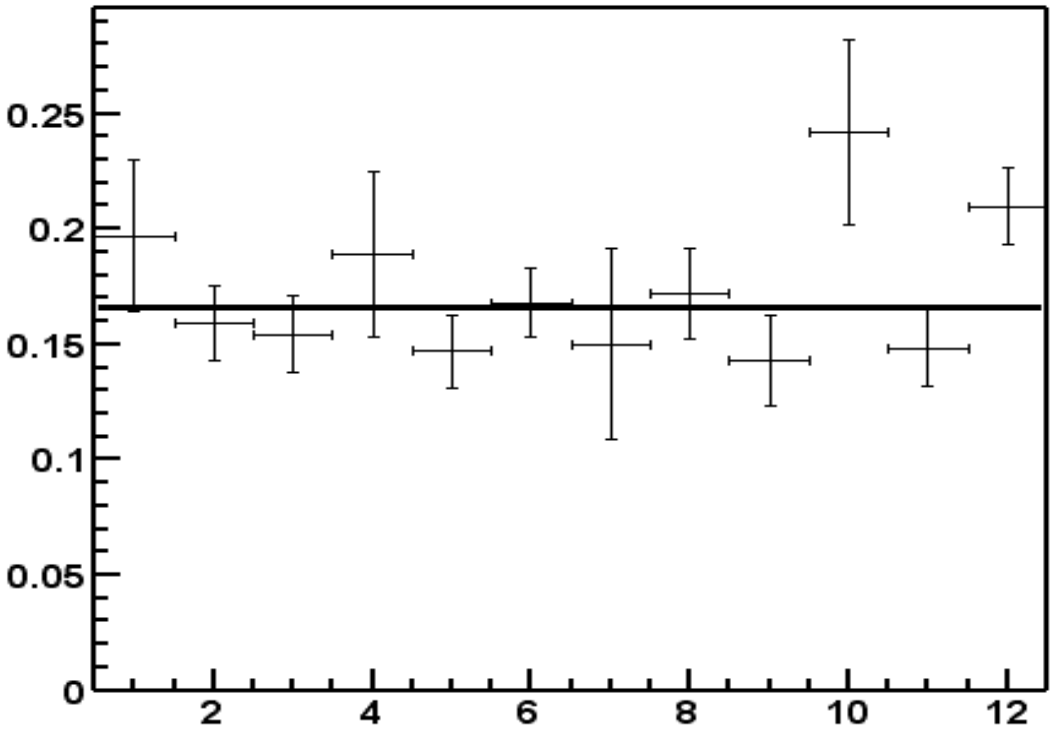
Get consistent results for exp/gauss background parameterizations.

Check with different TinyTIM models, based on time-varying SN template spectra. Get 2-3 % deviations max, small compared to 10 % errors.

Check with my own CRREJ processing and bad pixels removal – in progress.

NICMOS result

Use the SN/galaxy position from WFPC2 fit. The galaxy amplitude is rescaled from the final reference parameterization.



Flux vs. exposure #

Chi^2/DoF = 1.51

No obvious systematic pattern.

Flux = 0.1663 +/- 0.0057

(Drizzled image fit result is 0.1738 +/- 0.0040)

After large-angle correction, Flux = 0.172 +/- 0.006 counts/sec.

Rough Vega Mag = 24.44.

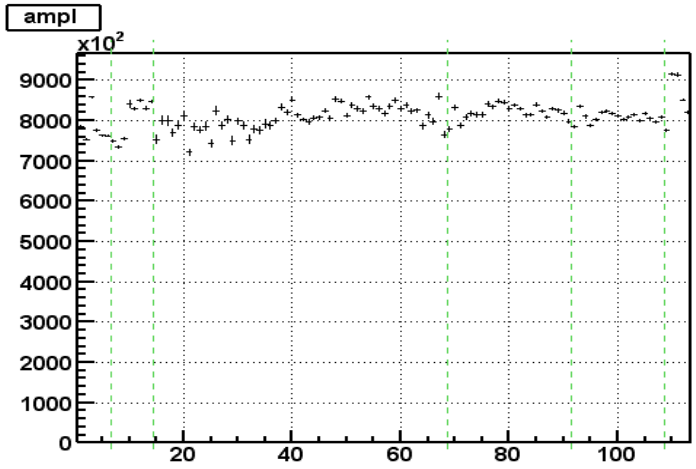
NICMOS Errors

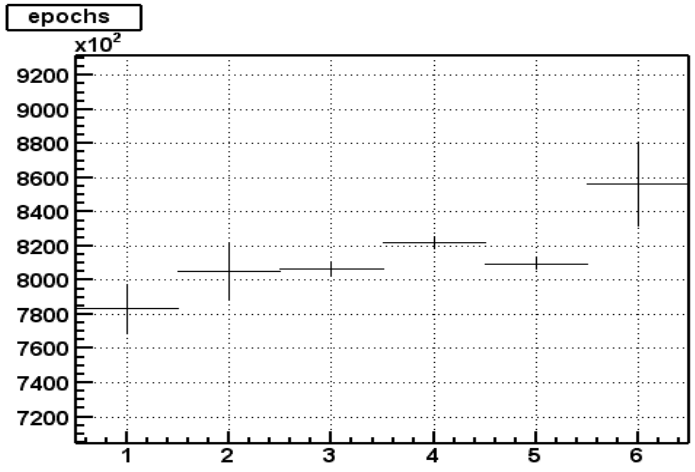
Systematic Effect	Estimated Error[%]
Position (matching final ref to the signal data)	2.0
Galaxy flux uncertainty	2.6
Galaxy shape error (Exp/Gauss)	0.4
Tiny TIM shape modeling	1.5
field position	1.2
PAM variation	0.6
cold mask wiggle	0.6
spectral dependence	0.4
SAA rejection algorithm	1.5
CR rejection	1.9
Nearby star diffraction ray	0.4
Photometric scale accuracy	2.0

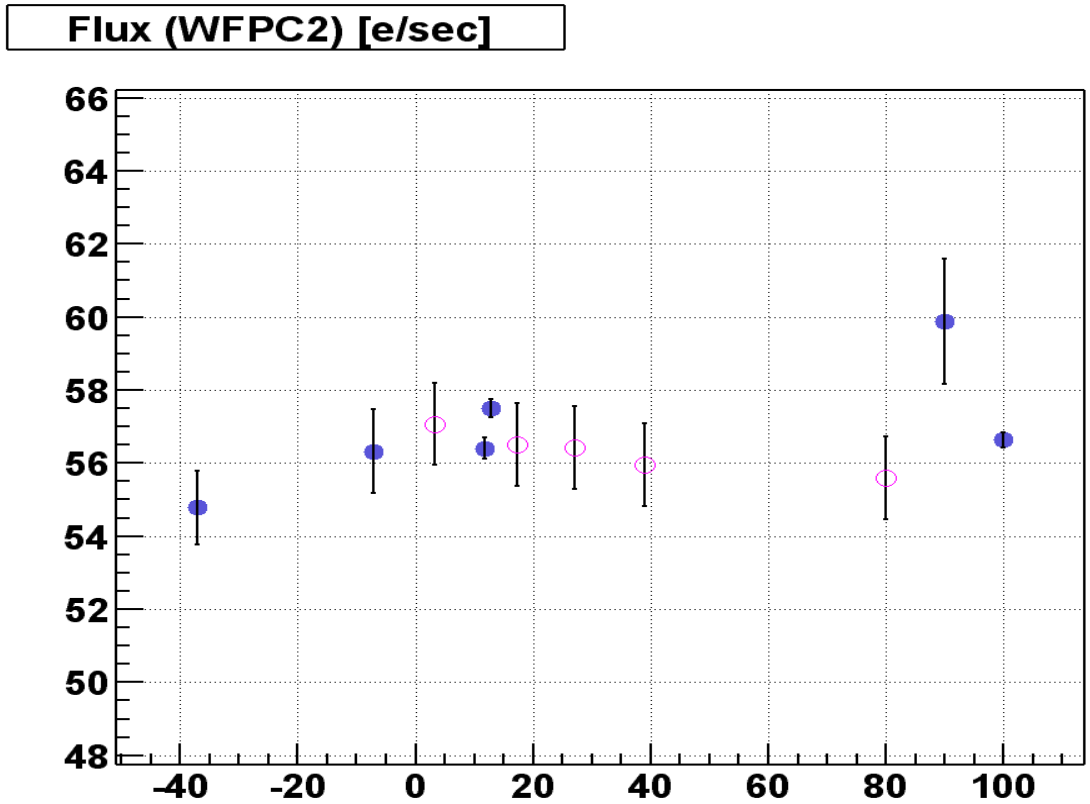
The combined systematic error is 4.8%.
The statistical error is 3.4%, or 5.0% if inflated according to Chi^2/nDof.
This gives a total of 6.9% combined error.

A field star cross-check

There is a single non-saturated field star in WFPC/PC images. We used it to chross-check the relative WFPC/ground calibration (Greg's idea).

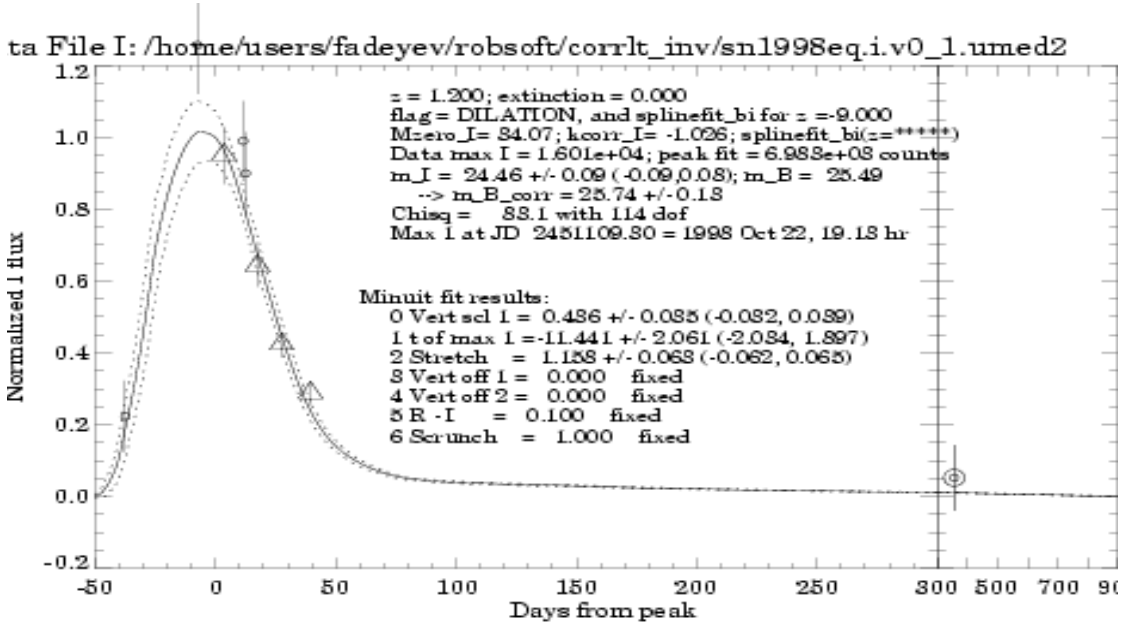


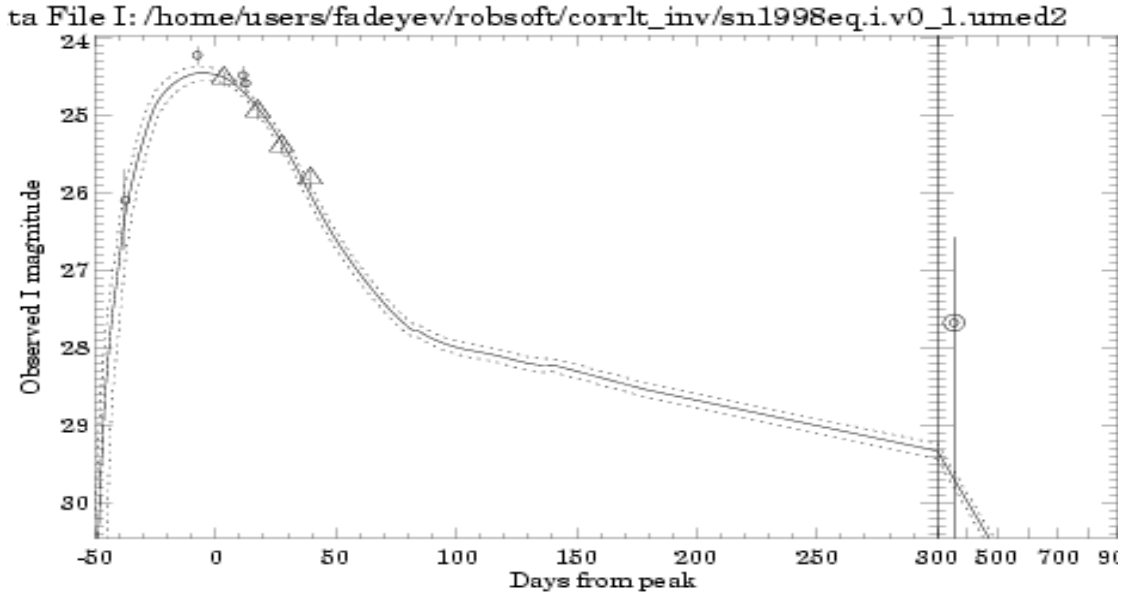




Ground (blue-filled) and WFPC2 (red-open) photometry scaled to WFPC2 fluxes. Final Ref. Dates are bogus.

A (bogus) lightcurve





A lightcurve with WRONG k-corrections etc. This is just to show that we have the photometry.

Show SN/gal flux ratios

To aid the spectral matching, we did the relative SN/host galaxy flux measurements:

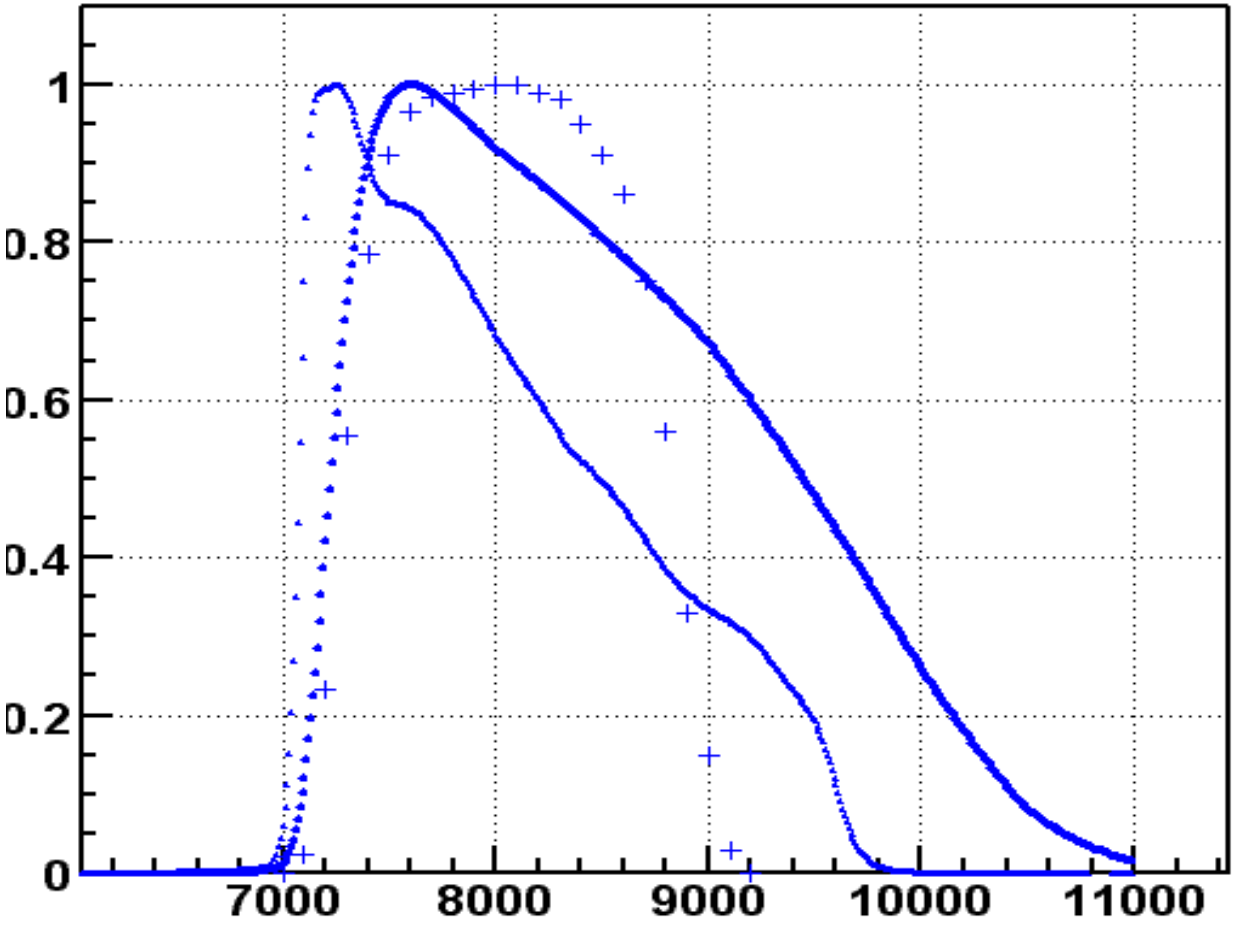
WFPC2, 8 days after max, Flux(SN)/Flux(galaxy) = 1.64 +/- 0.32.
NICMOS, 9 days after max, Flux(SN)/Flux(galaxy) = 1.35 +/- 0.20.

The I-band galaxy flux was obtained from the ground-based photometry.

Work plan

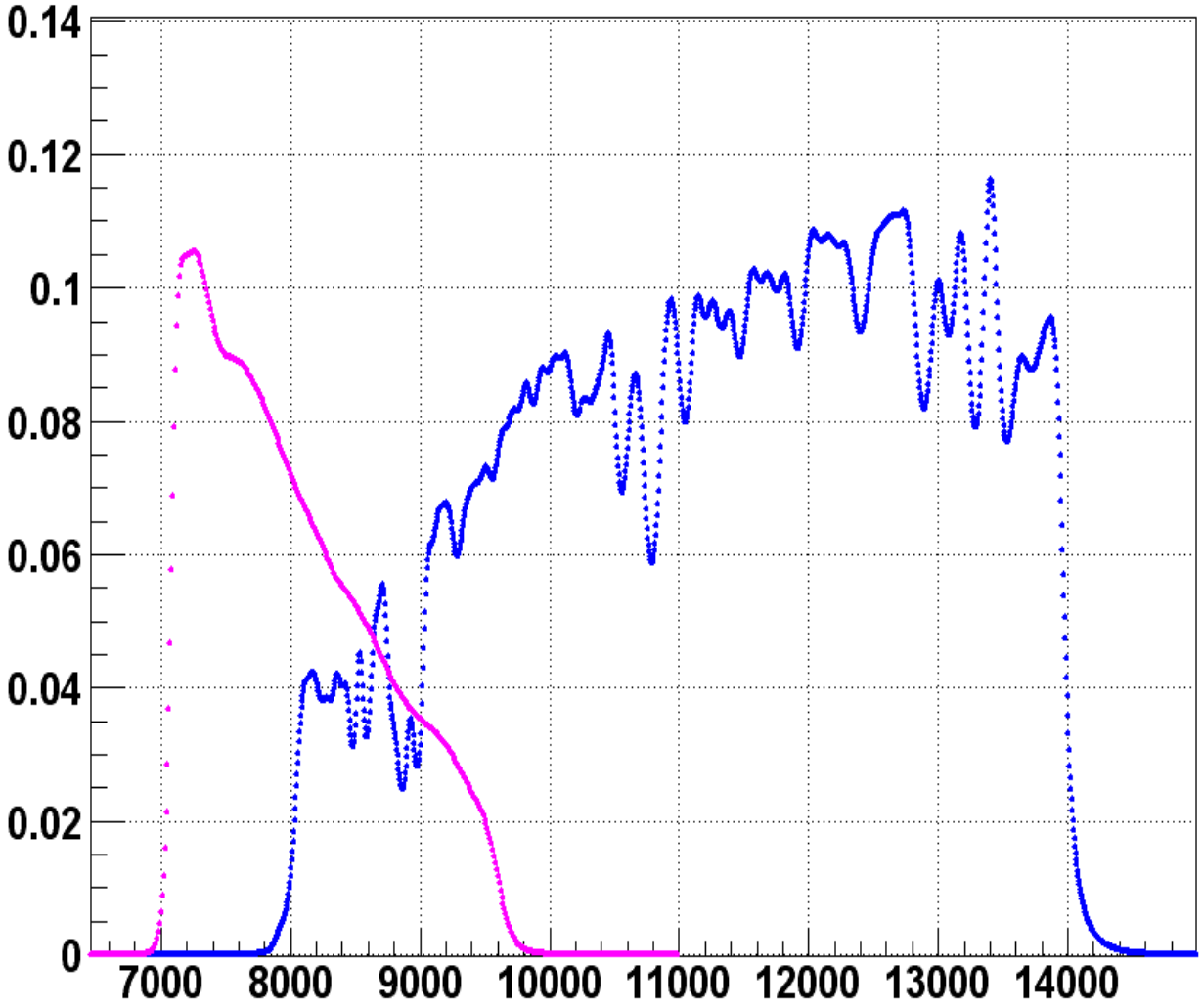
- **Complete the WFPC2 data cross-check**
- **Do proper K-corrections (Rollin)**
- **Do proper lightcurve fit, likely to be iterative process.**
- **Do cosmology**
- **Think about lensing**

I-band throughputs



750 nm -> 341 nm
950nm -> 432 nm
I -> U+B

F814W and F110W



800 nm -> 364 nm
1400nm -> 636 nm
"J" -> B+V

Albinoni FoV (WFPC2/PC)