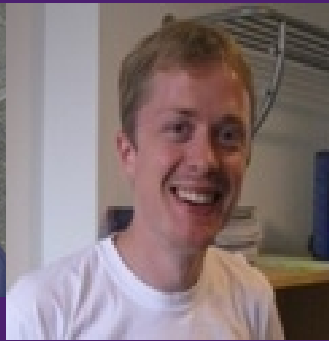


MCSS activities

Joe Anderson, U. de Chile (+Mario)



K. Takats!



Millennium Center for Supernova

Science (MCSS) overview

Organisation/funding

- PI: Mario Hamuy
- 3 universities: U. de Chile, Catolica, Andres Bello
- 4 other academics: Maza, Clocchiatti, Bauer, Pignata
- Currently 6 postdocs, and a number of students

- 3 years initial funding, which was renewed for additional 3 years in 2011

MCSS overview

5 research key projects

- 1. SNIa (*Alejandro Clocchiatti*)
 - 2. SNII (*Mario Hamuy*)
 - 3. SN/CSM interaction (*Franz Bauer*)
 - 4. SN rates (*Giuliano Pignata*)
 - 5. Robotic telescope (*Jose Maza*)
-
- **Smaller projects (Postdoc led):** (*I Ib, I bc, BL events: Bufano*);
(*SNe environments: Anderson*)

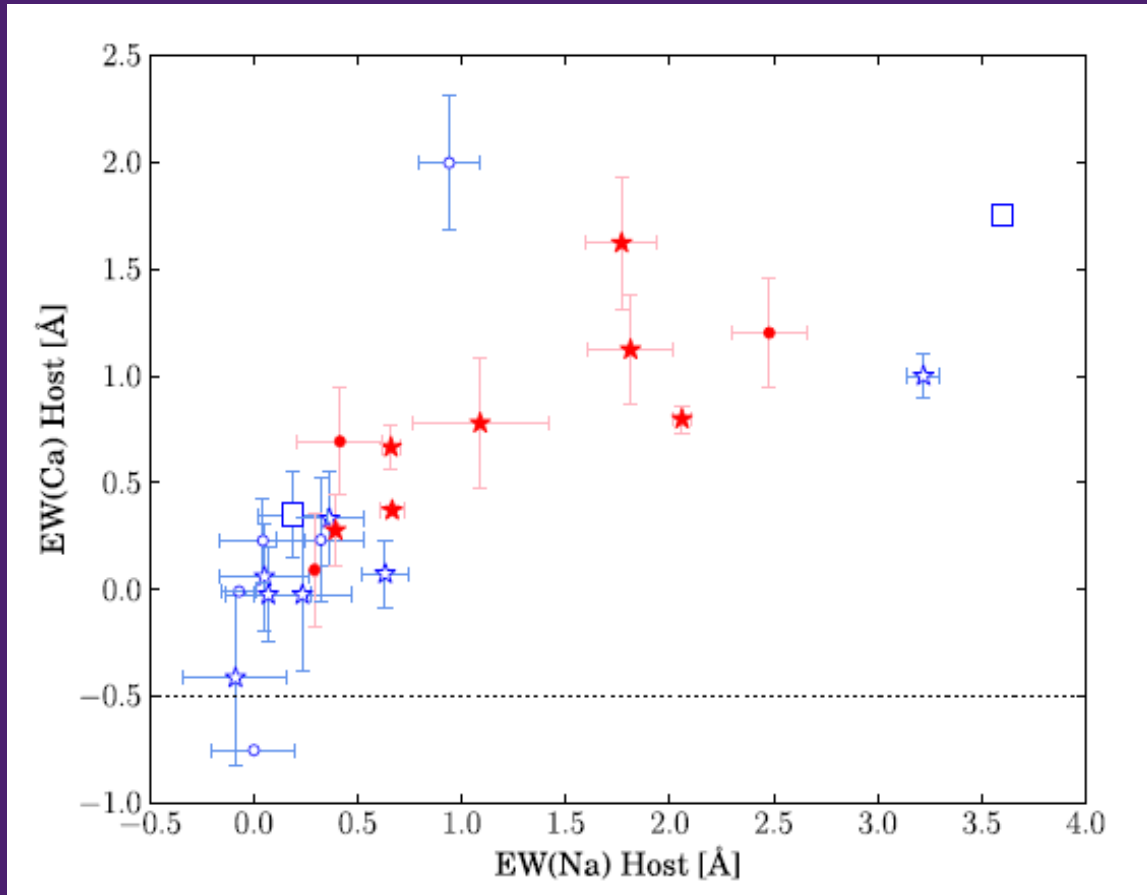
SNIa

Spectropol; sub-luminous; explosion models; LCs

(Clocchiatti, Bauer, Hamuy, Pignata, Forster, Gonzalez, Anderson)

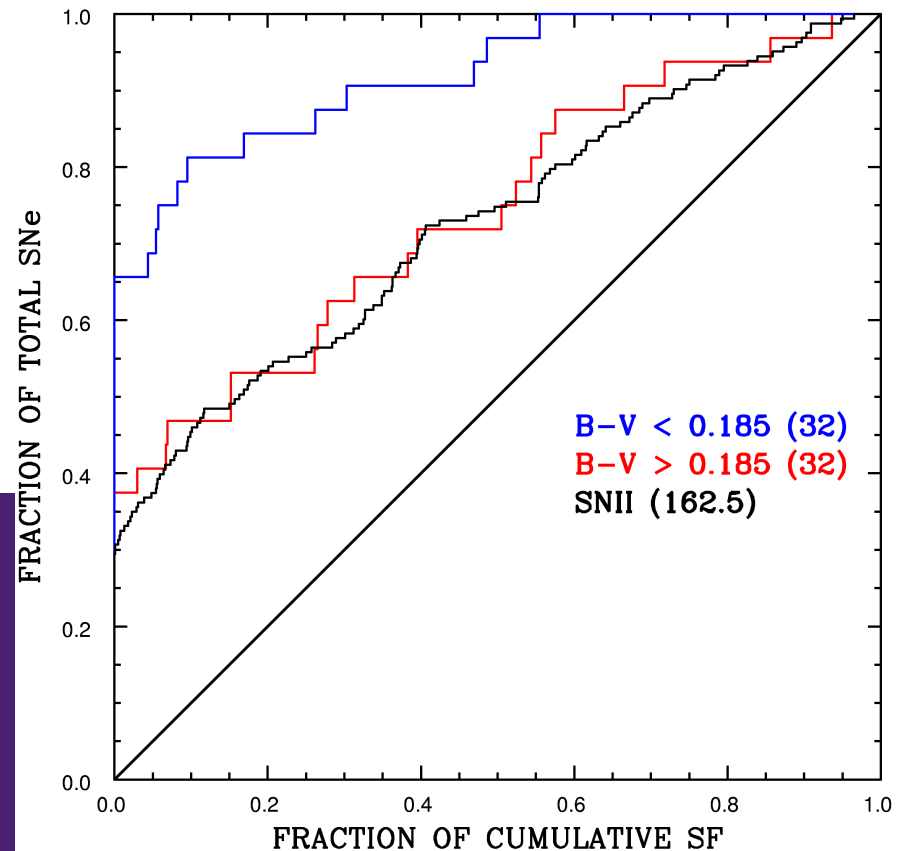
- **Polarisation measurements of nearby events**
 - asymmetries?
 - correlations with CSM?
- **PI of PESSTO sub-luminous events** (*S. Gonzalez*)
 - in collaboration with CSPI/CSPII
 - currently following one LSQ object
- **Explosion models/links to progenitors** (*F. Forster*)
- **SNIa LCs, asymmetries, and environments** (*J. Anderson*)
 - using literature databases of LCs
 - correlations with spectral properties/environments

SNIa Sampler



<-- Higher neb. velocity
SNe have higher
NaD EWs (*Forster et al.*
2012, ApJ, 754L, 21)

'Redder' SNe are more strongly
associated with SF regions -->
(*Anderson et al. in prep.*)



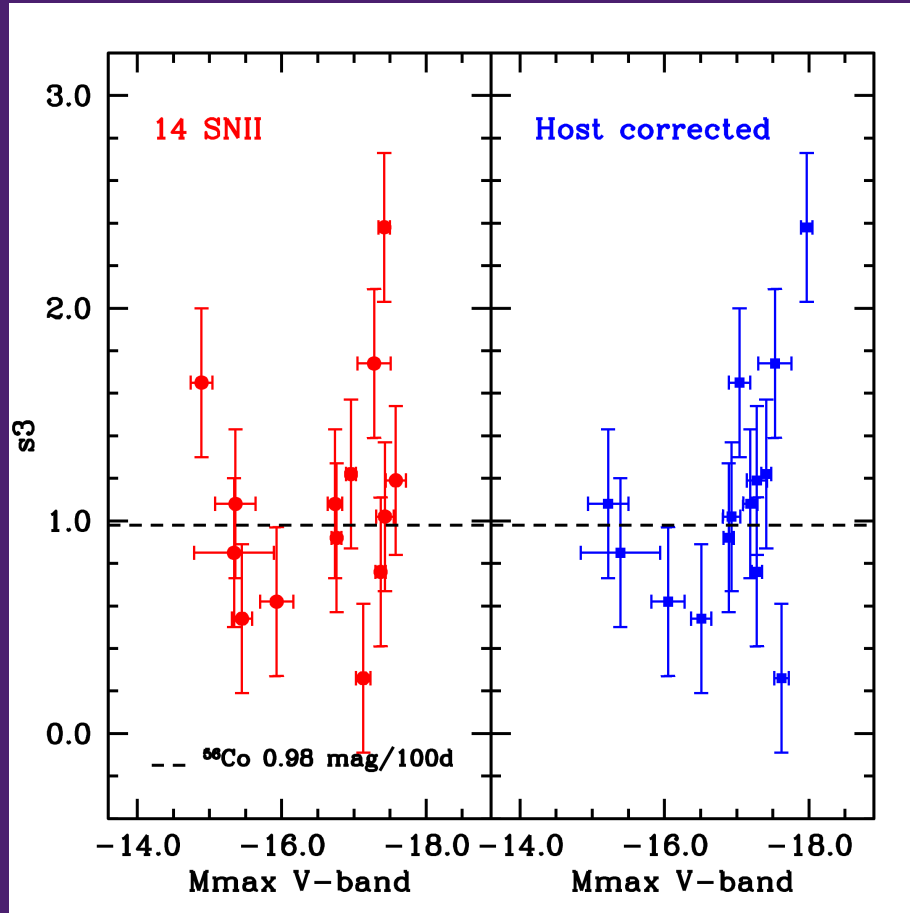
SNII

Optical LCs; infrared LCs; spectra; bolometric; distances

(Hamuy, Maza, Pignata, Anderson, Gonzalez)

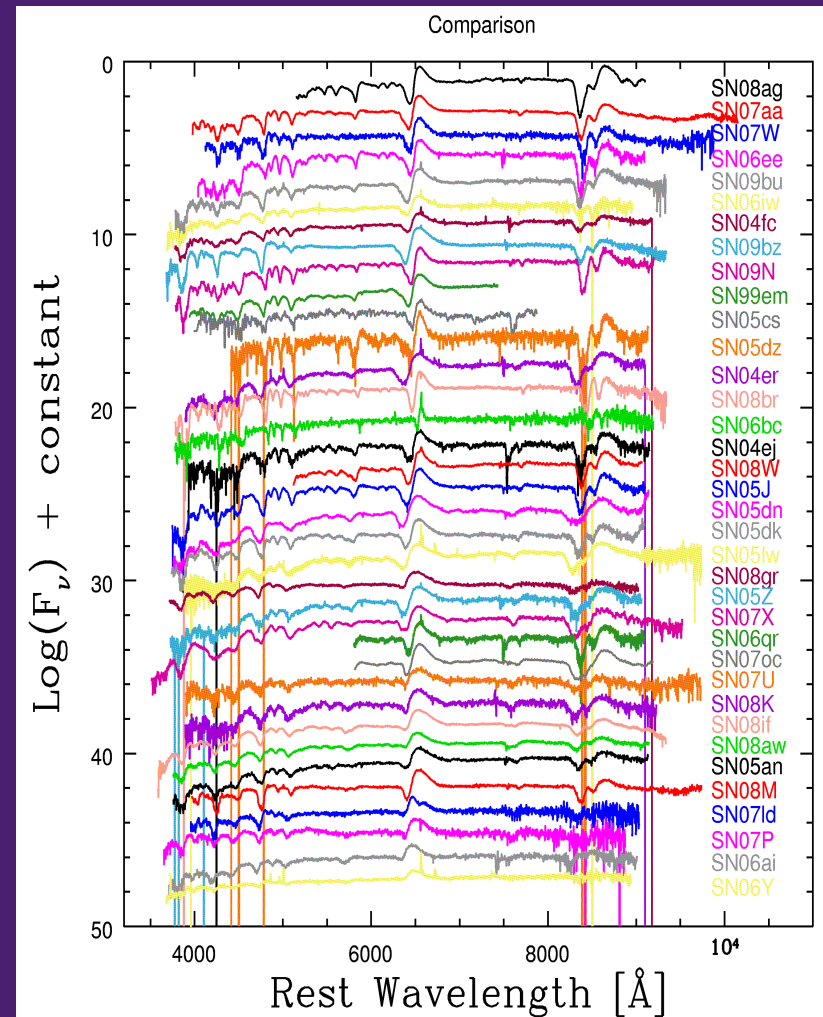
- **Optical light-curves: CATS & CSPI** (*J. Anderson*)
 - LC morphologies -> see tomorrow!
 - links to progenitor/explosions
- **Infrared light-curves: CATS & CSPI**
 - near-IR distances
- **Spectra: CATS & CSPI** (*C. Gutierrez*)
 - correlations with LCs -> see tomorrow!
- **Bolometric** (*collaboration with Melina Bersten*)
- **Distances: CSPI**
 - distance refinement, use of near-IR
 - search for photometric relation?

SNII Sampler



<-- M_{\max} – tail decline rate:
CATS data (*Hamuy et al.*
in prep.)

Spectral sequence, CSPI SNII -->
Ordered by decline rates
(*Gutierrez et al. in prep.*)



SN/CSM interaction

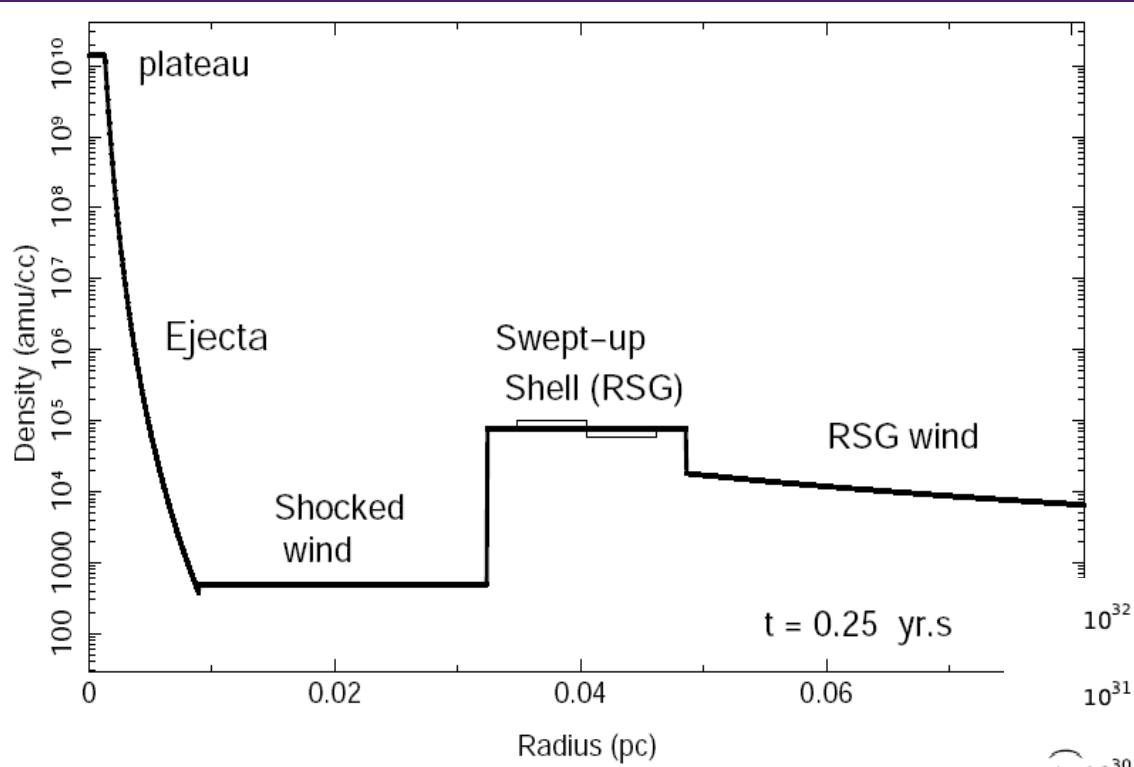
Multi-wavelength studies: ALMA, VLA, X-rays, optical, IR, spectpol

(Bauer, Bufano, Forster)

- SNIIn
- SNIbc/IIb/BL events
- Investigation of CSM properties and pre-SN mass-loss episodes
- Several ALMA projects in the pipeline...

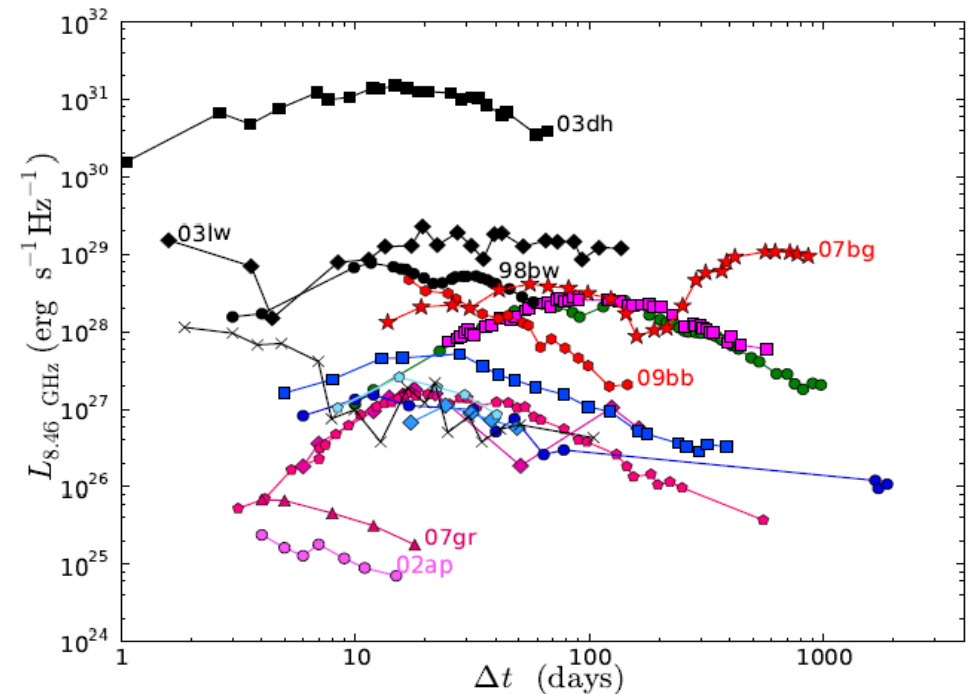
SN/CSM interaction

Sampler



<-- Modeling of CSM of SN1996cr (IIn)
 (Dwarkadas, Dewey & Bauer, 2010, MNRAS 407, 812)

Radio study; SN2007bg -->
 distinct CSM regimes in
 SNIc... (Salas et al. 2012,
 MNRAS, accepted)



SN rates

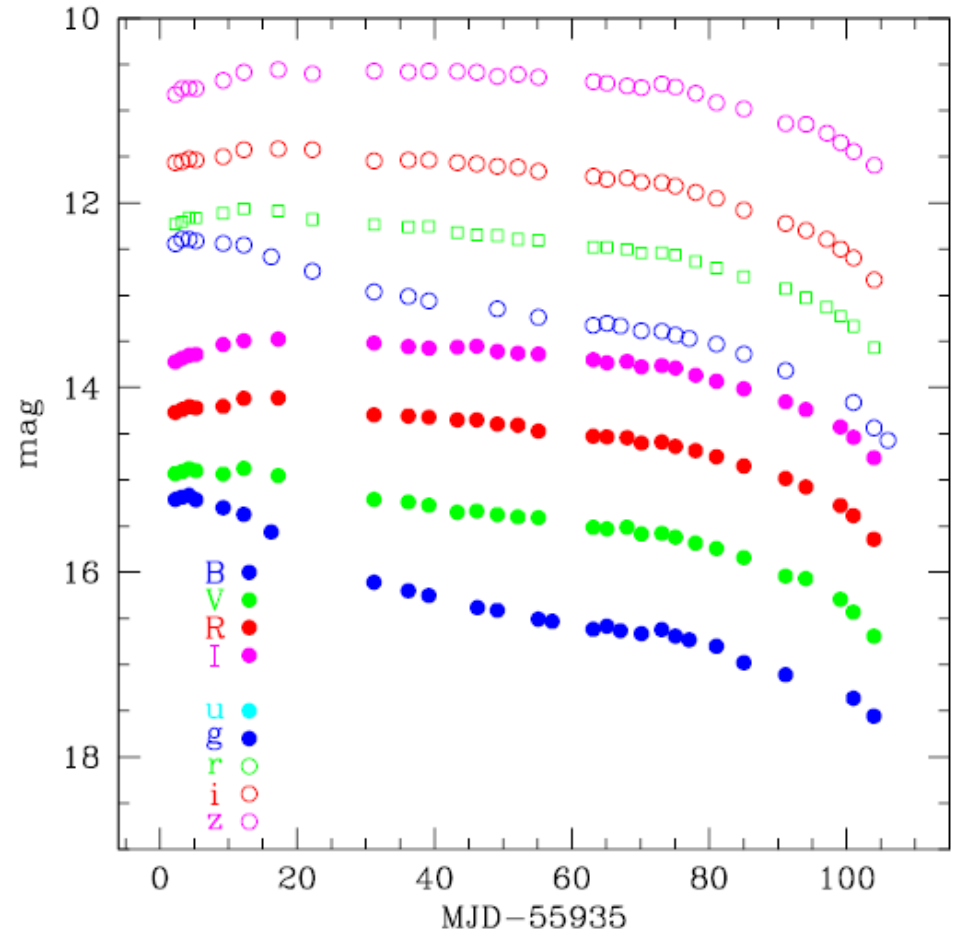
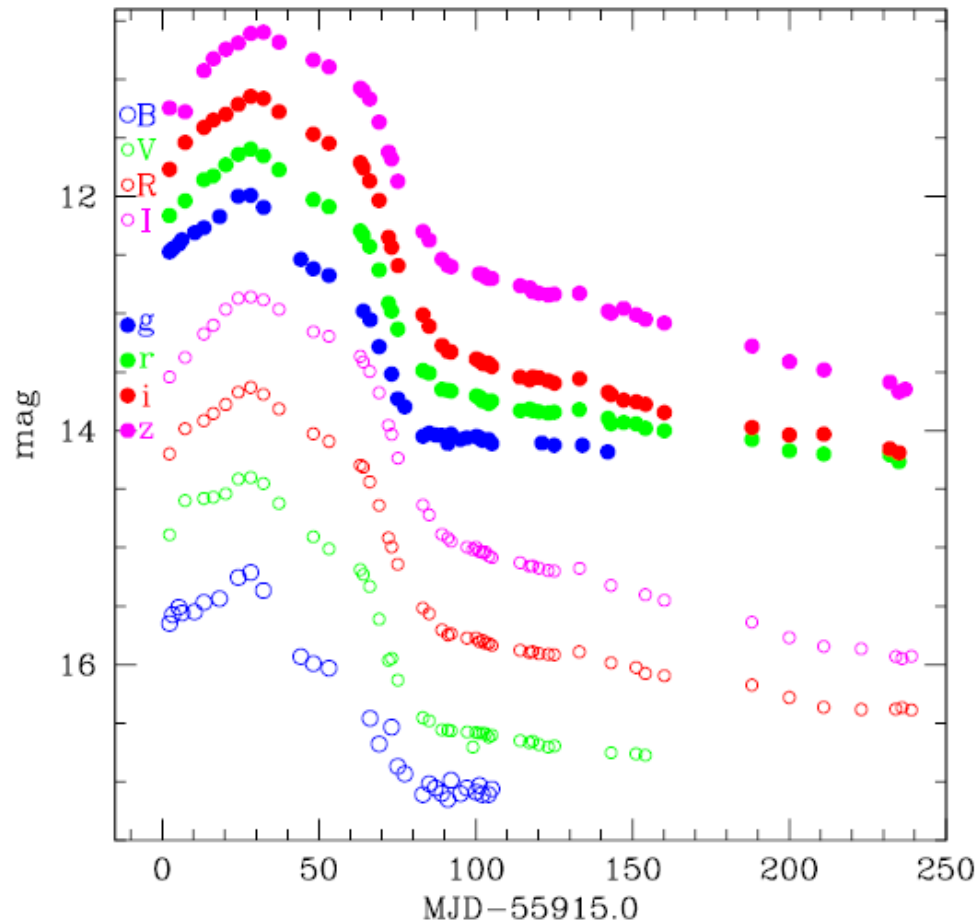
CHASE (PROMPT/TRAPPIST/MINITAO); SUDARE

(Pignata, Maza, Hamuy, Gonzalez, Forster, Anderson, Bufano)

- **Low-z rates in optical: PROMPT/TRAPPIST/CHASE-500**
 - targeted search operating since 2007
 - in 2008-2009 contributed many CSPI SNe
 - 2010A/B rapid-follow-up, high cadence search
 - PROMPTs now dying...
- **Low-z rates in near-IR: MINITAO**
 - searching 'normal' galaxies for 'missing' SNe
- **High-z rates: SUDARE/ULTRAVISTA**
 - SUpernova Diversity And Rate Evolution
 - 0.3-0.8 redshift

SN rates

Sampler



- SNII discovered and followed by CHASE...

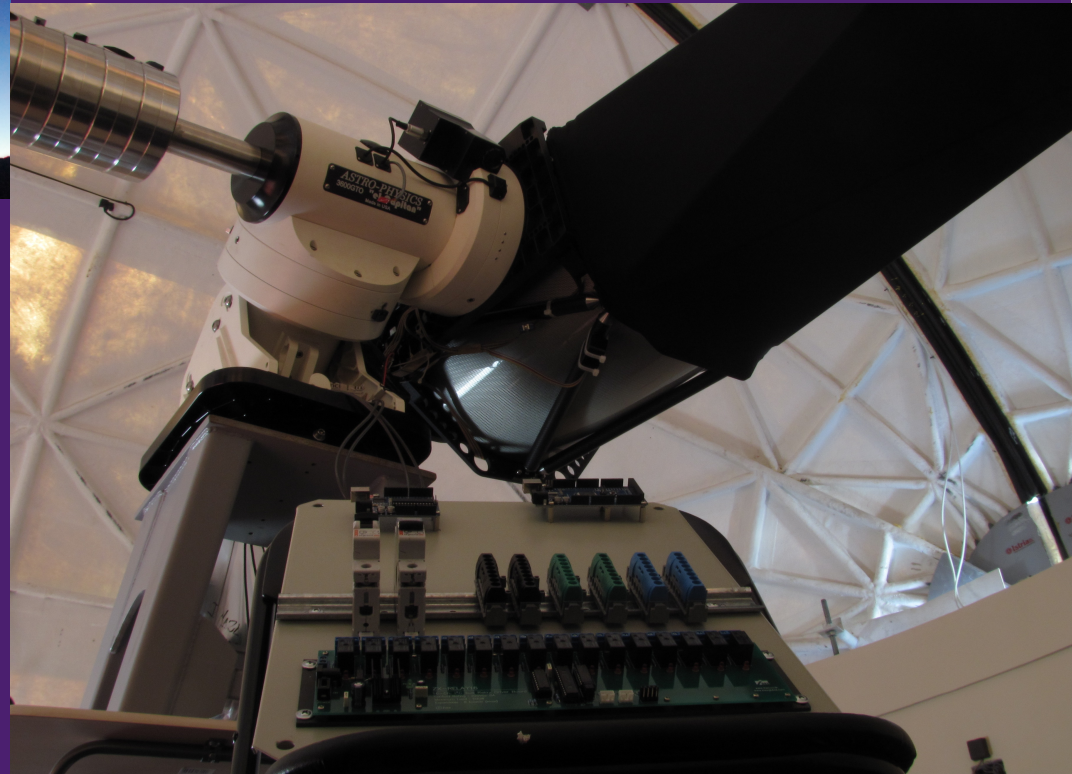
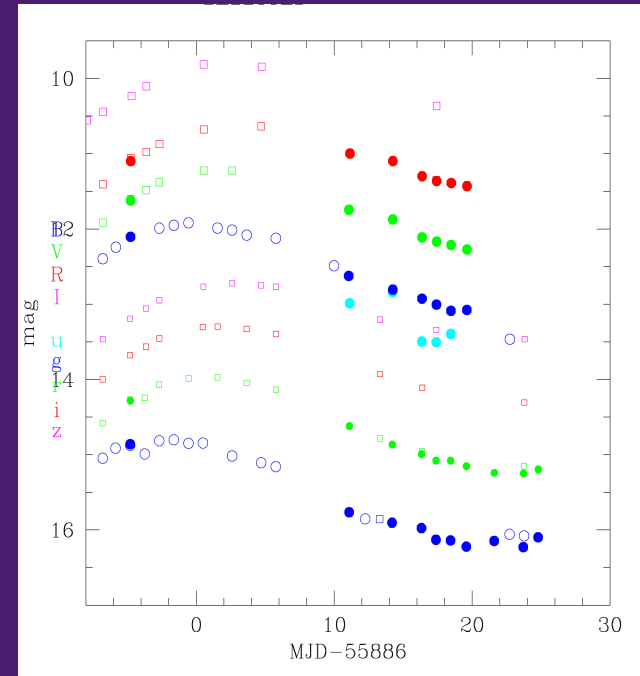
Robotic Telescope

Engineering; search; follow-up

(Maza, Hamuy, Pignata, Gonzalez, + engineers...)

- **MCSS 50cm telescope: CHASE-500**
 - fully robotic 50cm telescope at Cerro Tololo
 - 18'x18' FOV, 2048x2048 pixels, 0.54" pixel size
 - *ugrizBVRI*
 - fully operational since Feb. 2012
- **100% owned/run by MCSS**
- **Search strategy?**
 - very high cadence?
 - use as follow-up telescope?
- **Photometric follow-up**
- **Spectroscopic follow-up?**

Robotic Telescope Sampler



MCSS summary/the future

- The most successful southern hemisphere SN search
 - CHASE: ~150 SNe thus far
- The Chilean SN community in one collaboration
- Productive history of collaboration with CSPI/CSPII
 - leading SNII analysis (*Hamuy & Anderson*)
 - previous work on SNIa (*Folatelli*)
 - sub-luminous SNIa (*Gonzalez*)
 - efficient 'sharing' of telescope time

- ~2 more years of current funding
- Expansion to 'Institute'?