Supernova Science at LCOGT

D. Andrew Howell (Las Cumbres Observatory Global Telescope Network and University of California, Santa Barbara)

What is LCOGT?

LCOGT is a privately funded global telescope network with headquarters in Santa Barbara, California, loosely affiliated with UCSC. We are building a robotic network of 15 1-meter telescopes and 20 0.4-meter telescopes to supplement our existing 2 meters: Faulkes Telescope North and South.

Our focus is time-domain astronomy, especially supernovae and extrasolar planets (approximately half the science staff study supernovae and the other half study extrasolar planets).

Each site will have 2-3 1m telescopes (primarily for science) and 2-4 0.4m telescopes (primarily for education).

We have ~50 employees at LCOGT headquarters in Santa Barbara, including 13 PhD astronomers. Others are based at Liverpool, Cardiff, Hawaii, and Australia.

People

Institutionally, LCOGT is involved in the Pan-STARRS1 and Palomar Transient Factory (PTF) collaborations. In addition, various scientists are involved in their own collaborations. The SN group is:

D. Andrew Howell Staff Scientist, Adjunct Faculty, UCSC Involved in Supernova Legacy Survey, La Silla Supernova Search, the HST UV program, and co-leader of the PTF SN program.


Federica Bianco Postdoctoral Fellow Using SNLS data to search for signs of SN in progenitors (see oral session 308.07 today).

Ben Dilley Postdoctoral Fellow Interested in MENEACS cluster SN search (see oral session 308.06 today).

Melissa Graham Postdoctoral Fellow Involved in MENEACS cluster SN search (see oral session 308.06 today).

Jared Parente Graduate Fellow Studying Carbon in early SN ia spectra.

Collaborations

The Palomar Transient Factory (PTF) is a sky survey visiting thousands of square degrees in a 2 to 5 day cadence in g or r band, discovering ~800 SNe/yr. It uses the CFHT12k camera on the Palomar 48-inch, giving a 7.8 sq. deg. FOV. 60s exposures reach limiting mags of R=20.5, g=11.

The network currently features two 2m robotic telescopes: Faulkes North in Haleakala, Hawaii, and Faulkes South in Siding Spring, Australia. They have optical imaging cameras. A spectrograph is being built.

The first 1m telescope is built and is being commissioned in Santa Barbara with a temporary camera. Several more 1m telescopes are being assembled. The first will go to CTIO.

The prototype 1m camera, SINISTRO (above, 26 sq. arcmin², 0.389”/pix.), is being built in Santa Barbara.

Telescopes and Instruments

The first will go to Palomar Transient Factory (PTF) with a temporary camera. Several more 1m telescopes are being assembled. The first will go to CTIO.

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Science

2010 Supernova papers with LCOGT authors (24 total).

Highlights

Posterozzi et al. 2010 (PSI) Yellow points show SN 2010an, an extremely luminous CCSN discovered by PSI and followed by PTF. The SNe seem to be connected to SN 2006X, but the explosion mechanism is unknown.

Nall et al. 2010 Extreme core-collapse SNe (those with peak M_V>21), points, prefer discs, low-mass host galaxies. Contours are galaxy luminosities, and right axis is the core-collapse distribution from Arcavi et al. 2010 (PTF).

Sullivan et al. 2010 (SNIa) SN is a residual from the bubble diagram (after converting for SN spectrum shape and color), M_V<0.08 and 0.02 mag different in galaxies higher or lower than M_V=10^{−10} M☉.