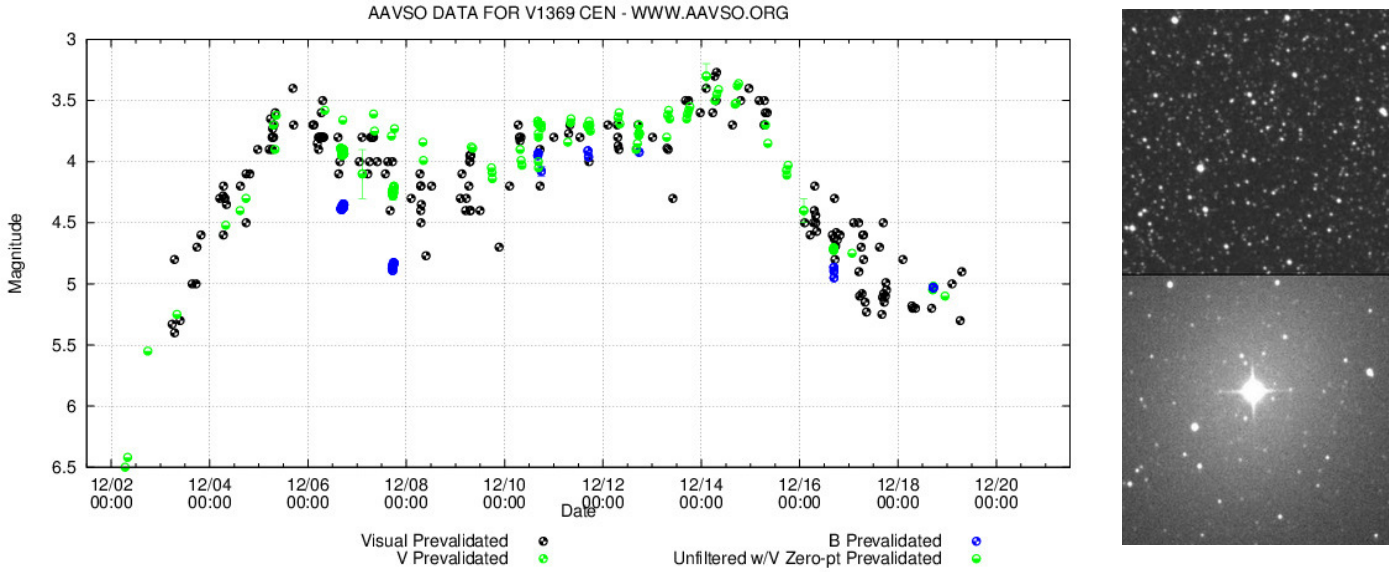
V1369 Cen : a naked-eye nova erupts in Centaurus!

On Monday, December 02, amateur astronomer John Seach from Chatsworth islands of New South Wales (Australia) reported the discovery of a new star (5.5m) in the constellation Centaurus, not far from Beta Centauri. A nova is a massive nuclear explosion on a dying star. These stars - white dwarfs - are the final evolutionary stage of Sun-like stars. This Nova is the second naked-eye nova burst in a couple of months! And it's even brighter than Nova Delphini 2013.

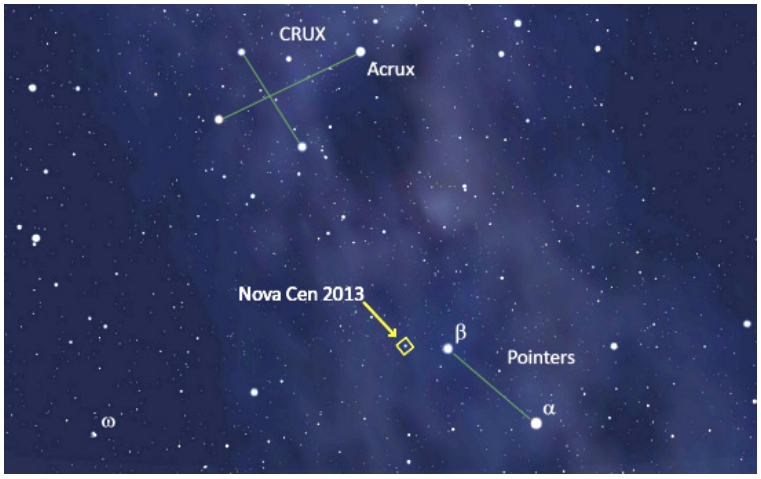
About 40 nova explosions erupt in the Milky Way each year, but only about a quarter of them are actually observed. Once a nova is observed, a light curve can be compiled, and based on the curve it is classified as either a fast, slow, very slow, or recurrent nova. The brightest nova of the latest decades was Nova Cygni 1975, which reached mag 2.0. Recent Nova Delphini appeared in August 2013 reached mag 4.3. The Nova in Centaurus quickly reached 3.2m on Dec 14th, breaking the top 20 brightest new stars of all time.



Nova Centauri 2013 photometric observations between 12/3/2013 and 12/19/2013. The chart is generated by the AAVSO web service. Comparison images (right) are based on data collected with the Danish 1.54-m telescope at the ESO La Silla Observatory

On December, 03 the discovery was confirmed by other astronomers, and the AAVSO has issued a notice about the nova burst with the number 492. The nova has been assigned the designation V1369 Cen.

Brian Skiff (Lowell Observatory, USA) has suggested that the possible progenitor star is 3UC 062-280459 (J2000.0 coordinates 13 54 45.35 -59 09 04.1), and notes that there is an XMM-Newton x-ray source 2″ away. A recent (2010) paper by Richard Strope, Bradley Schaefer and Arne Henden presents a modern classification system for novae, based solely on the appearance of the light curves – "Catalog of 93 Nova Light Curves: Classification and Properties" can be downloaded from arXiv.



Nova Centauri 2013 *(RA: 13h 54m 45s DEC: -59d 09m 04s)*
Discovery date*: 2013 December 02.692 UT*

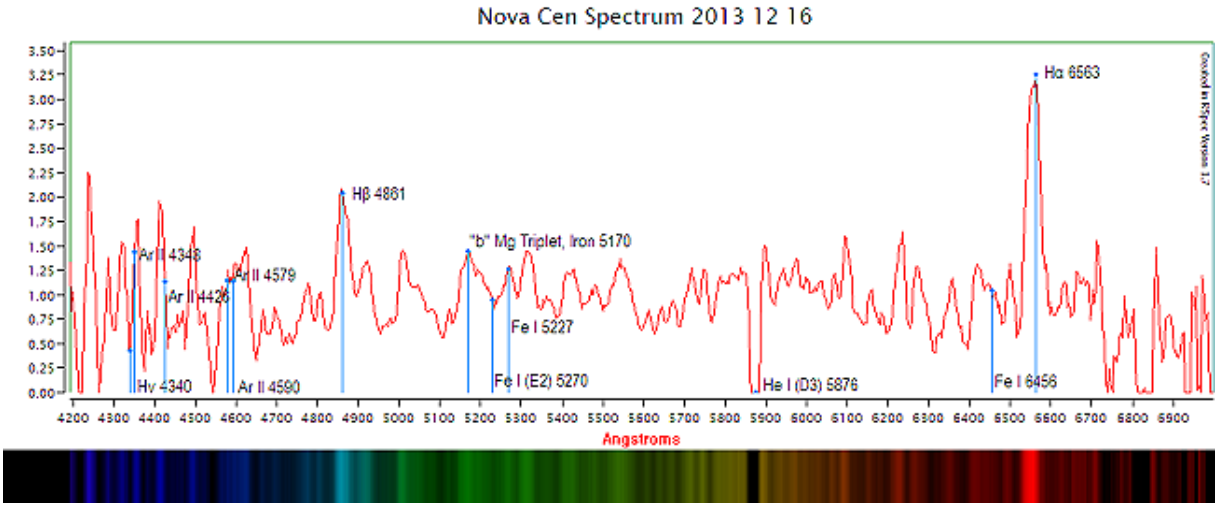
The object is very probably identical with a ~ 15 mag star USNO-B1.0 0308-0442031 = 2MASS 13544534-5909040 = UCAC4 155-128029, which was identified as a probable progenitor of the possible nova. If the identification is correct, the estimated amplitude of the outburst is ~ 10 mag, which is consistent with the outburst of a classical nova.

This should not be confused with a *supernova*, the last of which observed in our galaxy was Kepler's Supernova in 1604, just before the advent of the telescope in modern astronomy.

Soon after the discovery the nature of the burst was confirmed by spectroscopic observations.

Spectra of the Nova Centauri 2013 shows dominating peaks of Ha and Hb lines, which means the outburst is a classical nova. Below a spectra of the Nova taken on Dec 16 by Jerome Jooste is shown. A spectra taken by Malcolm Locke (New Zealand) and Rob Kaufman (Australia) also detected the strong and broad hydrogen emission lines typical of novae early in outburst,when a white dwarf star accreting matter from a binary companion until a new round of nuclear fusion occurs.

There is no reliable distance measurement for Nova Cen 2013 published yet.



Jerome Jooste has been taking spectra of the Nova; the example is taken on December 16. Credit: Jerome Jooste (2013)

Novae are distant cousins to Type Ia supernovae. In novae, the surface of the white dwarf produces a powerful explosion, but the white dwarf itself survives. In a Type Ia supernovae, the white dwarf accumulates just enough mass from its binary partner to be pushed above the Chandrasekhar limit of about 1.4 solar masses. This triggers a massive thermonuclear explosion that blows the entire white dwarf to smithereens. In the last 112 years, 48 novas have brightened into naked-eye view.

There are 10 known galactic recurrent novae (Schaefer, Bradley E., 2009) The recurrent nova typically brightens by about 8.6 magnitude, whereas a classic nova brightens by more than 12 magnitude. Below some good known exmaples of recurrent novae are listed to observe fairly easy.

Galactic recurrent novae

Object Designation	Short Name	Mag. Range	Days to drop 3 mag from peak	Eruption years
RS Ophiuchi	RS Oph	4.8–11	62	2011, 1967, 1944, 1920, 1902
T Coronae Borealis	T CrB	2.5–10.8	14	2006, 1985, 1967, 1958, 1933, 1898
T Pyxidis	T Pyx	6.4–15.5	6	1946, 1866
U Scorpii	U Sco	7.5–17.6	2.6	2010, 1999, 1987, 1979, 1936, 1917, 1906, 1863

Resources for further reading:

http://www.cbat.eps.harvard.edu/unconf/followups/J13544700-5909080.html
http://www.aavso.org/aavso-alert-notice-492
http://ooruri.kusastro.kyoto-u.ac.jp/mailarchive/vsnet-alert/16689
http://southern-sky-observations.blogspot.com/2013/12/nova-centauri-2013.html
http://phys.org/news/2013-12-naked-eye-nova-erupts-centaurus.html
http://www.aavso.org/vsx/index.php?view=detail.top&oid=358927
http://www.cbat.eps.harvard.edu/nova_list.html

Schaefer, B. E., 2010; Astrophys. J., Suppl. Ser., 187, 275
VizieR Catalog: http://cdsarc.u-strasbg.fr/viz-bin/Cat?J/ApJS/187/275

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