

# The High Desert Observer

## May 2017



The Astronomical Society of Las Cruces (ASLC) is dedicated to expanding public awareness and understanding of the wonders of the universe. ASLC holds frequent observing sessions and star parties and provides opportunities to work on Society and public educational projects. Members receive the *High Desert Observer*, our monthly newsletter, plus membership to the Astronomical League, including their quarterly publication, *Reflector*, in digital or paper format.

Individual Dues are \$30.00 per year

Family Dues are \$36.00 per year

Student (full-time) Dues are \$24.00

Annual dues are payable in January. Prorated dues are available for new members. Dues are payable to ASLC with an application form or note to: Treasurer ASLC, PO Box 921, Las Cruces, NM 88004. Contact our Treasurer, Patricia Conley (treasurer@aslc-nm.org) for further information.

*ASLC members receive electronic delivery of the HDO and are entitled to a \$5.00 (per year) Sky and Telescope magazine discount.*



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### ASLC Board of Directors, 2017

[Board@aslc-nm.org](mailto:Board@aslc-nm.org)

President: Howard Brewington; [President@aslc-nm.org](mailto:President@aslc-nm.org)

Vice President: Rich Richins; [VP@aslc-nm.org](mailto:VP@aslc-nm.org)

Treasurer: Patricia Conley; [Treasurer@aslc-nm.org](mailto:Treasurer@aslc-nm.org)

Secretary: John McCullough; [Secretary@aslc-nm.org](mailto:Secretary@aslc-nm.org)

Director-at-Large: Sidney Webb; [Director1@aslc-nm.org](mailto:Director1@aslc-nm.org)

Director-at-Large: Ed Montes [Director2@aslc-nm.org](mailto:Director2@aslc-nm.org)

Immediate Past President: Daniel Giron; [astrofix@comcast.net](mailto:astrofix@comcast.net)

### Committee Chairs

ALCor: Patricia Conley; [tconley00@hotmail.com](mailto:tconley00@hotmail.com)

Apparel: Howard Brewington; [comet\\_brewington@msn.com](mailto:comet_brewington@msn.com)

Calendar: Chuck Sterling; [csterlin@zianet.com](mailto:csterlin@zianet.com)

Education: Rich Richins; [Education@aslc-nm.org](mailto:Education@aslc-nm.org)

Grants: Sidney Webb; [sidwebb@gmail.com](mailto:sidwebb@gmail.com)

Loaner Telescope: Sidney Webb; [sidwebb@gmail.com](mailto:sidwebb@gmail.com)

Membership: Judy Kile; [judykile3916@gmail.com](mailto:judykile3916@gmail.com)

Observatories:

Leasburg Dam: David Doctor; [astrodoc71@gmail.com](mailto:astrodoc71@gmail.com)

Tombaugh: Steve Shaffer; [sshaffer@zianet.com](mailto:sshaffer@zianet.com)

Outreach: Chuck Sterling; [csterlin@zianet.com](mailto:csterlin@zianet.com)

Web-Site: Steve Barkes; [steve.barkes@gmail.com](mailto:steve.barkes@gmail.com)

HDO Editor: Charles Turner; [turnerc@stellanova.com](mailto:turnerc@stellanova.com)

*Masthead Image: February 10, 2017 From Las Cruces, Moon rising over the Organ Mts in Penumbral Eclipse.*

### May Meeting --

Our next meeting will be on **Friday, May 19**, at the Good Samaritan Society, Creative Arts Room starting at 7:00 p.m.

The speaker will be John W. Briggs, President  
Antique Telescope Society

Topic: Confessions of an Antique Telescope Collector

### Member Info Changes

All members need to keep the Society informed of changes to their basic information, such as name, address, phone number, or email address. Please contact [Treasurer@aslc-nm.org](mailto:Treasurer@aslc-nm.org) and [jkile3916@gmail.com](mailto:jkile3916@gmail.com) with any updates.

### Events

ASLC hosts deep-sky viewing and imaging at our dark sky location in Upham. We also have public in-town observing sessions at both the International Delights Cafe (1245 El Paseo) and at Tombaugh Observatory (on the NMSU Campus). All sessions begin at dusk.

At our Leasburg Dam State Park Observatory, we hold monthly star parties. Located just 20 miles north of Las Cruces, our 16" Meade telescope is used to observe under rather dark skies. Please see *Calendar of Events* for specific dates and times.

# What's Up ASLC?

May 2017

In spite of cloudy conditions at our Moon Gaze event, April was a very productive month for the Las Cruces Astronomical Society. Our star parties at Tombaugh and Leasburg observatories enjoyed large crowds. College students from El Paso, local amateurs, and novices were treated to views of the moon, the Great Orion Nebula, and the planet Jupiter.



These public observing sessions are a great way for new members to meet some of the hard-core folks of ASLC that do outreach for our club. And, these events also offer the opportunity for newbies to check out various types and sizes of telescopes. Most of our members' scopes are store bought, but we still have some individuals in our society with homemade instruments with hand ground optics.

Speaking of optics, I plan to do a presentation early next year on mirror making. I made my first mirror in 1988. This was before the Internet, so I read all available literature on the subject and asked a lot of questions. Unfortunately, there were only a couple of people in my home state of South Carolina that had made mirrors. So basically, I was working in a knowledge vacuum and dealing with a HUGE learning curve. Although I made many mistakes along the way, I was able to grind and polish my first mirror. Then, came parabolizing.

That first mirror, an 8-inch f/4.3, was too fast to leave its optical surface spherical. So, I did additional reading on the construction of a Foucault knife-edge mirror tester. I'd never heard of Frenchman Leon Foucault, but I had read about another one of his interesting inventions, i.e., the Foucault pendulum. For increased accuracy, my homemade Foucault mirror tester used a microscope stage and a dial indicator. And, I was able to easily determine the shape of my mirror's optical surface.

Making a mirror is not easy. I'm guessing that I spent about sixteen hours on rough and fine grinding. Afterwards, polishing took about the same amount of time if I include the construction and maintenance of a polishing lap. Parabolizing and testing can be done in about eight hours if things go smoothly. Unfortunately, things rarely go smoothly with your first mirror, yet mirror making is a great deal of fun. I highly recommend it!

Howard Brewington  
ASLC President

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## **Outreach**

Outreach is a very important part of ASLC. We are always looking for more volunteers to help us educate the public. Even if you do not have a portable telescope to bring to the events, please consider attending our public outreach programs to help answer questions, share knowledge and point out objects in the sky.

### ***Outreach Events***

by Jerry McMahan

#### ***Tombaugh Observatory, Friday, April 7***

Steve Shaffer operated the club's 12.5 inch Cassegrain. We had thin clouds, but the Moon was still visible through them. Steve counted 34 people looking through our scope. The Astronomy department did observe Jupiter, when the clouds permitted.

The Astronomy teacher from Desert Hills invited some of his students to the open house so they were present for the session as well.

#### ***Leasburg, Saturday, April 22***

El Paso Community College students attended. They worked on their own projects, next to the observatory. The 16 inch worked fine. It was operated by Sid Webb and was assisted by Bob Armstrong, Ed Montes and Howard Brewington.

Chuck Sterling set up his 4 inch refractor on the grass. I joined him with the ETX 125. The LX80 mount passed away at the last Leasburg event. Actually, it is not dead, just paraplegic. The Meade mount can operate the right ascension drive when in equatorial mode. Goto will not work without the declination drive, but at least it should be able to track in equatorial, but not alt-azimuth mode.

#### ***Tombaugh Observatory, Friday, May 5***

Steve Shaffer and I operated the club's 12.5 inch Cassegrain. We looked at the Moon, with the craters Copernicus, Tycho and Clavius, near the terminator. We then moved to Jupiter, with all four Galilean Moons visible.

The Astronomy department did a lecture about the up coming Solar eclipse. We are at the end of the semester (final exams the next week), so attendance was down a little. Steve counted 40 observations. To be fair, we were two of those and a few people came back for a second look. Over all, the session was a success which was nice since this was the last open house until the fall semester.

\* \* \*

## Calendar of Events (Mountain Time - 24 hr. clock)

May	01	19:48	Sun Sets
	02	20:47	First Quarter Moon
	02	23:02	Jupiter Transit: Io - 23:02 to 01:47 (53° to 44° alt)
	05	21:00	NMSU: Tombaugh Observatory Open House
	06	01:50	Jupiter Transit: Ganymede 01:50 to 04:05 (38° to 11° alt)
	06	19:45	OUTREACH; MoonGaze, International Delights Café
	08	02:55	Jupiter Transit: Europa 02:55 to 05:21 (23° to 07° alt)
	10	01:30	Jupiter Transit: Io - 01:30 to 02:58 (51° to 22° alt)
	10	15:44	Full Moon
	11	19:59	Jupiter Multi-Moon shadow transit (Io + Europa) (35° to -08° alt)
	12	17:30	OUTREACH; Highland Elementary School -solar observing til 19:30
	17	02:34	Jupiter Transit: Io - 02:34 to 04:45 (20° to -06° alt)
	18	18:26	Jupiter Transit: Europa 18:26 to 20:54 (24° to 49° alt)
	18	18:33	Last Quarter Moon
	18	21:53	Jupiter Transit: Io - 21:53 to 23:12 (50° to 51° alt)
	18	21:53	Jupiter Multi-Moon shadow transit (Io + Europa) (53° to 53° alt)
	19	19:00	ASLC Monthly Meeting; Good Samaritan Society, Activities Meeting Room
	20	20:00	OUTREACH; Dark Sky Observing at Leesburg Dam State Park
	21	12:00	Texas Star Party ( May 21 thru May 28)
	25	13:45	New Moon
	25	20:50	Jupiter Transit: Europa 20:50 to 23:18 (51° to 48° alt)
	25	22:48	Jupiter Transit: Io - 22:48 to 01:00 (51° to 32° alt)
	25	23:47	Jupiter Multi-Moon shadow transit (Io + Europa) (43° to 28° alt)
June	01	20:09	Sun Sets
	01	06:43	First Quarter Moon
	02	01:42	Jupiter Multi-Moon and multi-shadow transit (Io + Europa) (20° to 37° alt)
	03	20:00	OUTREACH; MoonGaze, International Delights Café
	03	20:20	Jupiter Multi-Moon shadow transit (Io + Ganymede) (52° to 50° alt)
	09	04:08	Jupiter Multi-Moon and multi-shadow transit (Io + Europa) (02° to -39° alt)
	09	07:10	Full Moon
	10	20:58	Jupiter Multi-Moon shadow transit (Io + Ganymede) (53° to 49° alt)
	15	00:00	Saturn at opposition
	17	05:33	Last Quarter Moon
	17	20:00	OUTREACH; Dark Sky Observing at Leesburg Dam State Park
	17	23:15	Jupiter Multi-Moon shadow transit (Io + Ganymede) (39° to 13° alt)
	20	22:24	Summer Solstice
	23	19:00	ASLC Monthly Meeting; Good Samaritan Society, Activities Meeting Room
	23	20:31	New Moon
	26	20:04	Jupiter Multi-Moon transit (Io + Europa) (53° to 46° alt)

Be sure to visit our web site for ASLC information: [www.aslc-nm.org](http://www.aslc-nm.org)

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### Announcements

1. Notice: the May ASLC meeting has been moved to the third Friday, 19 May, so our many photon seekers can attend the Texas Star Party without missing our meeting.

2. The speaker for the May meeting will be John W. Briggs, President of the Antique Telescope Society. John is active in the history of astronomy but specializes in telescopes and related instrumentation. He has an extensive telescope collection. He has worked on many professional telescope projects and served as an editor of Sky & Telescope magazine. One of his current projects is a telescope museum and astronomy library in Magdalena, NM. His presentation, "Confessions of An Antique Telescope Collector" will be filled with great images and very entertaining stories.

3. Road-Trip to Mount Graham, Saturday, July 15. It is not too early to sign up for this trip to tour the three observatories on Mt Graham near Safford, AZ. If you need more info, contact Mike Nuss (nuss1419@msn.com)

4 The agreement to use the facilities at Good Sam for our meeting prohibits members from bringing in ANY food or beverages, except water in a container with a screw lid. Take note: no more Starbucks or Saturn Cookies!

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### **Meeting Minutes**

**ASLC Monthly Meeting  
28 April 2017 Minutes**

***Diligently (?) recorded by Rich Richins, acting in John's absence.***

7:00 pm - No show and tell, so we continued to socialize.  
Meeting called to order 7:15 pm by President Howard.

(We have a nice group tonight - 30+)

President Howard Brewington spent several minutes doing guest introductions (there were several visitors). See roster (Howard has the roster). Some were also in the ham radio club. Howard made several plugs for the radio club. A clear conflict of interest (I digress).

Announcement made for Enchanted Skies SP by a visitor. Date is October 17-21. Two chances to tour the VLA. Two opportunities to do dark sky observing at 10,000+ feet. Flyers were available. Howard knows the name of the guy who did the announcement.

Howard expressed appreciation to Charles for the Club Newsletter.

Howard explained that the presentation published in the HDO had to be changed due to the scheduled speaker having a health-related issue.

Howard requested approval of the minutes by acclamation. There was consensus approval.

Chuck Sterling reported on outreach. The next Moongaze is Saturday, May 6. There is an outreach event at Highland ES on Friday, May 12. The event is before sunset, so solar viewing only. The next Leasburg dark sky night is May 20th. Chuck also mentioned that TSP was 5/21-28, the same week as the planned Cosmic Campground outing.

Steve Shaffer reported on Tombaugh Observatory. Steve counted 28 viewers at last month's NMSU open house. Last chance to view thru the scope for the Spring semester is May 5th. There will be no additional scheduled observing sessions at NMSU until the beginning of the Fall semester.

Sid talked about the last Leasburg event. A class of students from DACC were in attendance. Some brought telescopes. They were assigned to visit the various telescopes and have cards signed off as they viewed various objects. It made for a good evening with the students staying longer than the astronomer volunteers



Speaker – Dr. Alan Hale Hale-Bopp Comet Discovery and his life since discovering it. 20 years since it's discovery.

Talk ended at 8:29. Questions followed. Questions ended 8:38

Announcements: Repeat of Enchanted Skies SP promotion.

Meeting adjourned at 8:40. After-meeting get-together at Pecan Grill.

\* \* \*

### ***Back at the Telescope***

by Bert Stevens

Supernovae are among the biggest explosions in the universe. They are differentiated from the more common nova by their much greater increase in luminosity. At their brightest, a supernova can outshine the entire host galaxy. While novae happen a few times a year in our galaxy, supernovae happen only about three times in a century in our galaxy.

Initially, all supernovae were considered to be in one category. As soon as astronomers started taking spectra of the supernovae, they started to classify each supernova into two types, Type I and Type II. Type II supernovae showed bright hydrogen lines, while Type I supernovae do not. This implies that Type I supernovae occur in an object that does not have much hydrogen in it when it explodes.

To get more data on supernovae, astronomers have implemented surveys of known galaxies to monitor them for supernovae explosions. Most of the galaxies they survey every clear (or partially clear) night do not have a new supernova. However, every day two or three supernovae are announced on the Astronomer's Telegram mailing list (<http://www.astronomersteam.org>). The surveys find the supernovae, and then larger telescopes (1.5-meter and up) start to follow them on a regular schedule.

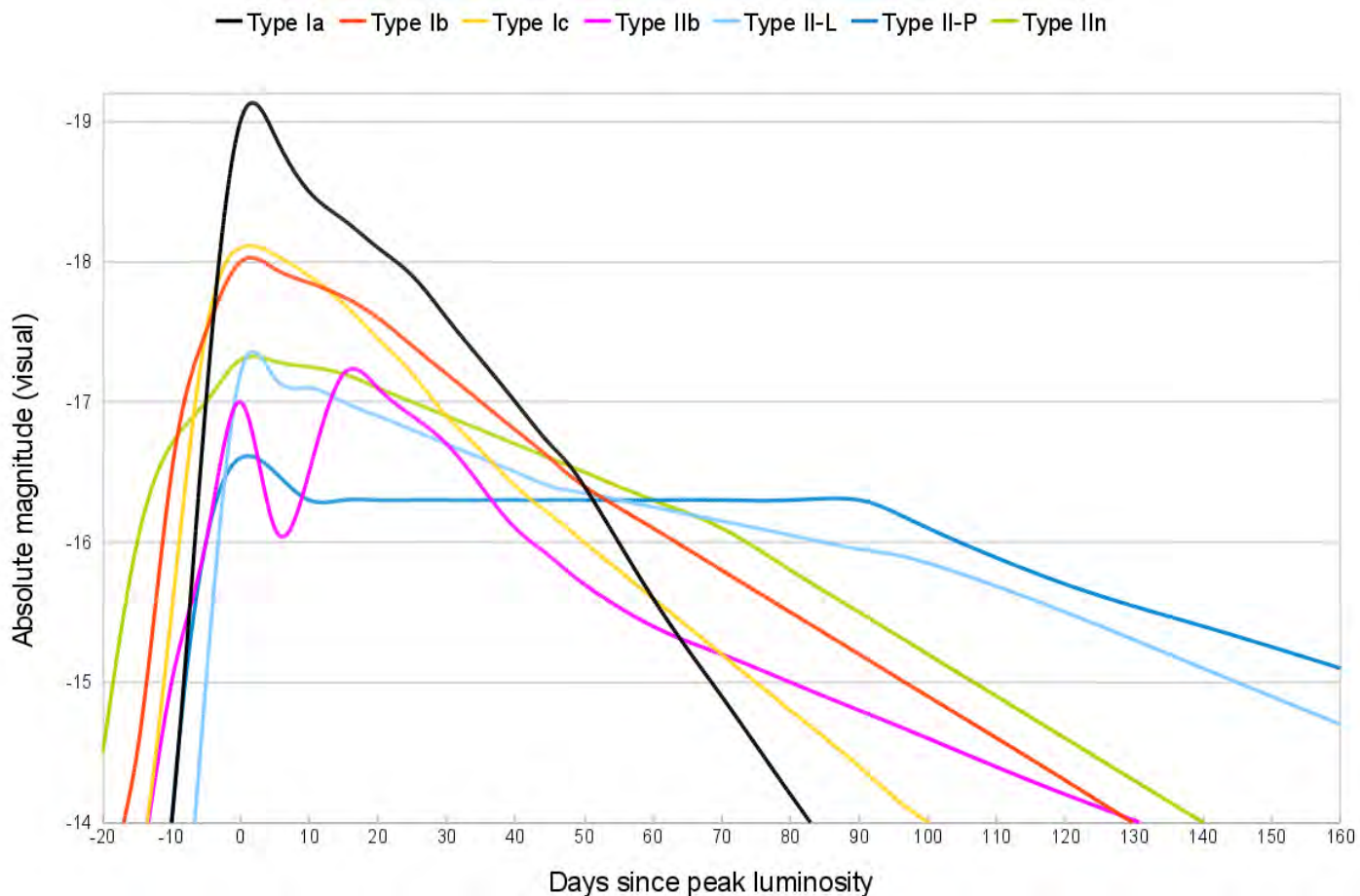
They take both spectroscopic and luminosity measurements.

Based on these observations, astronomers further subdivided supernovae into seven categories. These are Types Ia, Ib, Ic, IIb, II-L, II-P and Type IIn. Each of these has a different spectral signature and a different light curve. The evolution of a supernova depends on what caused the supernova and the composition of the progenitor object.

#### ***Figure 1: Supernova 1994D***

*Galaxy NGC 4526 was host to the Type Ia supernova 1994d. It was discovered by Richard Treffers, Alex Filippenko, Schuyler Van Dyk, and M.W. Richmond using the automated 30-inch telescope at Leuschner Observatory as part of their automated supernova survey. This supernova reached magnitude +15.2 before it started to fade away.*





**Figure 2: Supernova Light Curves**

The representative light curves of the main supernova types are plotted here with absolute magnitude versus time. The Type Ia supernovae are the brightest supernovae, but they also fade the quickest.

We often think of supernovae as occurring in an old massive star that is no longer able to produce enough energy to support its atmosphere and the core collapses to form a neutron star or black hole. This explosion blows the rest of the star's material into space forming a nebula like M1, the Crab Nebula. Indeed, all types of supernova explosions except type Ia are these iconic core collapse supernovae.

Type Ia supernovae, however, are not connected to core collapses. A Type Ia always occurs in a binary star system. The progenitor of the Type Ia supernova is a white dwarf star. White dwarfs are the end state of a star that was not massive enough to undergo a supernova explosion. The younger companion star in the binary star system sheds most of its atmosphere as it goes through the final stages of its evolution.

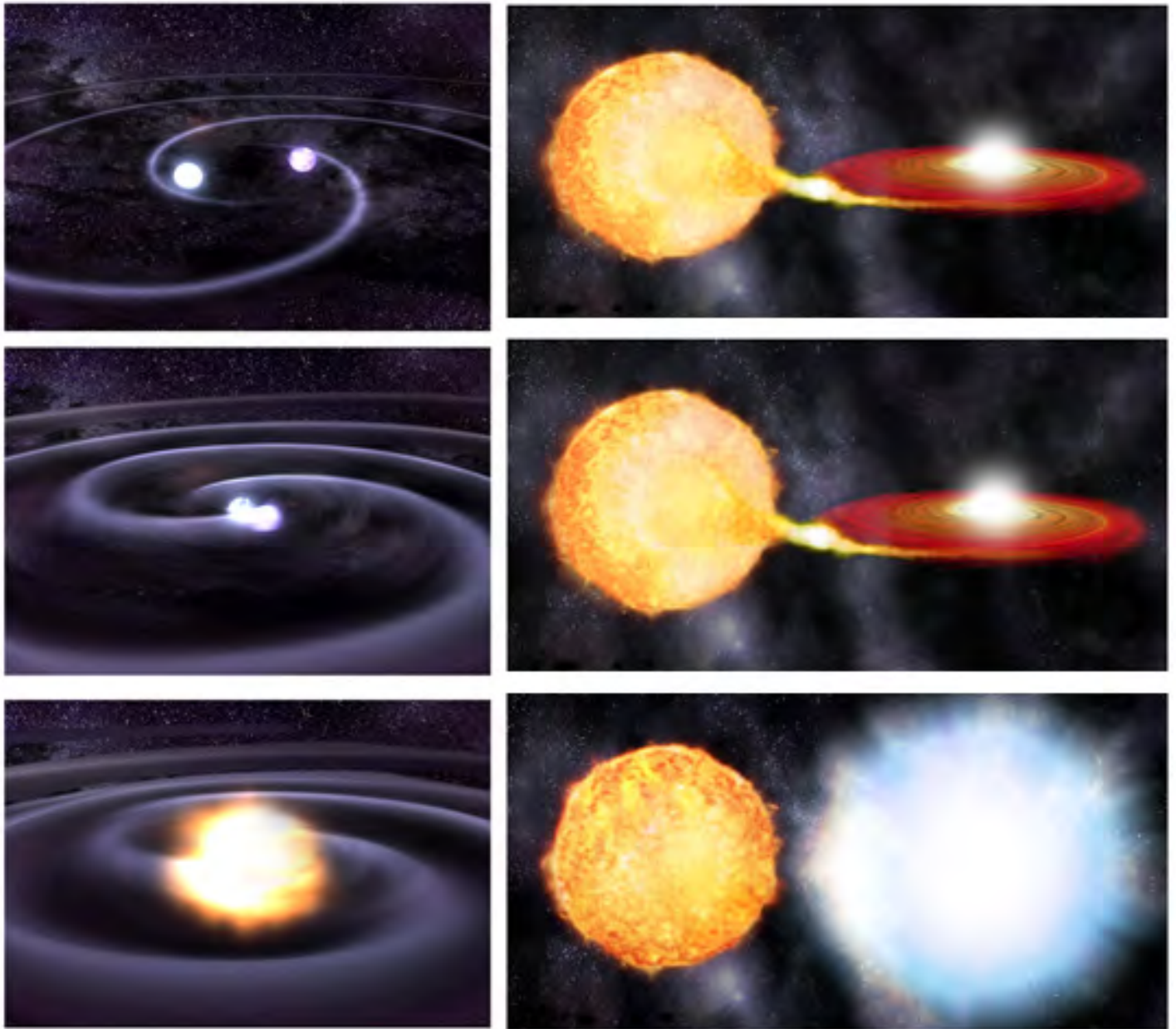
When it no longer has enough fusion fuel to make energy, the core of the star starts to shrink. It continues to shrink until the atoms are packed extremely close together. This forms a very dense object, a white dwarf, composed mostly of carbon and oxygen nuclei floating in a sea of electrons. The white dwarf is only supported by this electron degeneracy pressure.

The white dwarf is no longer generating energy, so it glows only by the heat left over from its life as a fusion-energy producing star. It slowly radiates this heat into space, cooling off into a dark, invisible black dwarf. This process takes many billions of years, so the white dwarf will glow for a very long time.

Since these Type Ia supernovae are not caused by a core collapse, what does cause the brilliant supernova explosion? These supernovae can only occur where the two stars in the binary system are

not too far apart. One of the stars is a white dwarf, as indicated by the lack of hydrogen in the spectra of the explosion. What we do not know is the type of the other star in the binary system.

One possibility is the companion star is also a white dwarf. If this is the case, then the Type Ia supernova occurs when the two white dwarfs orbit down so close together that they combine into a single star. The combined star is too massive to be supported by electron degeneracy pressure. It begins to collapse again, with carbon starting to fuse into heavier elements. The new fusion energy blows the star apart in a supernova explosion.



**Figure 3:** Here is a comparison of the two competing scenarios for Type Ia supernova production. On the left, two white dwarf stars orbit each other. They emit gravity waves, slowing them down causing them to become closer together. They finally merge and almost immediately explode as a supernova.

In the right-hand scenario, a white dwarf siphons off the outer atmosphere of a companion red giant star into an accretion disc. As gas settles on to the surface of the white dwarf, it increases the white dwarf's mass. When it reaches 1.44 solar masses, the white dwarf begins to fuse oxygen and carbon. The sudden release of energy blows the white dwarf apart in a supernova explosion.



The other possible progenitor is a white dwarf with a companion star that is a little younger and it has just reached the red giant phase. The outer envelope of the red giant is siphoned off by the white dwarf into an accretion disc. It then settles on the white dwarf, slowly increasing its mass.

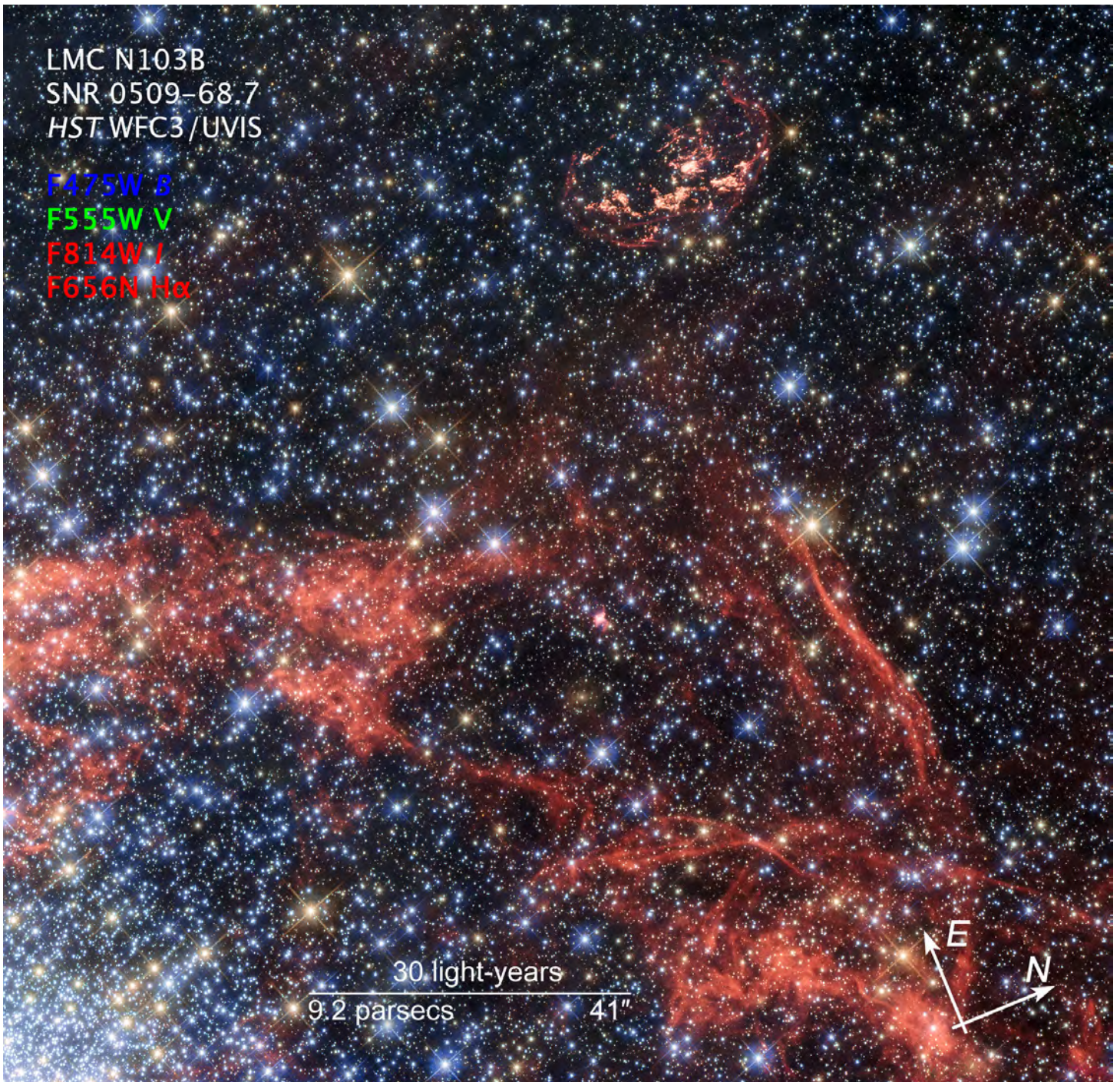
Eventually, the white dwarf reaches the point where its mass exceeds the 1.44-solar-mass Chandrasekhar limit and the oxygen and carbon fusion resumes in the white dwarf. This sudden burst of energy blows the white dwarf apart in the supernova explosion. Even with this energetic event happening nearby, the red giant should still be intact after the explosion.

So which scenario is the correct one? A group of astronomers used images from the Hubble Space Telescope and high-dispersion spectra from the 4-meter and 1.5-meter telescopes at Cerro Tololo Inter-American Observatory in Chile to study the Type Ia supernova remnant N103B. N103B is in the outskirts of the superbubble around the rich cluster NGC 1850 in the Large Magellanic Cloud.

They analyzed the remnant's structure and determined the center of the remnant. They searched the area at the center of the remnant and the star nearest the center was a subgiant star with a mass of about one solar mass. Observations indicate that between 0.2 and 0.8 solar masses of its atmosphere has been stripped away and the remaining star has been heated by the supernova shock wave.

While this tentative identification points toward the Type Ia supernovae being formed by a binary of a white dwarf and red giant star, it still does not confirm the hypothesis. More observations of the possible companion are needed to confirm or reject the identification. It is also possible that both scenarios are true, resulting in different subgroups of type Ia explosions. Only future observations of this and other supernova remnants will help determine how these explosions occur.

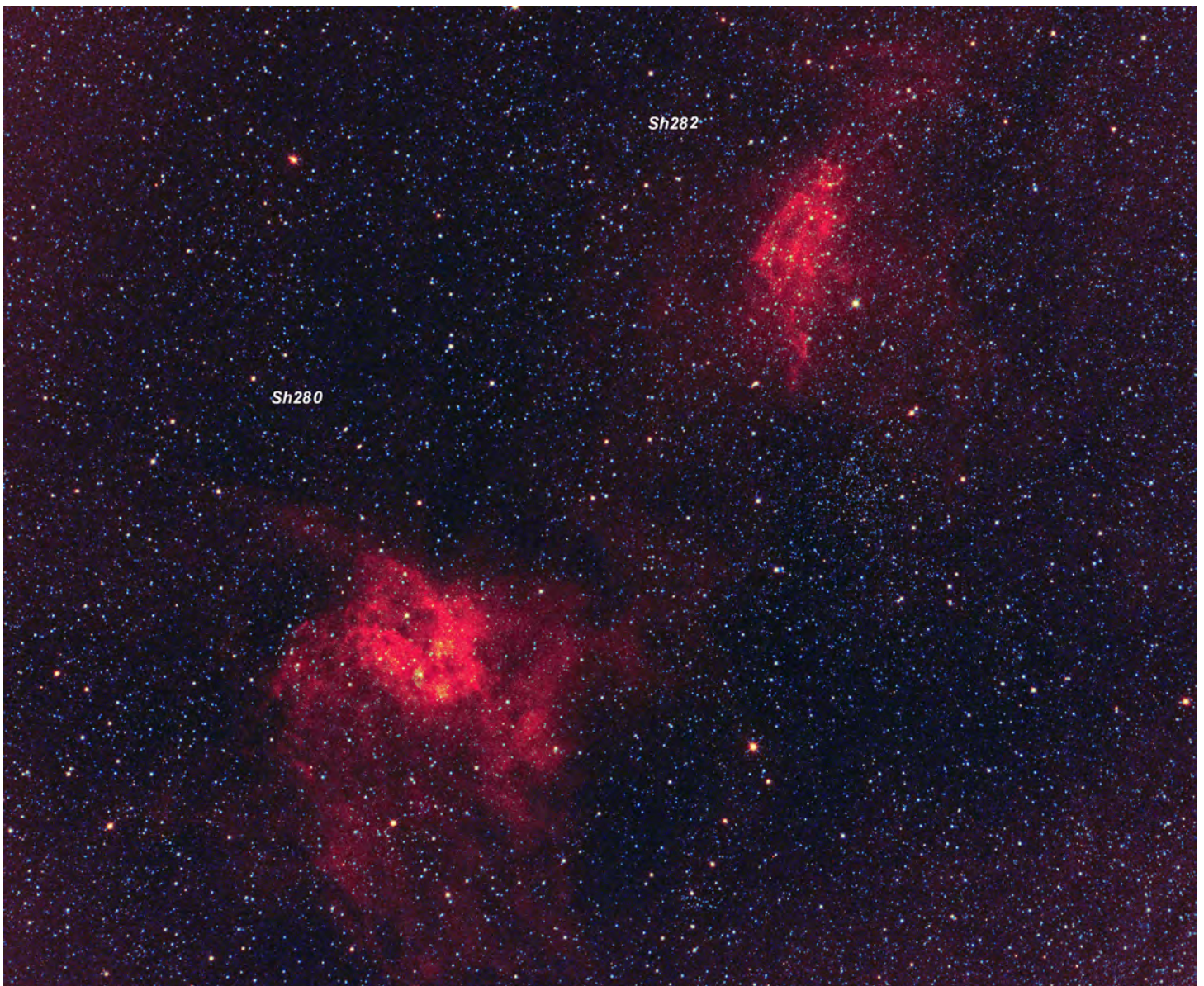




**Figure 4: Supernova N103B** The remnant of a Type Ia supernova explosion 1,500 years ago, N103B (also known as SNR 0509-68.7) is in the outer envelope of the superbubble that surrounds the young globular-like cluster NGC 1850. This is not a single cluster, but two that are surrounded by a huge bubble blown in the interstellar medium. The edge of the cluster itself is in the lower left-hand corner of this image. The orange-red filaments of the superbubble rim arcs from left-center to the lower right. The supernova remnant is the elliptical reddish nebula near the upper right-hand corner. It is thought that the edge of the supernova remnant has struck denser areas of the interstellar medium, slowing it down and causing the elliptical shape.

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**Photo of the Month**



**OBJECT** Sharpless 280 and 282 Part of the Sharpless HII emission nebulas located in Monoceros, SE of the Rosette Nebula. Sh2-182 is mostly Ha while Sh2-280 has a slight amount of OIII in addition to its Ha emissions.

**Telescope** Takahashi Epsilon  
**Camera** FLI ML 161200  
**Filters** Ha & OIII 6x5 min  
**Processing:** CCDstack & PS

**Date/Location** Las Cruces, NM: March 20, 2017  
**Copyright** John Kutney

**Photo of the Month**



Above is a crop of an image I acquired of Comet Johnson in NE Hercules on April 23rd. It was around the 7th mag and sporting a tail which Comet Tuttle was not.

Right is Comet Tuttle at the bottom-left of the image. It was in NW Hercules and image was taken on the same night.

85 mm, F/2, 30 seconds, ISO 1600, unguided. Both comets were found in Sky Safari.

John Gilkison



Photo of the Month



© Jeff Johnson | jeffjastro.com

**OBJECT** IC 434 (Horsehead) and NGC 2024 (Flame) and surroundings Distance: 1,500 light years  
**Telescope** Takahashi FS-60C @ f/6.2 Mount Takahashi EM200 Temma II  
**Camera** QSI 540wsg @ -15C  
**Filters** Astrodon Ha (3nm), Astrodon Tru-Balance I-Series LRGB Gen 2  
**Guider** SX Lodestar Settings: 6x20min Ha, 2x5min L (bin1x1); 2x5min ea RGB (bin2x2);  
AstroArt5, CS4 (slightly cropped, 10xdarks/flats/fdarks/bias)  
**Date/Location** 26 January 2017 - Las Cruces, NM  
This image is LHaRGB, where Ha was used in combination with Luminance and Ha:R (80:20) was used for the Red channel.

Copyright Jeffrey O. Johnson

**Poem of the Month**

#8

Look to the horizon can you see it  
blue and green            white  
driving            from where  
going            it knows  
born            always existing  
alike            very different  
see it            it was always there  
moving            holding  
coming            I see it  
building            force  
exploding            dying  
withdrawing  
Look to the horizon can you see it  
Endless

John Kutney '73