nightwatch
Newsletter of the Pomona Valley Amateur Astronomers

We don't believe anything we don't want to believe.
Theodore Sturgeon

VIRTUAL CLUB EVENTS
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Volume 42 Number 2 ***nightwatch*** **Fedruary 2022**

C/2021 A1 (Leonard) and M3

This Image is 5/120s subs taken at GMARS on December 3, 2021 with a William Optics RedCat 51 telescope and ZWO ASI2600MC with no filter on a Rainbow Astro RST135 mount. Captured with ASIAIR+ and processed in PixInsight.

from ***Sharol Carter***

Jellyfish

It was a tough week leading up to new moon weekend. I set up in the backyard to get tuned in on this month's target and after one night of imaging, we had a major windstorm! While my setup weighs about 100 pounds and quite stable, I was worried all night long that the cover would act like a sail and it would tumble over. I got one night of H-alpha imaging in before the wind came and one night afterward. I got two more nights after the windstorm for S-II data, then packed up for the new moon weekend of January 28 and 29 to capture O-III frames. The target for the month was the Jellyfish Nebula, also known as IC443 and SH2-248, a target I last shot nearly 5 years ago. The same telescope was used for both, a 90mm StellarVue refractor operating at about f/5.6, but the mount and camera were different. The previous version was taken with a cooled, but not temperature regulated, color camera on a wedge-mounted fork mount, an Orion Starshoot Pro v2 camera and Celestron CPC800 mount. This month's version uses a temperature-regulated, monochrome camera and a German equatorial mount, a ZWO ASI1600MMcool camera and Paramount MYT mount. One final difference is the previous version was an RGB image while the current, final version is a narrowband, SHO image.

Situated in the constellation Gemini, the Jellyfish is about 5,000 light years away. One of the most studied apparent supernova remnants, it spans 50 arcminutes in the sky, about 2/3 larger than the diameter of the full moon. Near the area where the "tentacles" meet the Jellyfish's body, a neutron star was found, likely formed by the supernova. Neutron stars form from a supernova explosion and core collapse of a supermassive star, 10-25 times the mass of the sun. Results of X-ray studies of the Jellyfish are consistent with a rapidly spinning neutron star known as a pulsar, however, I don't find reference to the spin rate, so perhaps the radiation poles are not directed sufficiently toward us to be detected.

I've attached two versions of the Jellyfish. I first shot 46 frames of 10 minutes each through the H-alpha filter on January 20 and 22. All the frames shot on the 21st were unusable due to the windstorm. I had hoped to get at least a few usable frames before the wind got too strong. The nights of January 23 and 24 yielded 49 S-II frames of 10 minutes each. At this point, I wanted to see if the S-II signal was strong enough, so I mapped S-II to red and H-alpha to blue, which I've never done before. Lacking anything in the green channel, I used a Photoshop plugin to create an artificial green channel from red and blue. Stretching the test image to see the amount of noise showed potential. After further refinement, the result was a grayish white Jellyfish sailing into a blue sea! I was pleasantly surprised and decided to keep it.

I waited until the dark site to take O-III data since it always seems to be very noisy when shot from home. The weekend was forecast to be partly cloudy, so I was hoping for at least a few hours to collect some data. Friday night was relatively clear, but either the seeing was poor or my guiding was affected by poorly focused guide scope because the stars were a little bloated in the imaging camera. Saturday night was a little more questionable weather-wise, but by mid-evening, the visible clouds were gone, although I suspect high thin clouds were still present. Regardless of the conditions, I managed 48 frames of 10 minutes each over January 28 and 29. A more traditional mapping of S-II to red, H-alpha to green, and O-III to blue for a Hubble palette was done. I had to do a little creative color balancing to get the colors where I wanted them, but the Jellyfish is bright and the signal was pretty good in general, so I didn't have to stretch a lot to get a good result.

This one was a challenge due to weather, yet in spite of wind and clouds, the images turned out nicely! I hope you agree.

Ron Ugolick

https://www.astrobin.com/users/ruccdu/

Club Events Calendar

Feb 18	**Virtual General Meeting – Alper Ates**
	"Celestial Orientation of the Temple of Apollo"
Mar 5	**Star Party – TBD**
Mar 9	**Board Meeting**
Mar 18	**Virtual General Meeting**
Apr 2	**Star Party – TBD**
Apr 6	**Board Meeting**
Apr 22	**General Meeting (presentation: TBD)**
May 4	**Board Meeting**
May 13	**General Meeting (presentation: TBD)**
May 28	**Star Party – TBD**
Jun 8	**Board Meeting**
Jun 17	**General Meeting (presentation: TBD)**
Jun 25	**Star Party – TBD**
July 6	**Board Meeting**
July 15	**General Meeting (presentation: TBD)**
July 30	**Star Party – TBD**
Aug 3	**Board Meeting**
Aug 12	**General Meeting (presentation: TBD)**
Aug 27	**Star Party – TBD**
Aug 31	**Board Meeting**
Sep 9	**General Meeting (presentation: TBD)**
Sep 24	**Star Party – GMARS**
Sept 28	**Board Meeting**
Oct 7	**General Meeting (presentation: TBD)**
Oct 22	**Star Party – TBD**
Oct 26	**Board Meeting**
Nov 11	**General Meeting (presentation: TBD)**
Nov 26	**Star Party – TBD**
Nov 30	**Board Meeting**

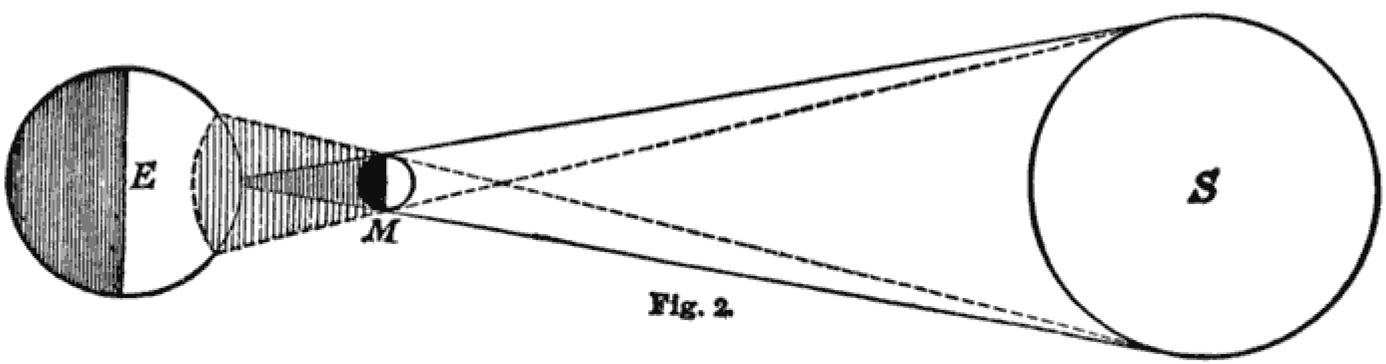


Fig. 2.

PVAA Officers and Board

Officers

President ….....	Mathew Wedel	909-767-9851
Vice President ..	Joe Hillberg	909-949-3650
Secretary	position is currently open	
Treasurer	Gary Thompson	909-935-5509

Board

Jim Bridgewater (2022)........................	909-599-7123
Richard Wismer(2022)	
Ron Hoekwater (2023).........................	909-706-7453
Jay Zacks (2023) ………………….	

Directors

Membership / Publicity....	Gary Thompson .	909-935-5509
Outreach	Jeff Schroeder	909-758-1840
Programs	Ron Hoekwater	909-391-1943

PVAA General Meeting 1/14/22

We had another Zoom meeting to start off the year. This will continue until further notice. When we do finally get to meet in person, we will continue to put the main presentation online.

January's main presentation by Claude Plymate was on 'Adaptive Optics.' Claude recently retired from being the Telescope Engineer and Chief Observer at Big Bear Solar Observatory. He started out the presentation stating that we are now in 'A Golden Age' in Astronomy. He showed the black & white photo of galaxies taken with the 200-inch Hale telescope at Mount Palomar and compared it to a color image of the same galaxies taken by the Hubble Space Telescope. He then compared the 50-year-old HP-35 calculator with a modern iPhone. He mentioned computer-controlled telescopes, CCDs, giant segmented telescopes, and advanced imaging processes. Yes, we live in a golden age.

Adaptive Optics is part of the revolution in astronomical imaging. First, there are three tings to remember: First: Aperture = Resolution. That is, the larger the telescope mirror or objective, the higher the resolution and the smaller the objects or details you can see, or resolve. The minimum resolving angle is equal to the wavelength we are looking at divided by the diameter of the telescope times 1.22.

$$\theta_{(Min)} \approx 1.22\, \lambda / D$$

The second thing is any known optical aberration can be corrected with additional optics. The Hubble Space Telescope is a prime example of this. The third thing to remember is that any real image can be manipulated optically as if it is a real object (we can magnify, distort, whatever we wish as if the image was a real object).

The problem is that our atmosphere limits the resolution available at the Earth's surface.

1.) Changes in the air temperature at different heights change the refractive index.

2.) Bubbles of air at differing temperatures act like weak lenses that deviate the light rays as they randomly move through the Field-Of-View (FOV).

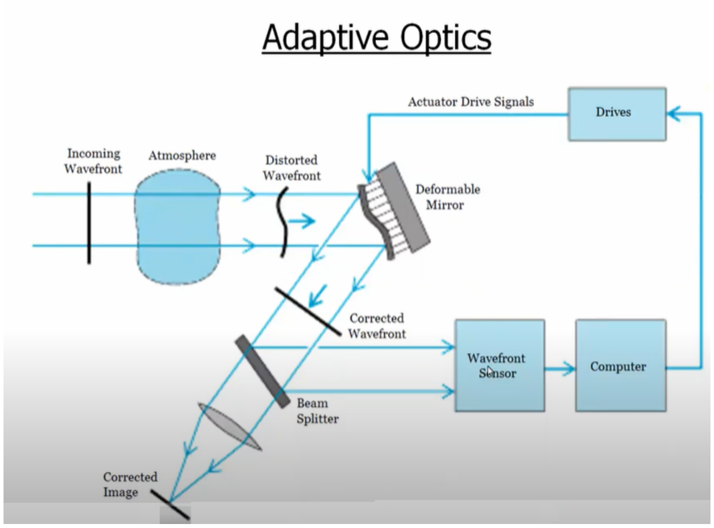
3.) Flat wavefronts coming from astronomical distances are distorted in the last 100km while traversing the Earth's atmosphere.

4.) This limits the resolving power to about 0.5 arcseconds on a perfect night, no matter how large the telescope, or about the same as a ten-inch telescope in space.

The solution to this is to have your telescopes in space. The problem with this solution is that it is VERY expensive. Expensive to build, expensive to launch, expensive to maintain. Then came adaptive optics. This was first proposed in 1953, but the computer power to do this commercially did not exist. Now, of course, they are used extensively at all major earth-bound observatories. Claude then showed a video of sunspots taken with adaptive optics turned off, and then turned on. The difference in image quality was amazing. He then got into how the adaptive (flexible) mirrors work, creating a guide star using a sodium laser or 'Rayleigh beacons.' Each have their pros and cons, but most use the sodium laser.

Now we are moving beyond the classic Adaptive Optics to Multi-Conjugate Adaptive Optics. This allows for a larger area to be corrected. A video showing the classic AO compared to Multi-Conjugate AO showed a much larger area being in focus. While amateur scope Adaptive Optics are still expensive they are available, but you really need to dig deep to find prices for them. These are not off-the-shelf items yet.

Gary Thompson



Large Binocular Telescope adaptive secondary incorporating 672 voice coil actuators

NASA Night Sky Notes February 2022

This article is distributed by NASA Night Sky Network

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

Hang Out with the Twins of Gemini

David Prosper

The night skies of February are filled with beautiful star patterns, and so this month we take a closer look at another famous constellation, now rising high in the east after sunset: Gemini, the Twins!

If you're observing Orion, as discussed in last month's article, then Gemini is easy to find: just look above Orion's "head" to find Gemini's "feet." Or, make a line from brilliant blue-white Rigel in the foot of Orion, through its distinct "Belt," and then on through orange Betelgeuse. Keep going and you will end up in between the bright stars Castor and Pollux, the "heads" of the Gemini Twins. While not actually related – these stars aren't bound to each other, and are almost a magnitude apart in brightness – they do pair up nicely when compared to their surrounding stars. Take note: more than one stargazer has confused Gemini with its next-door neighbor constellation, Auriga. The stars of Auriga rise before Gemini's, and its brightest star, Capella, doesn't pair up as strikingly with its second most brilliant star as Castor and Pollux do. Star-hop to Gemini from Orion using the trick above if you aren't sure which constellation you're looking at.

Pollux is the brighter of Gemini's two "head" stars - imagine it has the head of the "left twin" - and located about 34 light-years away from our Solar System. Pollux even possesses a planet, Pollux b, over twice the mass of Jupiter. Castor - the head of the "right twin" - by contrast, lies about 51 light-years distant and is slightly dimmer. While no planets have been detected, there is still plenty of company as Castor is actually a six-star system! There are several great deep-sky objects to observe as well. You may be able to spot one with your unaided eyes, if you have dark skies and sharp eyes: M35, a large open cluster near the "right foot" of Gemini, about 3,870 light-years away. It's almost the size of a full Moon in our skies! Optical aid like binoculars or a telescope reveals the cluster's brilliant member stars. Once you spot M35, look around to see if you can spot another open cluster, NGC 2158, much smaller and more distant than M35 at 9,000 light-years away. Another notable object is NGC 2392, a planetary nebula created from the remains of a dying star, located about 6,500 light-years distant. You'll want to use a telescope to find this intriguing faint fuzzy, located near the "left hip" star Wasat.

Gemini's stars are referenced quite often in cultures around the world, and even in the history of space exploration. NASA's famed Gemini program took its name from these stars, as do the appropriately named twin Gemini North and South Observatories in Hawaii and Chile. You can discover more about Gemini's namesakes along with the latest observations of its stars and related celestial objects at nasa.gov.

Castor and Pollux are Gemini's most prominent stars, and often referred to as the "heads" of the eponymous twins from Greek myth. In Chinese astronomy, these stars make up two separate patterns: the Vermillion Bird of the South and the White Tiger of the North. What do you see? The Night Sky Network's "Legends in the Sky" activity includes downloadable "Create Your Own Constellation" handouts so you can draw your own star stories: bit.ly/legendsinthesky

Image created with assistance from Stellarium.

Montage of Gemini North, located on Mauna Kea in Hawaii, and Gemini South, located on Cerro Pachón in Chile. These "twin" telescopes work together as the Gemini Observatory to observe the entire sky.

Image Credit: NOIRLab Source: https://www.gemini.edu/gallery/media/gemini-northsouth-montage