nightwatch
Newsletter of the Pomona Valley Amateur Astronomers

A miracle is what seems impossible but happens anyway.
Griff the Arcanen

VIRTUAL CLUB EVENTS SEE WEBSITE FOR DETAILS

Volume 41 Number 06 ***nightwatch*** **June 2021**

PVAA General Meeting 05/28/21

The PVAA General Meeting was started by Gary Thompson who remined everyone that dues are now due for the year. $30/ year for an individual, $40/year for a family, and only $12/year for students under 18 years of age.

The speaker for the night was Claude Plymate. His presentation was on the Goode Solar Telescope Big Bear Solar Observatory. (BBSO) Claude worked as the Telescope Engineer/ Chief Observer for the Big Bear Solar Observatory from 2011 until retiring this year. Currently it is being run by the New Jersey Institute of Technology. Before that he worked as the site manager for the McMath-Pierce Solar Telescope outside of Tucson Arizona.

Until recently the Goode Solar Telescope in Big Bear was the highest resolution solar telescope in the world. In December 2019, the 4-meter Daniel K. Inouye Solar Telescope in Hawaii saw first light, surpassing Big Bear. The reason it was built at Big Bear was that scientists thought that a lake would have less thermals coming off it as compared to the ground. Another reason was that the originators (Cal-Tech) wanted something nearby, with good seeing conditions. In 1995 Professor Zirin, director of BBSO, announced he would retire, so Cal-Tech, being heavily invested developing the twin 10-meter Keck telescopes in Hawaii, transferred the BBSO to the New Jersey Institute of Technology.

First light of the observatory came in 1969 with twin 10-inch refractors. In 1972 a 26-inch reflector originally built to fly on Skylab II, which never flew, was installed. Later they were trying to determine how to get better resolution. Unfortunately, the atmosphere limits the resolution to ~0.5 arcseconds, so anything above ~10 inches is a waste of aperture (you do not need the extra light gathering power that larger telescopes give). The answer was adaptive optics (AO). The original problem with adaptive optics was that it adapted for only one area (the center – a few arcseconds) of the field of view. The rest of the image slowly degraded the further from the center you went, due to atmospheric turbulence. Improved Multi-conjugate Adaptive Optics allowed virtually the full frame to become clear. Using adaptive optics allowed the installation of the 1.6-meter telescope in May 2008.

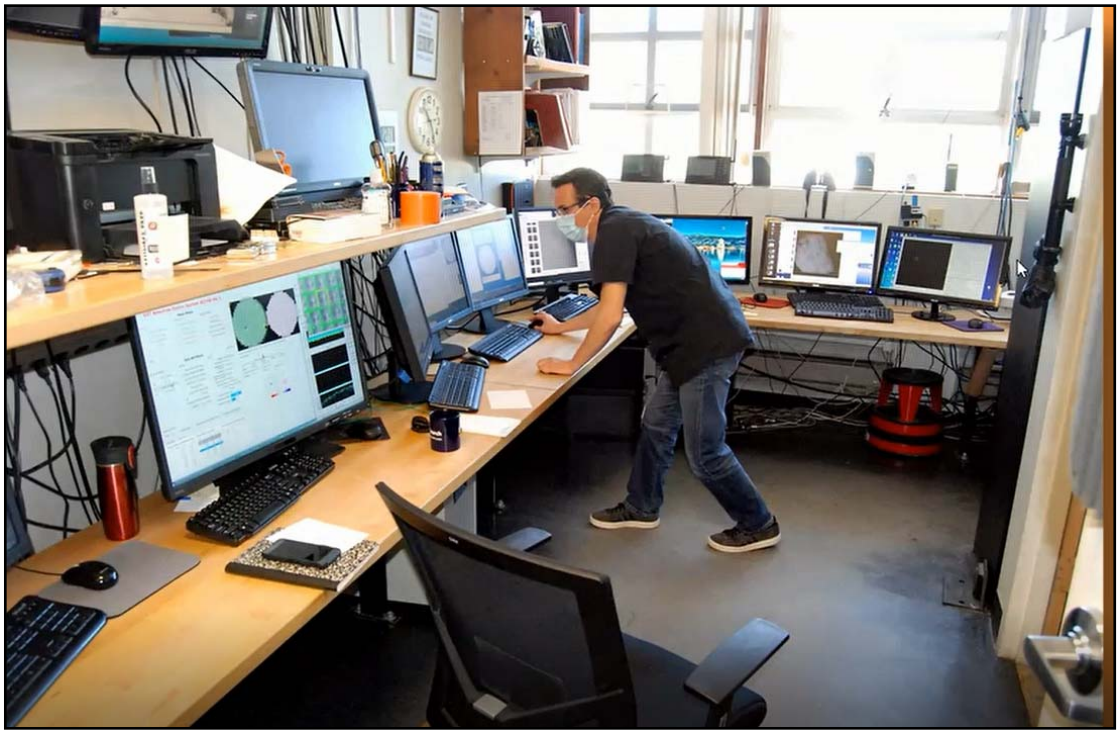
The current 1.6-meter (1.7-meter full aperture) mirror came from the University of Arizona as a test run of a section of the Giant Magellan Telescope (GMT), at 1.5th scale. Full scale is 8.4 meters for each of the seven sections for GMT giving it an aperture of 25.4 meters. BBSO shared the costs of the 1/5th development in exchange for the mirror.

One of the biggest problems they had to resolve is the fact that concentrating that much sunlight into a 1.4-inch diameter image will melt metal. BBSO uses a water-cooled aluminum field stop to reduce the field of view and carry away the solar heat from 2 kilowatts to 20 watts - without reducing the resolution.

Big Bear Solar Observatory website:
http://bbsoweb.bbso.njit.edu/

Claude Plymate

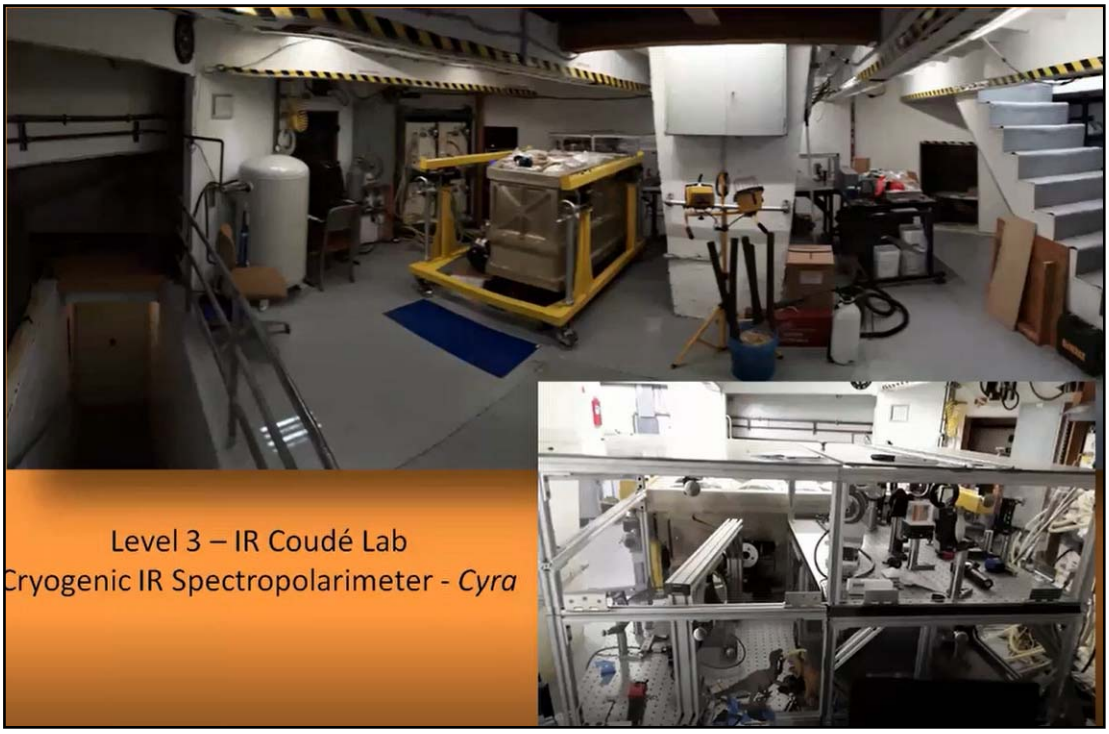
BBSO



Observing Room

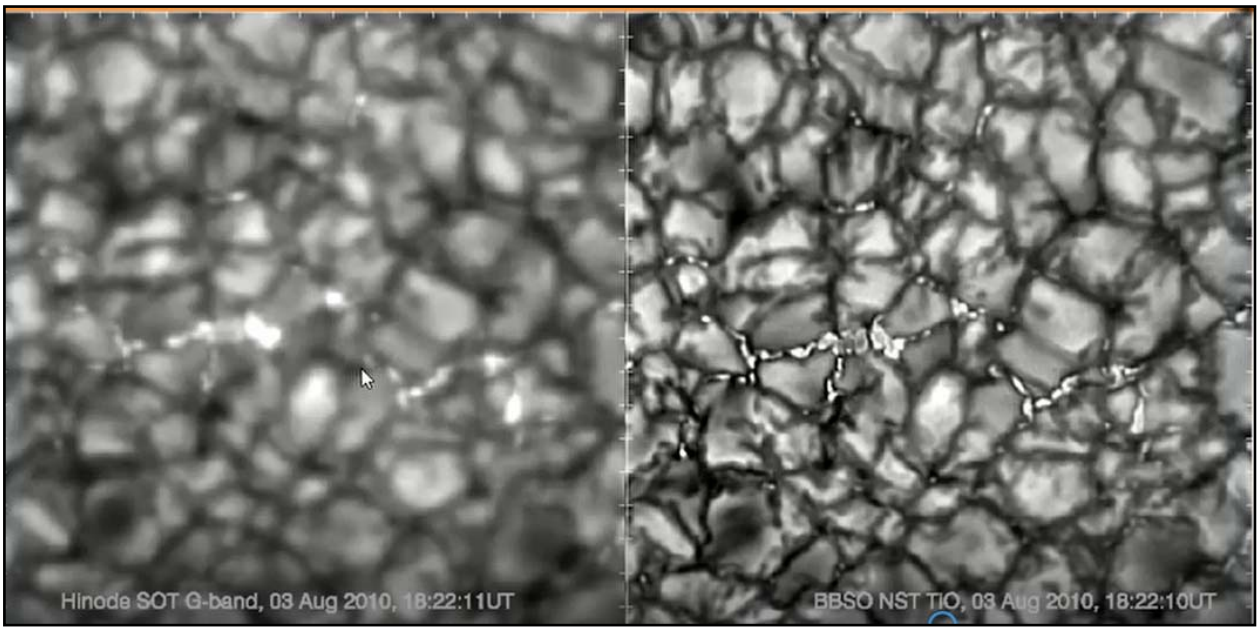
Electronics/Computer Room

CoudLab é (Focus room on level 2)


Level 3 – IR Coudé Lab
Cryogenic IR Spectropolarimeter - *Cyra*


Telescope level

Dome Floor



Hindoda Space Telescope Vs BBSO

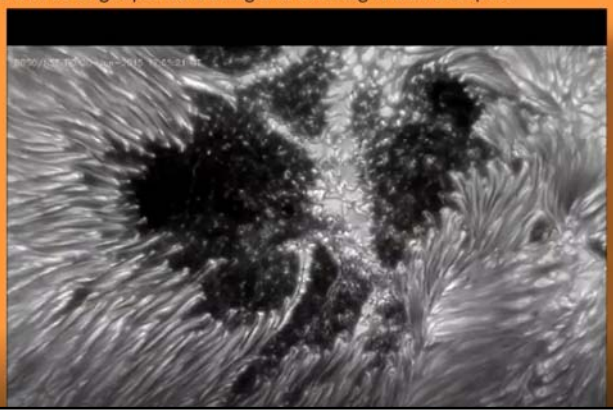
GST-DKIST Comparison

GST
- 1.6-m f/2.4 off-axis Gregorian
- Equatorial
- Res:
  - 57 km @ 0.5 µm
  - 171 km @ 1.5 µm
  - 570 km @ 5.0 µm
- First Light 2008
- 3 arcmin FOV Heat Stop Reflecting ~ 2 kw.
- Fixed Coude with field rotation of 15°/hr
- VIS/IR imaging, Spectropolarimetry, MCAO
- Altitude: 2060 m (6,760')
- Development $25 million, 5 years.
- Operations: ~ $1 million/yr.

DKIST
- 4-m f/2 off-axis Gregorian
- Alt/Az
- Res:
  - 23 km @ 0.5 µm
  - 68 km @ 1.5 µm
  - 228 km @ 5.0 µm
- First Light Dec 2019
- 5 arcmin FOV Heat Stop Rejecting ~ 1
- Variable speed rotating Coude Lab.
- 1st generation Instruments similar to
- Altitude: 3067 m (10,062')
- Development $344 million, 20 years.
- Operations: ~ $18 million/yr.

Example Data

- A photospheric movie of a large complex sunspot region. This region features a quite well developed light bridge that clearly shows convection as well as bright points moving and evolving within the spot!



Ron Ugolick's Astrophotography

\New moon was June 10, and hopefully some of you got to see at least a partial annual solar eclipse. It was not visible from my place, unfortunately. We were camping on June 11 and could see Venus and a very thin sliver of the moon nearby, but only through binoculars. It was too faint to see naked eye. It was hot at the dark site during the day, but cooled nicely at night with no dew. Friday night was really good for imaging and Saturday night was nearly as good. I thought I solved my drift problem from the last time out, but it came back Friday night. Fortunately, I was able to work around it this time since I knew what the problem was. I had it fixed after my imaging session Friday night and so Saturday night I had no problems. I think I'm doing something out of sequence and it is messing up the sky model in the mount. I'll have to be more consistent with my start-up routine.

It was a little difficult to choose a target this time, being at the very end of galaxy season. My first target turned out to be too low in the south, so I went with my first back-up target. It is Barnard 150, also known as the Seahorse Nebula in Cepheus. It turns out there is another Seahorse Nebula, also a dark nebula, in Dorado in the southern hemisphere. The Barnard catalog of nebulae is a list of dark nebulae, one of the more familiar ones being the Horsehead Nebula, Barnard 33, in Orion. These nebulae are generally cold, dark clouds of gas and dust that obscure the visible light from background stars. However, in many of them, the Seahorse included, new stars are forming within the dense clouds.

The Seahorse Nebula is so named because of its resemblance to a seahorse when viewed with north to the right. My image is shown in the standard north up, east to the left configuration. This is opposite of a map, because with a map you are looking down at the Earth, whereas with the sky, you are looking up and that switches east and west. The nebula lies about 1,200 light years away and is circumpolar, meaning that it is always above the horizon. It is currently in the northeast in the early evening and rising throughout the night. It's pretty large, spanning an area of about 1 degree in the sky. I can't find information on how large it is physically, but I suppose given the distance and angular size, you could do the math and figure it out!

I grabbed 15 images of 2 minutes each through the luminance, green, and blue filters, and 10 images of 3 minutes each through the red filter on Friday night. Saturday night I captured 60 luminance, 30 green and blue, and 20 red frames, all with the same exposure times as Friday night. I had planned on taking only luminance frames, but changed my mind at the last minute and captured color frames as well. In hindsight, I probably should have stayed with my original plan to reduce luminance noise. This totals 75 frames (2.5 hours) of luminance, 45 frames (1.5 hours) of green and blue, and 30 frames (1.5 hours) of red data. All the frames were calibrated with 12 dark, 20 flat, and 20 flat dark frames, although, because the frames were dithered (shifted after each exposure), dark frames were probably not needed.

As is normal for me, each set of frames were stacked separately and an initial stretch was done in FITS Liberator. The color frames were combined and stretched in Photoshop to enhance the dark clouds and bring the color saturation up. The luminance frames were stretched in Photoshop to enhance the contrast between the light and dark areas while keeping the noise level under control. The only thing I did a little differently this time was to brighten the midtones. By doing this, the faint dust clouds around the darkest regions became a little easier to see.

While I have imaged dark nebulae before, this is really the first time where no additional nebulosity was also in the image. It's also the first target in which I've used my new electronic focuser. I can now automatically refocus periodically throughout the night without having to get up and do it myself. Hopefully you enjoy the dark side! Next month will most likely be a more colorful image.

Ron Ugolick

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

Club Events Calendar

Jun 25	**General Meeting - Ken Elchert**
"Astronomy by the Numbers or How Fast are you Moving"	
July 10	**Star Party – White Mountain/ Cow Canyon**
July 17	**Star Party in the Park – Cahuilla Park 7:30 PM**
July 14	**Board Meeting**
July 23	**General Meeting**
"Latest Lucky Imaging Results" by Dr. Thomas Spirock	
Aug 7	**Star Party – GMARS**
Aug 11	**Board Meeting**
Aug 20	**General Meeting (presentation: TBD)**
Sep 4	**Star Party – GMARS**
Sep 8	**Board Meeting**
Sep 17	**General Meeting (presentation: TBD)**
Oct 9	**Star Party – TBD**
Oct 13	**Board Meeting**
Oct 22	**General Meeting (presentation: TBD)**
Nov 6	**Star Party – TBD**
Nov 10	**Board Meeting**
Nov 19	**General Meeting (presentation: TBD)**
Dec 11	**Christmas Party**

Link to PVAA May General Meeting

https://us02web.zoom.us/rec/share/AgKD6zBfEAI7DFzHhJd51HVbPmdGMQHJE-yqiHybQDcHb2tfhSCmmvwF55RUNJ8R.bmXwwdK0RNYMJ49w?fbclid=IwAR2pVmqtdxikt0ZSrEB2uyUWmRy_ndB7DCX37i40yOjHnEqM41c7CTDntk4

Passcode: qtZLS49#

Link once Passcode is used

https://us02web.zoom.us/rec/play/MDMJwMrw3Fi4O5zCyYuE291ETeWvU6YWDO9GFV_uyGRF6-IIxO5somGOz16jT68fyu6I_ilmwrx09agT.Day7S30yj-KeYs2h?continueMode=true&_x_zm_rtaid=92tBQIMFR9aIrE9Zw_HZWg.1623816348776.e800a09d3a8d8e53b4198f6e33f156ff&_x_zm_rhtaid=693

Mars and Venus Appulse

There's a very close appulse between Mars and Venus on July 12 which will be a nice sequel to the Jupiter-Saturn appulse that occurred in December and called the Christmas Star. Here in southern California, Mars and Venus can be seen approaching each other every night starting around the 4th of July from about 8:35 pm to 9:40 pm PDT. They can be seen in the western sky about 15 degrees above the horizon when Mars becomes visible after sunset. Mars will be at a distance of about 2.47 AU and will be shining at magnitude 2.03 extincted to magnitude 3.2. Venus will be at a distance of about 1.44 AU and shining at magnitude -3.35 extincted to magnitude -2.2. The closest approach on July 12 will be accompanied by a 3-day old Moon with 9.7% illumination which will make this a very photogenic close encounter.

Ken Elchert

PVAA Officers and Board

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President ….....	Mathew Wedel	909-767-9851
Vice President ..	Joe Hillberg	909-949-3650
Secretary	Ken Elchert	626-541-8679
Treasurer	Gary Thompson	909-935-5509
VP Facilities	Jeff Felton	909-622-6726

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Richard Wismer(2022)	
Ron Hoekwater (2021).....	909-706-7453
Jay Zacks (2021) ……	

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Outreach	Jeff Schroeder	909-758-1840
Programs	Ron Hoekwater	909-391-1943

NASA Night Sky Notes July 2021

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!

Observe the Milky Way and Great Rift

David Prosper

Summer skies bring glorious views of our own Milky Way galaxy to observers blessed with dark skies. For many city dwellers, their first sight of the Milky Way comes during trips to rural areas - so if you are traveling away from city lights, do yourself a favor and look up!

To observe the Milky Way, you need clear, dark skies, and enough time to adapt your eyes to the dark. Photos of the Milky Way are breathtaking, but they usually show far more detail and color than the human eye can see – that's the beauty and quietly deceptive nature of long exposure photography. For Northern Hemisphere observers, the most prominent portion of the Milky Way rises in the southeast as marked by the constellations Scorpius and Sagittarius. Take note that, even in dark skies, the Milky Way isn't easily visible until it rises a bit above the horizon and the thick, turbulent air which obscures the view. The Milky Way is huge, but is also rather faint, and our eyes need time to truly adjust to the dark and see it in any detail. Try not to check your phone while you wait, as its light will reset your night vision. It's best to attempt to view the Milky Way when the Moon is at a new or crescent phase; you don't want the Moon's brilliant light washing out any potential views, especially since a full Moon is up all night.

Keeping your eyes dark adapted is especially important if you want to not only see the haze of the Milky Way, but also the dark lane cutting into that haze, stretching from the Summer Triangle to Sagittarius. This dark detail is known as the Great Rift, and is seen more readily in very dark skies, especially dark, dry skies found in high desert regions. What exactly is the Great Rift? You are looking at massive clouds of galactic dust lying between Earth and the interior of the Milky Way. Other "dark nebulae" of cosmic clouds pepper the Milky Way, including the famed Coalsack, found in the Southern Hemisphere constellation of Crux. Many cultures celebrate these dark clouds in their traditional stories along with the constellations and Milky Way.

Where exactly is our solar system within the Milky Way? Is there a way to get a sense of scale? The "Our Place in Our Galaxy" activity can help you do just that, with only birdseed, a coin, and your imagination: bit.ly/galaxyplace. You can also discover the amazing science NASA is doing to understand our galaxy – and our place in it - at nasa.gov.

NASA Night Sky Notes July 2021

The Great Rift is shown in more detail in this photo of a portion of the Milky Way along with the bright stars of the Summer Triangle. You can see why it is also called the "Dark Rift." Credit: NASA / A.Fujii

If the Milky Way was shrunk down to the size of North America, our entire Solar System would be about the size of a quarter. At that scale, the North Star, Polaris - which is about 433 light years distant from us - would be 11 miles away! Find more ways to visualize these immense sizes with the Our Place in Our Galaxy activity: bit.ly/galaxyplace