SPACE

St. Petersburg Astronomy Club Examiner

August 2022 Editor – Guy Earle

The St. Petersburg Astronomy Club has been the center of family astronomy in the Tampa Bay Area since 1927. Our 386 adult members are dedicated to promoting and sharing the wonders and science of astronomy. We host a dark-sky star party each New Moon at Withlacoochee River Park, along with local star parties, telescope-making workshops, science lectures, astronomy lectures, educational outreach sessions and much more.

Inside this Issue:

Astronomy Image of the Month

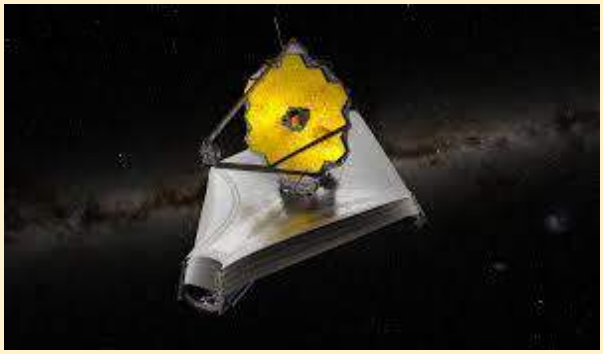
NGC 6888, the Crescent Nebula by **Philip Roey**

Celebrating 30 years of OBS in 2023

February 2023 will mark our 30th anniversary of our annual Orange Blossom Star Party! Started at our old clubhouse on Hickory Hill in Brooksville, the tradition continues today at Withlacoochee River Park. Keep an eye peeled for more information, including our retro club t-shirt design.

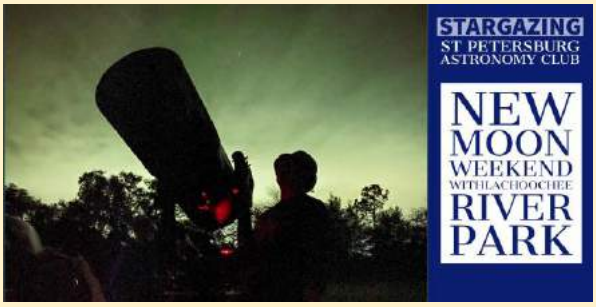
August General Meeting

This month's general meeting will take place on Friday, August 26th at **8:00 PM**. The meeting will be ***in person*** at St. Petersburg College, Gibbs Campus, 6405 5th Avenue North, Natural Science Building, Classroom 232, 2nd floor, and also virtual. This month's presentation is **James Webb Telescope's First Images** by Kathy Blackett



To attend virtually with **Zoom,**
join from your computer, tablet or smartphone by clicking here.
You can also dial in using your phone.
United States: +1 (301) 715-8592
Meeting ID: 993-399-331
Passcode: 999123

The club's **New Moon observing weekend** will be held August 26th – 28th at Withlacoochee River Park east of Dade City.



New SPAC Members

We would like to welcome Katie & Mike Didio, Jessica & William Russell, Kristina Yang, and Steven Balke to our family of members.

Examiner Staff

Editor	Guy Earle	813 785-1972
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SPAC New Moon Weekend
Withlacoochee River Park
July 29 – 31, 2022

KELLY ANDERSON

By Your Intrepid Field Reporter

The summer version of our customary New Moon Weekend was, as Florida in July typically presents, hot … very, very not. The heat index at mid-day rose to the wrong side of 100 degrees (38 degrees Celsius for those of you with a metric bent). But, those of us who decided to tough it out were rewarded with pretty good skies.

Your Not-So-Intrepid Field Reported had missed the past two New Moons. The May event over Memorial Day conflicted with the Florida Folk Festival at the Stephen Foster Cultural Center. We had not attended this annual event for several years (the last two had been cancelled due to you know what), and we didn't want to miss the revival. Reportedly the weekend at Withlacoochee was pretty much rained out, but the FFF was a great time. If you like Folk and Country music, crafts, story-telling, too much food and the chance to chat with some really talented musicians, you should go (https://www.floridastateparks.org/FloridaFolkFestival).

We missed the June NMW because I wimped out. When one reaches a certain age one seeks comfort more than some other things (translation: the hot and rainy forecast scared us away). It turned out that those who didn't wimp out had pretty good viewing. Not wanting to miss a third weekend, we decided to run up and hoped there'd be some decent skies. As luck would have it, the cloud gods cooperated.

Joe Canzoneri was first to arrive on Thursday morning. Your not-so-intrepid Field Reported arrived about noon. Later that afternoon we were joined by Tim Harris who arrived in Gargantua, his motor home of considerable length. Tim set up his home-made 18" go-to Dobsonian reflector. If you haven't had the chance to look through Tim's scope, you've missed an extraordinary viewing experience. Joe brought his 3" refractor. Check out the SPAC Facebook page to see what that little scope can do. I set up my 6" RC Cassegrain. Then, we waited patiently for dark. This doesn't happen in the dog days of middle summer until about 10:00 pm. The skies were mostly clear with a little African dust to make things interesting, but at least we could see stars to play with.

Friday evening we were joined by Marshall and Aaron, two prospective members from Largo. Marshall brought his brand-new 8" Dobsonian. Yeah, a new telescope. Right about sunset the clouds formed over us until the entire sky was covered. I explained to Marshall that the cloud cover was his fault.

About an hour later, though, the clouds disappeared, and we had even better seeing than the previous night. Equipment trouble continued to plague me so I had to be content with looking through the other people's equipment. All in all, a pretty good weekend, but it left me with a puzzle to solve once I got home.

Because of a previous commitment your IFW departed for home on Saturday morning, but not without some difficulty. The trailer brakes didn't work! Our 9,500-pound trailer doesn't work well without brakes. I managed to get to Camping World by backroads, and they went to work on the brakes right away. As it turned out, they couldn't find anything wrong, because the braking system worked perfectly. I hooked up the trailer and got home with no further difficulties. I guess it was my turn to experience the perverse behavior of inanimate objects.

Joe reported that no one else joined our little band of observers for Saturday night, but the skies were the best he had ever seen at Withlacoochee.

As a perfect end to a perfect weekend, I set up my system in my garage on Monday, and, of course, everything worked perfectly on the first try. It figures.

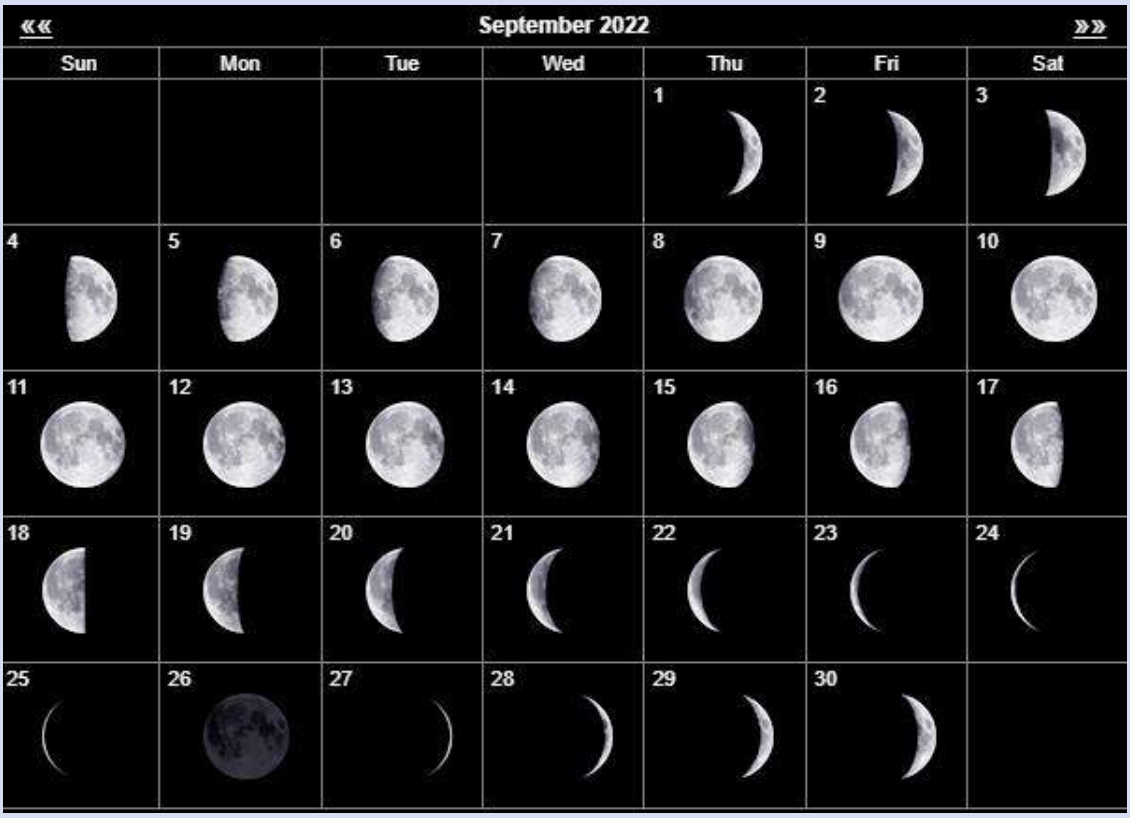
Cooler temperatures and clear skies are guaranteed for our August New Moon Weekend. Mark your calendars for August 26 – 28.

Annual SPAC Officer Elections

We are seeking nominations for the following club leadership positions: **President, Vice President, Secretary, Treasurer, and 2023 Director-at-Large**. Please submit your nomination to Browncongo@yahoo.com no later than September 23rd. The slate of nominations will be published in the September Examiner. This year's elections will be in person at the October monthly meeting. Once you have signed in, you will see a green button, "Annual Elections."

Any Club member who wishes to submit a nomination is encouraged to do so by the September general meeting. If you nominate a person for a position, be sure to ask that person if he or she is willing to serve in that position.

September Lunar Calendar



September 1, the Moon will cross the Equator headed south at its Descending Node

First Quarter September 3

September 3 Antares will be about 5 lunar diameters south of the Moon

September 7, the Moon will be at Perigee: 364,491 km from Earth

September 8, Saturn will be about 8 lunar diameters north of Moon

Full Moon September 10, the Full Harvest Moon

September 11, Jupiter will be about 4 lunar diameters north of the Moon

September14, the Moon will cross the Equator headed north at its Ascending Node

September 15, the Pleiades will be about 6 lunar diameters north of the Moon

September 16, Neptune will be at Opposition

Third Quarter September 17

September 20, Pollux will be about 4 lunar diameters north of the Moon

September 22 is the Autumnal Equinox

New Moon September 25

September 26, Jupiter at Opposition

September 28, the Moon will cross the Equator headed south at its Descending Node

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Space Exploration News

STEVE ROBBINS

Surprise! James Webb Space Telescope has the ability to increase our "lookback" from Hubble Space Telescopes 480 million years after the Big Bang to **180 million years ABB**. Image credit: NASA. It only makes sense that its first released scientific images would feature that increased capability. But the STSI, Space Telescope Science Institute, thought otherwise. We amateurs were amazed and delighted that STSI chose for three of the first four images to be objects we observe often: **Stephan's Quintet** (Hubble view there, which also resolves stars in NGC 7320, The Eight Burst Nebula, announced as the Southern Ring Nebula (one of the severe defects of popular naming systems), **NGC 3132** (another Hubble image from 2005), and the **Carina Nebula**, Eta Carina Nebula, NGC 3372, here shown by Dr Becky Smethurst's YouTube channel compared to the best Hubble image. These images of familiar objects highlighted the increased capability of JWST far more dramatically than any deep field two week long exposure could have, took a morning's length exposure and so could be released quickly to the public. What a great thought process they had!

Starliner completed its first successful unmanned docking with ISS during its Orbital Flight Test-2, landing at White Sands Missile Range on May 25, 2022. NASA congratulated Boeing on its successful accomplishment. But behind the scenes there were troubles. During the mission, Starliner **lost two of three** Orbital Maneuvering and Attitude Control (OMAC) thrusters out of a cluster of three in a single "doghouse." Fortunately the one remaining thruster in the cluster was sufficient to raise the orbit to ISS. Then, during docking with ISS, Starliner **lost two RCS thrusters** due to malfunction. The radiative cooling system also had problems early in the flight. Fortunately, all failures happened

in redundant systems and could be compensated for. Boeing gave OFT-2 a 15 score out of a possible 10. However, NASA, while saying nice things about OFT-2, betrayed by its actions that it is losing confidence in Boeing's ability to deliver quality for twice the price of SpaceX. Before talking nice about OFT-2, NASA announced that it was going to issue SpaceX **a single source contract** for five more Crew Dragon flights to ISS, in addition to the three extra already contracted. That means that SpaceX can continue to **supply all ISS' needs until 2028** without a single Starliner flight. Also, in the same release, NASA solicited other companies to **submit requests for contracts** on alternate means of commercial crew support to ISS. That means that NASA is taking no chances and will do what is necessary to ensure ISS is continuously occupied and supplied through 2030. Boeing's chances are strictly limited and their possible failure is already mitigated.

Remember the "doorway on Mars?" Turned out to be 22 cm tall and, no surprise, not a doorway at all. Well forgedaboudit! On June 12, 2022 (Sol 466) at the local mean solar time of 12:20:39 Right Mastcam-Z photographed **a cliff with a "snake head" sticking out of it** and a more prosaic but more interesting balancing boulder on top of a butte. There are lots of balancing boulders in the American west and even in the Appalachians, and erosion is an amazing thing. But pareidolia is fun!

When stars between 8 and 20 solar masses go supernova, they **leave behind a neutron star**, some of which are pulsars, like the one in M1, the Crab Nebula. But when a star of more than 20 solar masses supernovas, it leaves behind a small black hole of a mass under 10 solar masses. Only .01% of Milky Way stars are over 20 solar masses, but that accounts for enough of them over the life of the Milky Way to have produced 100 million small stellar mass black holes in the galaxy right now. Most of them detected so far have been members of binary star systems, making detection straightforward, but **astronomers led by Kailash Sahu** of the Space Telescope Science Institute in Baltimore, Maryland, announced the discovery of the first known isolated stellar-mass black hole, using the Hubble Space Telescope. They should be common. They will be beastly difficult to find.

In Memoriam

It is with great sadness that we learned William (Bill) Melilo, a long time SPAC member, passed away on July 8th, aged 94. He was a staple at Hickory Hill back in the 90's and early 2000's, and a good friend to members Don Saylor and Dee Stevens. Every New Moon weekend, Bill would set up his telescope on the east side of the clubhouse, near Don, Dee, and myself. Many an evening started by sitting around a folding table, all of us having a good laugh and enjoying each other's company. Bill was always kind, with a smile that was infective. He could be quiet, but his ever-present grin always beguiled a great and sharp sense of humor. Bill continued with SPAC after we relocated for a few years to the Alafia River State Park, but he sadly did not follow to our current location. I'm regret that I lost touch with Bill after that point, and since then both Don and Dee have also passed away. I can fondly remember many observing nights, crawling into the bunk beds at the Hill, only to hear Bill and Don loudly discussing something in the other room. Bill was never short of kindness, and I will cherish the memories of those days and the warmth of his personality.

Bill was active in the club when I joined in 2006. He was at the Science Center events when we had busy times there. Dan also said that Bill was very active at Hickory Hill, going there as a club leader at least twice a month. **Shirley Vuille**

So sorry to hear about Bill! He was a genuinely nice guy! I used to go to Hickory Hill on the Fridays of observing weekends, arriving in the early afternoon, and Bill and his friend Don Saylor would usually already be there. He was so pleasant and calm, friendly and nice to talk with. Then years later, he was the contact person for Bauder Elementary's evening science fair telescope viewing. He asked for help with that, and I helped him each year for a number of years. I was always impressed how Bill, then in his 80s, could get his Celestron NexStarr 11 GPS—65 lbs.!—in and out of his PT Cruiser so effortlessly!

Bill will be missed by many of us. I was glad to have known him. **Greg Simpson**

How to Image the Planets

Part I: Location

Guy Earle

This is the first of a multi-part article that I will do over the next few months, discussing all aspects of how to image—and by default—how to observe, the planets. The first thing you need to know is *where* to find them in the night sky. It is amusing when someone asks, "Did you see Saturn? I heard on the news you can see it tonight." They mean well, and I certainly appreciate the information, but if a planet was only visible for one night then the solar system would have some very different celestial mechanics! Most of the planets are up for the better part of the year, and once you understand their motions in the sky, you'll see them all the time.

You want to observe the planets, image them even, right? The first step is knowing not only where they are at night, but when it is best to see them. Think of this analogy: you are looking at a car moving in the distance but then the car suddenly gets closer. It's easier to see details on the car when it gets closer. The same is true for the planets: it's called *opposition*. It's the point where the Earth is directly between the Sun and the planet you are observing. The closest path between two points is a straight line, correct? So, a planet is largest at opposition, and just like the approaching car it's the chance to see the most detail.

A simple Google search can yield the opposition dates for the planets, but for convenience, here they are in no particular order:

Jupiter, September 26th
Saturn, August 14th
Uranus, November 9th
Neptune, September 16th
Mercury, August 17th
Venus, February 19th

Knowing the opposition dates is a start, but there's more (of course, right?). The inner planets are different for observing than the outer. For Jupiter and Saturn, they've been up for the past few months and will continue to be visible into 2023. It's just a matter of where they are, whether that be in the western sky at sunset, the eastern, or due south. Watch them over a month at the same time of night and you'll begin to notice that they rise earlier. Eventually, they'll be low in the west at sunrise and disappear for a time. Then, a little bit later you'll spot them in the eastern sky shortly before sunrise, and the cycle starts again. Jupiter, being the king of the planets, is gigantic and makes a

prime target to image. How much larger than the rest? For example, Uranus typically is about 3.8 arc seconds wide (about the size of a slightly out-of-focus star), whereas Jupiter goes from 35 to almost 50 arc seconds in size over a season! Saturn appears large because of the rings, but the planet itself is visually only about ½ the size of Jupiter. Around opposition the rings tend to brighten. Saturn's actually size is much closer to Jupiter but the key is that *its further away,* so it appears smaller. Neptune and Uranus are even smaller and further away, so a telescope is necessary, unless you want a challenge and try to see Uranus with binoculars. The orbits of Neptune and Uranus are so enormous that their size barely changes from our viewpoint, even year to year. By comparison there's Mars, being so close to the Earth it has dramatic changes in size.

Mars, because of its orbit, increases dramatically in size every two years, with 2022 being such a year. Currently, Mars is about 7 arc seconds but will increase to about 18 arc seconds at opposition in October. To illustrate the change, here's a collage of how Mars changed in size over the last opposition in 2020.

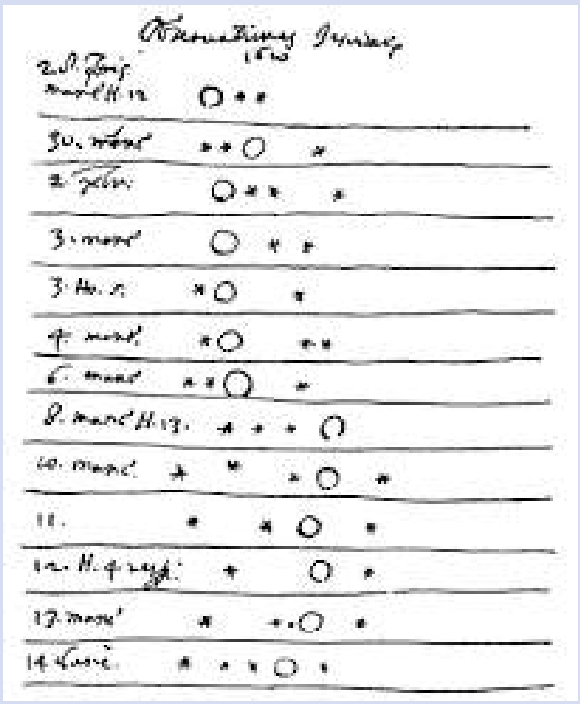
As you can see, back in March of 2020 Mars was very tiny, a mere 6 arc seconds. But by the time it reached opposition in early October it had increased to over 22 arc seconds. That close approach, just like the car in the example, allows the opportunity to see details you could not see months before.

Lastly, I should also discuss Venus and Mercury; being that they are between the Earth and Sun they naturally don't stray far from the Sun in the sky. Your best chance is to catch them when they are furthest in their orbit away from the Sun, meaning the highest point in our sky when the Sun sets. Higher up at sunset, more time to view them before they set. For Venus, the planet is easy to spot since it shines so brightly. Venus already passed opposition in the eastern sky back in February, so now we have to wait until nearly Christmas to see it rise in the west after sunset. Mercury follows the same logic, but is the toughest planet to see since it is closest to the Sun. It's up for only a few weeks at best, with the highest point being only a few days before it starts to drop below the tree line.

So, before you start trying to figure out what equipment to purchase, take a moment to learn when it is best to see the planets. Next month I'll detail what equipment to use when imaging.

Observing Jupiter's Great Red Spot

Guy Earle



As we get into the best time of year to observe Jupiter, there are two main things both new and old astronomers look for on the largest gas giant: the four largest moons, called the Galilean Moons, and the Great Red Spot. Back when I did planetarium shows at MOSI in the 90's, we always did a quick tour of the night sky after each show, describing what was up in the night sky at that time of year. I'd describe how you can take a pair of average binoculars to see Jupiter's four main moons; Ganymede, Europa, Io, and Callisto. Looking at Galileo's drawings through his early, crude refractor looks similar to amateur astronomer's first drawings. Noticing that there were celestial bodies that orbited another celestial body was proof that the Earth was not the center of the universe. Just make sure to put them somewhere solid, like the top of a fence post. Having them bounce around in your hand makes it impossible.

The other main thing that people look for is the Great Red Spot (GRS), an immense storm that has been around as long as astronomers have been using telescopes, which is larger than the Earth itself. However, there's an easy way to know if the GRS will be visible when you take your scope out. Sky and Telescope has a very simple program on their website, which tells you exactly when the GRS will be passing across, or making a "transit." Being that Jupiter rotates in just ten hours, despite its enormous size, you can watch changes occur each hour. If you're lucky enough, maybe you'll catch the GRS along with a Galilean Moon making a transit, such as a photo I took last summer (right). Good luck!

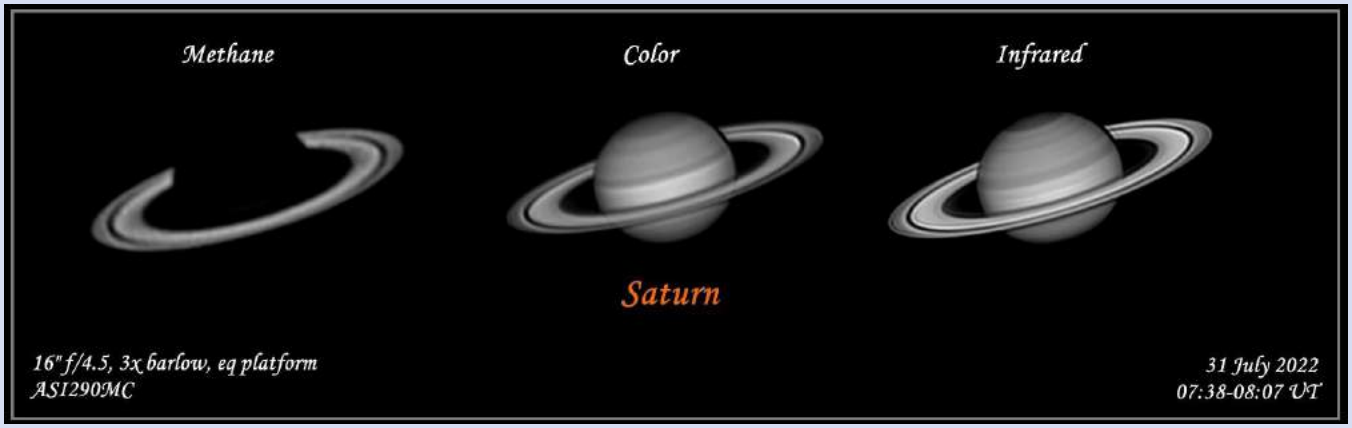
SPAC Image Gallery

Here are some excellent astrophotography highlights from our fellow SPAC members. Anyone who would like to share his or her work, I encourage you to email the editor to submit for future newsletters or share them on our SPAC Facebook page.

Above: NGC 7000 The North American Nebula (SHO) (cropped), Date: 2022-07-21,29,30,31, Location: Chiefland Astro Ranch, OTA: Rasa 11
Camera: ZWO ASI2600MM, Mount: CEM70
Exposures: HA 300s x23, OIII 300s x42, SII 300s x42
Filter: Baader Ultra-highspeed HA, OIII, SII by **Jamie Kenas**

Above: Meade 16, **M13** to image with a Nikon FF DSLR @ ISO6400. This is a stack of 30 x 60s subs by **Howard Ritter**

Below: **Saturn** in various wavelengths **by the editor**



Above: **M20 Trifid Nebula** C11 SCT in the Whimbrelwood Observatory, Fishhawk Ranch **by Les Gatechair**
Below: **SH2-129,** 300s X 76 HA by **Jamie Kenas**

International Dark Sky Association

Globe at Night

LEEANN MUSZYNSKI

Get out and observe the night sky! Can YOU see the stars?

Light pollution has been a known issue for decades. But we've only recently been able to access the tools and technology to better understand which sources contribute the most to light pollution, and what impact that has on the natural world.

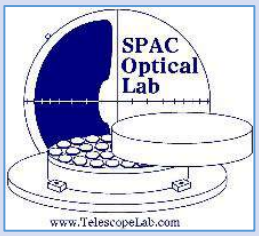
Take part in the Globe at Night campaign. This worldwide campaign asks individuals to measure the quality of the night sky where they live. You don't have to leave your backyard (or porch or patio) to take night sky measurements, and reporting your results takes only a moment using the Globe at Night web app. Your reported measurements are added to other reports from around the world where they are held in an open-source database. With these measurements, scientists can see how the quality of the night is changing all around the world. **Your measurements help the International Dark Sky Association develop targeted policies and guidelines to help solve the problem of light pollution.**

In 2021 citizen scientists contributed **25,479** data points!

We are off to a great start this year with **12,140 observations** so far! Help us reach our goal of 20,000 data points for 2022! Join the Globe at Night campaign! **August 18-27, 2022** featuring the constellation Hercules.

www.globeatnight.org

SPAC Mirror Lab



MICHAEL DAVIS

Hi All,

OBS is on the horizon. You may be feeling the itch to buy something new to stand out on the observing field. But in these deteriorating economic times of inflation coupled with supply chain shortages, upgrading to a new telescope may seem like an impossible dream. Even if you can afford the rapidly rising prices of new hardware, you are likely to find it is out of stock and back-ordered forever. What to do?

Why not instead upgrade your existing scope to make it work like new, or even better than new? There are all kinds of maintenance, modifications and upgrades that can be done to telescopes to make them look and work better than ever. A lot of these tips are specific to Dobsonian or Newtonian type scopes (like the type we make at The Mirror Lab) but many are also universal.

Let's start with a few simple things that don't cost much but can really enhance the performance and appearance of your existing equipment.

Clean the optics.

Recoat mirrors if needed.

Repaint optical tubes.

Refinish rocker boxes or tripods.

Replace or upgrade bearing materials.

Add flocking or baffles to optical tubes.

Install any available software updates or upgrades.

All those things are fairly cheap and easy, and will make an older scope look and work like new. Plus you won't have to worry about suffering the curse of new equipment.

If you have some spare cash and can find some things in stock, (or find them at the amazing OBS Swap Meet), why not add a few accessories to make your old scope even better than when it was new?

Upgrade to a larger finder.

Upgrade your focuser.

Upgrade your eyepieces.

Invest in some filters.

Install a Sky Commander or other digital finder aid.

Install cooling fans and dew heaters.

Optimize your secondary mirror size.

Install thumbscrews and knobs for easy and tool-free collimation.

New accessories can unlock previously unused, or underutilized potential in your older equipment, at a fraction of the cost of upgrading to new equipment. Fix up your older equipment and that shiny, new, expensive, back-ordered telescope you saw in an S&T ad that you'll have to mortgage the house for and wait eight months to get might not seem so absolutely necessary after all.

That's all for this month. Please feel free to submit your own article ideas. If you know of a mirror making or telescope making story that you think should be showcased here, email me at astronomermike@gmail.com. Put "Mirror Lab Submission" in the title so it will stand out in my email torrent. You can follow everything happening at The Mirror Lab at http://telescopelab.com/. You can follow what I am doing on my blog at http://www.mdpub.com.

SPAC Business Meeting

Our next business meeting is **Wed., Sept. 14th, at 8:00 PM** via conference call; details upon request. All interested members are invited to attend. All club business decisions are made at the business meeting so as not to encumber the general meeting.

Officers & Directors

President	Brad Perryman	727 420-1957
Vice Pres.	Paul Krahmer	727 535-5827
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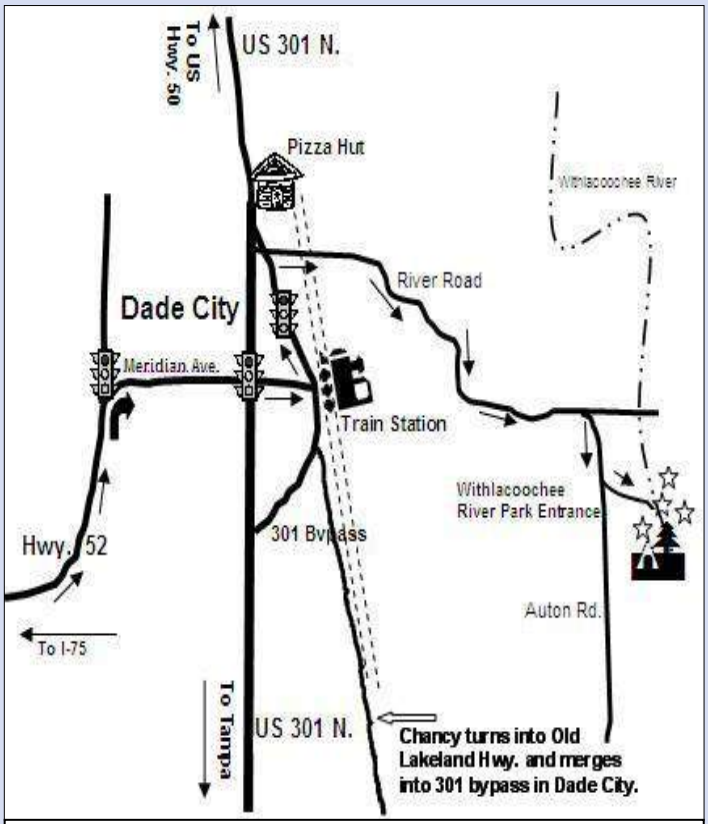
Outreach Chair	Jim Hunter	813 507-8415
Star Party Chair	Mike Partain	850 339-0828
Librarian	Ralph Craig	727 384-2086
Club Webmaster	Jack Fritz	813 508-5680
Dark Sky Chair	Leeann Muszynski	813-601-0986

Click on the name to send email



Withlacoochee River Park – Dade City, FL
Detailed directions can be found at:
www.StPeteAstronomyClub.org

Withlacoochee New Moon Weekends

There's no need for reservations. However, the park closes at sundown, so you will need to arrive before then. The park rangers will give you the gate-code once you're inside the park. Please do not call for the gate code as they are not allowed to give it out over the phone.

Reservations are not necessary. Please print and display our Friends-Of-The-Park Pass on your dashboard.

Please join us! All astronomy enthusiasts are welcome. You do not need to be a club member to attend. Please refer to our Club Calendar for details and scheduled dates.

Recognition of Patrons & Benefactors

Clifford B. Benham	Benefactor
Lakeisha & Stephen Black	Benefactor
David Brewer	Benefactor
Walter Brinkman	Benefactor
Mark & Sharon Bruns	Benefactor
Dave & Deborah Catalano	Benefactor
Jack & Roni Fritz	Benefactor
Christopher Halls	Benefactor
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Todd Vogt & Brittany MacDonald	Benefactor
Andrew & Bonnie Watts	Benefactor
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Dan & Alyson Affolter	Patron
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Lori & Espen Holmen	Patron
Kyle Brinkman	Patron
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Jason & Steph Hargrove	Patron
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Matt Hughes & Manuel Ordonez	Patron
Lee Jarvis	Patron
Paul & Robin Kavan	Patron
Neal Kleinman	Patron
Matt Labadie & Jennifer Willman	Patron
Joe & Shirley Litton	Patron
Barbara Lloyd	Patron
Michael Maguire	Patron
Allen Maroney & Tracee Elliott	Patron
Gabriel & Reyna Martinez	Patron
Joe Mirabelle	Patron
Herb Monroe & Martha Stewart	Patron
Leeann Muszynski	Patron
Robert Nadeau & Ali Wuchert	Patron
Stephen Oros	Patron
Brad & Lisa Perryman	Patron
Alan Polansky	Patron
John & Abbie Redmond	Patron
David & Rusty Richmond	Patron
Christian & Wendy Rubach	Patron
Robert Rutledge	Patron
Gregory Satchwell	Patron
Rebeca & Jack Selbo	Patron
Anthony Staiano	Patron
Tom & Michelle Sweet	Patron
Alexie Velez & Yanira Hernandez	Patron
Charlie White	Patron
Ed Wilson	Patron

St. Petersburg Astronomy Club Membership Form

Membership in St. Petersburg Astronomy Club, Inc. (SPAC) is open to anyone, regardless of age, who is interested in astronomy. Benefits of membership include a monthly subscription to the SPAC Examiner newsletter, reduced camping rates and use of the club's bunkhouse at our dark sky site at Withlacoochee River Park, the ability to serve on the SPAC board and voting privileges. Dues are considered donations and are non-refundable. Membership options are available as listed below.

You are now able to choose how you wish to join or renew your membership:

- **Preferred On-line Website Option: New instructions as our website has been updated.**

Go to https://www.stpeteastronomyclub.org/Sign_In.php on the SPAC website where you can join, view and update your membership profile, provide payment, and **print your membership card**.

- **US Mail Option: Takes more time to process manually because we are all volunteers.**

Complete the attached membership form and send it along with your payment to:

Jim Hunter
17316 Oak Ledge Drive
Lutz, FL 33549.
(Checks should be made payable to SPAC, Inc.)

Adult 1: _____ Adult 2: _____

Street: _____

City, State, Zip: _____

Home Phone: _____ Cell Phone: _____

Email Address: _____

Number of Children under 18: _____

Memberships:

Single: [ ] $ 30.00/YR. Includes one adult, minor children, the "SPACE" newsletter, and all the rights and privileges of membership.

Family: [ ] $ 35.00/YR. Includes two adults, minor children and the above rights and privileges.

Patron: [ ] $ 50.00/YR. A Patron member is entitled to the above rights and privileges.

Benefactor: [ ] $100.00/YR. A Benefactor member is entitled to the above rights and privileges.

Student: [ ] FREE. SPAC offers free membership to full time high school and college students.
Expected date of graduation: _____

Total Submitted: $_____

Your SPAC Membership Card is required for reduced fees at the campground.