SPACE

St. Petersburg Astronomy Club Examiner

July 2023

Editor – Guy Earle

The St. Petersburg Astronomy Club has been the center of family astronomy in the Tampa Bay Area since 1927. Our 385 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

Globular cluster **M22** in Sagittarius **by Peter McLean**

August Preview

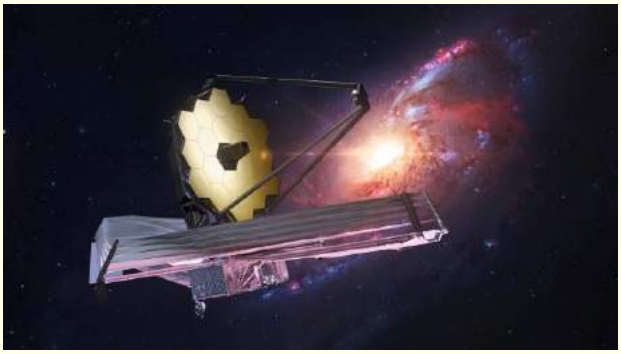
In next month's issue, Mike Partain will be reviewing a new piece of observing equipment, the TV14 night vision eyepiece. This has the potential to revolutionize visual observing in the coming years, as much as binoviewers did 20 years ago and all the various imaging equipment this last decade.

The solar eclipse article has been postponed until August to allow space for Howard Ritter's *In Memoriam.*

There are a couple important **solar eclipses** that are coming up this fall and next spring, so we'll take a moment to talk about where you'll be able to see them.

July General Meeting

This month's general meeting is on Thursday, July 27th at **7:30 PM**. The meeting will be ***in person*** at St. Petersburg College, Gibbs Campus, 6405 5th Avenue North, Natural Science Building, Classroom 236, 2nd floor, and **also virtual**. This month's presentation is **James Webb Space Telescope's Recent Discoveries** by NASA Ambassador, 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: 993-399-3311
Passcode: 999123

The club's **New Moon observing weekend** will by August 11th-13th at Withlacoochee River Park east of Dade City.

New SPAC Members

We would like to welcome Bruce King and Terry & Na Na Thompson to our family of members.

Examiner Staff

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Experiencing the Cherry Springs Star Party

Mike Partain

Last month, Carli and I had the opportunity to attend the Cherry Springs star party in Pennsylvania. This was the first time in my 20+ years in the hobby that I had the pleasure to attend a star party outside Florida. The star party is located at Cherry Springs State Park, and is a Bortle 2 class sky hosted by the Astronomical Society of Harrisburg, PA. The park is located up in the mountains in north-central Potter County, Pennsylvania.

The Cherry Springs star party is held every summer, and I was anxious to see the summertime night sky and my favorite constellations, Sagittarius and Scorpios. Unfortunately, as we all know, our summers in Florida are often out of reach for those who like to go out and observe the night sky. Between the heat and humidity and mosquitoes, as big as small dogs, Florida observing can be quite brutal. Both Carli and I were pleasantly surprised when we arrived on Wednesday to the high temperature of 73° in the middle of the afternoon, and even more surprised of the low of 47° the next morning. Those temperatures were worth the trip alone!

The first two nights of the star party were overcast, with last two offering views of the sky; Saturday was clear the whole night. There is something to be said about experiencing a truly dark site. The skies reminded me of both Chiefland Astronomical village and Kissimmee Prairie Preserves over 20 years ago. It is sad to see just how much sky we have lost over the past two decades from light pollution.

The party was attended by over 400 astronomers from all over the eastern seaboard, including Canada. It was exciting to see so many people and all the equipment gathered around the various electrical boxes throughout the observing field. I did note that we were one of the few RVs out on the field, with the majority of the attendees being tent campers. I am sure the cooler weather and access to power was a factor in that composition.

The host club was extremely nice and accommodating for everybody. They even had a neat way of doing raffles, which I hope to emanate in our next Orange Blossom Special star party. One of the advantages of attending a star party out of state is to see how others do the same thing we all love. I see both differences and similarities, including how our community tends to bond together to help one another. I found myself helping an astronomer out of Maryland collimate his new scope that he had just finished completing in time for the last day of the star party. Ironically, he was a former OBS attendee, and we worked for about 30-40 minutes to get his scope set up to observe for the night.

If you should have the chance to attend the star party out of our local area, I would encourage you to do so. I think you'll find it both refreshing and exhilarating at the same time. Next year, I hope to attend the Cherry Springs star party once again, and who knows, maybe even go out to Nebraska or the Grand Canyon as well. Until then clear skies.

Flats and Darks

Rich Tobin

What Telescope to Purchase

By Rich Tobin

For those new to this hobby the most asked question is what telescope should I buy, there is no easy answer to this question. One must ask themselves do I just want to view the night sky or do I want to take images. If your interest is solely in viewing again ask yourself how much time am I time am I willing to dedicate to this hobby also how much am I willing to spend. If your answer is I just want to view the night sky a Dobson telescope may be the way to go they are inexpensive and very easy to use for viewing objects within our Solar system like the moon, Jupiter and its moons also Saturn and this can be a very satisfying experience.

I entered this hobby with the mindset that I just wanted something to view the Solar system the moon and planets, that didn't last long before I wanted to share my experience with friends and family and upgraded to a small Reflector telescope and a small planetary camera for capturing images in our solar system such as the moon and nearby planets. Once you decide what kind of telescope will suit your needs the second most important piece of equipment on the list will be the mount, a goto mount will be the simplest way find what you want to view or image. Again there are specific mounts for viewing and for imaging a Altazimuth mount is great for viewing but not for imaging for imaging one must have an Equatorial mount that will track your targets through the night sky.

Typically I knew very little about astrophotography and what I was getting into and the learning curve began. The posts you see of the gorgeous Nebulas and deep sky objects don't just happen and one must not expect to get images like them right off the bat they are taken by very talented and dedicated individuals who spend many hours and nights to get a single image. If you think your interest is in capturing images for the beginners my thoughts are to start with our Solar system the moon it's a great place to begin your learning process with and a small Reflector telescope and a

inexpensive planetary camera with an equatorial mount will give you many great nights of imaging to share with your friends and family, it will also tell you am I going to jump deeper into this hobby or not without spending a large amount of money to get started with.

We all started in the same manner I have spent many nights spraying myself with mosquito repellent or in the cold wondering if I will ever get feeling back in my frozen fingers along with many failures and nights of frustration this all go along with the learning process, but then you get that image and show it to your friends and they say wow did you take that.

The first time I saw the Orion Nebula even though it was not more than a white cloud I was hooked and wanted to start a new faze with deep sky imaging as my goal. I quickly learned and realized this was a whole new ball game and the equipment I was using for the solar system just wasn't going to make it for deep sky imaging and I would have to invest in much better equipment of course this comes with a price tag.

I have gone through many telescopes and mounts over the years in pursuit of capturing those deep sky images and still consider myself as a intermediate backyard astronomer with so much more still to learn, every time you point your telescope up in the night sky the learning process begins all over again. For deep sky imaging I have two main telescopes a Williams Optics Redcat 71 for wide field nebula imaging and a Orion EON 130 triplet for very distant targets such as Galaxies and Star Clusters. The equipment I currently use in conjunction with these telescopes start with the AM5 Harmonic drive mount, a ZWO auto focus unit to give me the best focus I can get out of my equipment, the ZWO Asi Air plus, a Williams Optics guide scope, the ZWO 2600 cooled camera along with a ZWO camera for my tracking. All of this is good but now processing your data is the next step, I use PixNsight now to process my images which is a whole new learning experience but there are many good free programs to process your data with. SharpCap is an excellent free program for processing objects you may capture in our Solar system and I used it for a years before plunging into deep space astrophotography.

I can best describe this as a passion to photograph the hidden treasures in the night sky. My suggestion and best advice for anyone who wants to start with this hobby is to read before spending a lot money on equipment that will work for your needs and save yourself from buying equipment that is not going to suit your needs, two great books that were suggested to me when I started. I hope this helps anyone new to this hobby, Clear Sky's!

- *The Backyard Astronomer's Guide* by Terence Dickinson & Alan Dyer
- *The Deep-Sky Imaging Primer* by Charles Bracken

Venus Article and Conference

GREG SHANOS

Fellow planetary imager and SPAC member, Greg Shanos, has a Venus article published in ALPO's journal, ***The Strolling Astronomer***. Scan the QR code below to see the published article, which has been truncated from the journal. Greg is also the featured speaker during the ALPO Conference on July 28, 2023 at 1:45pm to 2:15pm. The conference will be live streamed and will be recorded and available on YouTube at (223) Association of Lunar and Planetary Observers - YouTube, which you can reach by scanning the QR code below.

ALPO Youtube Meeting

Venus ALPO article

SPAC New Moon Weekend

Withlacoochee River Park

June 16-18, 2023

By Intrepid Field Reporter

KELLY ANDERSON

Summer in Florida is a mixed bag. On the one hand it's hot. On the other hand, it's stormy. We experienced both this New Moon Weekend. It seems a band of really nasty weather was working its way across the Panhandle and would spit out a pulse of storms our way from time to time.

Probably because of the less than optimistic weather forecast (astronomically speaking) we didn't have a large crowd, but a few of us indomitable observers managed to screw up our courage and go for it. Or, we were dumb enough to ignore the forecasts and went anyway. Your choice.

1 - Messier 27 by Joe Canzoneri

Joe & Penny Canzoneri plus granddaughter Trinity, and Ron & Dee Wayman arrived Wednesday. Greeted by the much-anticipated torrid temperatures, Joe nevertheless got set up just in case the weather broke. He was rewarded with a few sucker holes stayed around long enough for him to get a great image of M 27.

Your Intrepid Field Reporter arrived on Thursday morning with a fully functioning trailer braking system, a welcome change from last month. While the "feels-like" temps were pushing the three-figure area the breeze was brisk and helped a bit. The sun, however, was brutal.

Bob & Rita Mizel showed up that afternoon, bringing the population of our burgeoning star city to eight. Johnny White stopped by for a few hours to visit that afternoon.

Even though it would be reasonable to expect the clouds to clear at sunset, the weather gods decided to be totally unreasonable, treating us to a never-clearing dense overcast.

We hoped that Friday night would be better, cloud-wise, and for once our wish was granted. The clouds cleared out nicely shortly after sunset and we set to work, forgetting about that that afternoon's downpour, in which we were visited by a heavy rain shower with your odd thunderclap to keep things interesting. One of the great things about our observing field is that it quickly drains. The rainwater was gone and we enjoyed an amazingly clear sky that evening.

The rest of the weekend? Not so much. After all, it's Summer in Florida and we'll take what we can get.

Feeling adventure-ish? Mark your calendars for our next New Moon extravaganza July 14 – 16. Come early and stay late … after all, it's "summertime and the livin' is easy. Fish are jumpin' …" Well, you know the rest.

2 - The Leo Triplet by Kelly Anderson

Space Exploration News

STEVE ROBBINS

We'll lead off with the weird. A physicist from Harvard University, a financial contributor to UFO enthusiasts all over the globe, Avi Loeb, has announced finding evidence of debris from a crashed alien spaceship that Loeb claims entered Earth's atmosphere at a speed and angle making it an interstellar, not a solar system object on January 8, 2014 at 17:05:34 UT. This was derived from the CNEOS (Center for Near Earth Object Studies) database of satellite observation data. CNEOS also publishes light curve data. Before we get all excited, please note that this bolide was observed for only 5 seconds. Any trajectory information is suspect. It did have a velocity of about 44.8 km/s, higher than the local solar system orbital velocity of about 30 km/s. However, contrary to Loeb's claim, this is not particularly unusual. CNEOS 2015-07-04's velocity was 49.0 km/s, 2014-05-06, 44.0 km/s and 2014-05-10, 44.0 km/s, for instance. Finally, Dr Leob is

returning from a visit to the general vicinity of the sighting and claims to be returning with debris from a crashed alien craft. What he has are 50 iron sphericals, each about half a millimeter in size. Further research has shown that metal sphericals on the ocean bottom are not rare. The first such finding was by HMS Challenger on its expedition of 1872-1876. The find was described as "cosmic spherules" and so they were. These were material ablated from the surface (great article here) of an iron meteorite that formed spheres as they fell into the ocean, just as Avi Loeb has found. If Loeb is correct and this is debris from an alien spacecraft, what evidence could possibly make the connection?

In the constellation Sculptor, 264 light-years away, is a G-type main sequence star with a radius of 95% of our Sun's and the same mass, LTT 9779. Around it, with an unbelievably short orbital period of .79 days, orbits a strange planet, LTT 9779b. Typically, ultra-sort-period planets tend to be either "hot Jupiters" with a size of more than 10 Earth radii, or rocky planets smaller than 2 Earth radii. This one, though, is characterized as a "hot Neptune" with a radius of 4.6 Earth radii and a mass of 29 Earth masses, making it very rare in the solar systems studied so far. But that's not the strange part. The Moon has an albedo of about .12, 12% of the light from the sun reflects off it. Earth's albedo is about .3, Venus' is .75. This planet reflects a full 80% of the light falling on it. How? A recent study headed by James S. Jenkins, University of Chile, concludes that this planet is so hot that its atmosphere is filled with titanium and silicate vapor. On this planet, it literally rains titanium!

Jeff Bezos' rocket company, Blue Origin, has exploded one of its BE-4 methylox booster motors about 10 seconds into a test. This was published the other morning by CNBC, not announced by Blue Origin. Upon being contacted by CNBC, a spokesman for Blue Origin said they, "ran into an issue while testing Vulcan's Flight Engine 3." They claim it will have no impact on future launches of the United Launch Alliance's new Vulcan Centaur rocket, contracted to launch 60% of Department of Defense payloads during the next five years. If ULA is unable to launch 2 Vulcan Centaur rockets successfully to orbit within a tight deadline, they will lose that contract. Both ULA and Blue Origin claim this failure will have no impact on meeting the qualifications for this defense contract.

Most amateur astronomers, myself included, have thought that the Orion Nebula (M43) is the closest stellar nursery to Earth. But in celebration of a year of operation of the James Webb Space Telescope, NASA released a stunning image of the Rho Ophuichi cloud complex, at 390 light-years distance, just over 1/3 of the distance to M43. Here on NASA's JWST site, is both the complete photo and a video tour of this nursery of about 50 new stars. Sorry, the permalink isn't published yet.

To illustrate the true cost of the monster that ate NASA's budget, the SLS reassembly of 1970s left-over parts, NASA has found it necessary to cancel the missions of two already completed Janus satellites to the cost of about $50 million. These satellites will go into a warehouse instead of performing the two asteroid missions previously scheduled. They will still be usable for future

missions to other targets, and maybe NASA will get lucky with a new target of opportunity in the future…….or not.

The Moon is a hot commodity these days, with no less than six unmanned missions slated to soft land on the Moon before the end of 2023. First up, launching in July, is a mulligan for India and its Chandrayaan-3 orbiter/lander duo. Failing to land in 2019, India still has the highest resolution camera in CIS lunar space with Chandrayaan-2. Then Russia plans to return to the Moon for the first time since the early 1970s with Luna 25, scheduled for an August launch. Scheduled for an August 26 launch is JAXA's SLIM mission to conduct Japan's first lunar landing. Finally, NASA has three Commercial Lunar Service Payloads program missions, IM-1. Peregrine Mission One and IM-2 scheduled for 3rd and 4th quarter of this year. 2024 looks to mark China's return to the Moon's surface with a sample return mission.

Finally, let's all get depressed. We think Voyager 1 is incredibly remote, and it is, but let's consider the true scale of the neighborhood. Get three people. One plays the Sun in the middle of the room. The other plays Earth three feet away from the Sun. Where do your put the third person, playing the part of Proxima Centauri, the closest star to Earth? Better give him a car because he has to drive 200 miles away! Years ago, NASA, lacking anything to take credit for, announced that Voyager 1 left the solar system, having reached the heliopause, the outer limit of the solar wind. However the heliopause isn't anywhere near the edge of the solar system. It's even only 1/3 of the way to the furthest known minor planet, Sedna, and since it orbits the Sun it's within the solar system, isn't it? But it's worse than that. Outside Sedna's orbit is the Oort cloud, extending from 2,000 to 5,000 AU to its inner edge and the outer edge more than 100,000 Astronomical Units distant! Voyager 1 will reach that inner edge between 600 and 1,500 years from now. Let's get even more depressed. If Byzantine Emperor Justinian had launched Voyager 1 from Constantinople in 540 AD, it would just now be reaching the innermost extent of the Oort cloud. Welcome to the immediate neighborhood! Time of Voyager 1 to get to Proxima Centauri? Try 80,000 years.

August Lunar Calendar

Full Moon August 1, the Full Sturgeon Moon

August 2, the Moon will be at Perigee: 357,311 km from Earth

August 3, Saturn will be 2.5° north of the Moon

August 6, the Moon will cross the celestial equator going northward at the Ascending Node

Third Quarter August 8

August 8, Jupiter will be 2.9° south of the Moon

August 9, the Pleiades will be 1.9° north of Moon

August 9, Mercury will be at Greatest Elongation: 27.4° east of the Sun

August 13, will be the Perseid Meteor Shower peak at 3:58 EDT, ZHR ~90, moon 10% illuminated, lots of trains, best of the year

August 13, Mercury will be 4.7° south of Mars

August 13, Pollux will be 1.5° south of the Moon

New Moon August 16

August 18, Mars will be 2.2° south of the Moon

August 21, Spica will be 2.6° south of Moon

August 21, the Moon will cross the celestial equator going southward at the Descending Node

First Quarter August 24

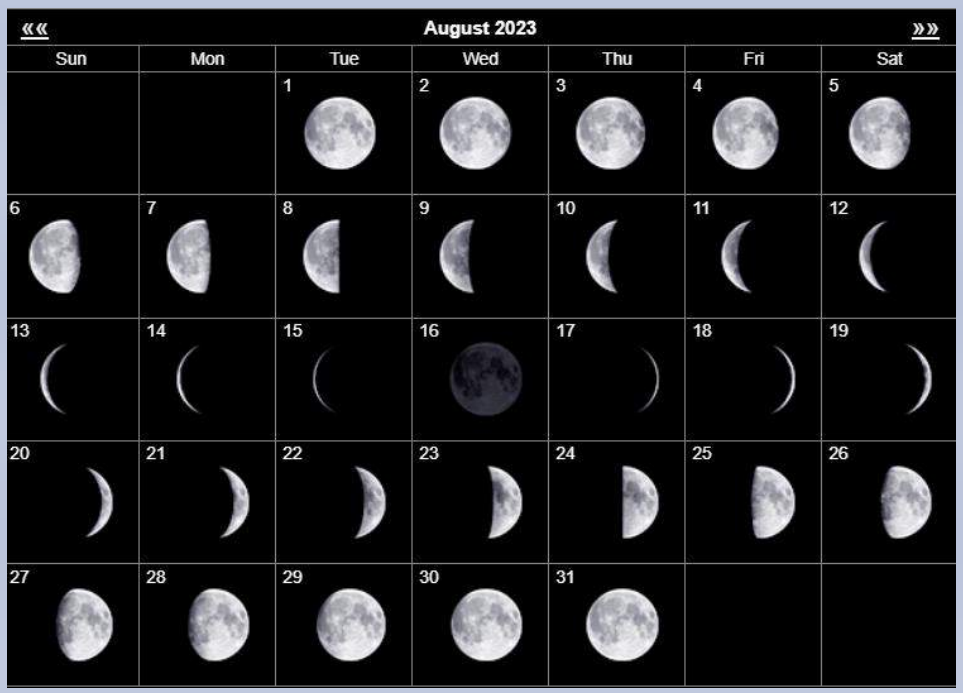
August 24, Antares will be 1.1° south of the Moon

August 6, Saturn will be at opposition, rising at sunset, setting at sunrise, magnitude +0.4

August 16, the Moon will be at Perigee: 357,182 km from Earth

Full Moon, August 30, the Full Blue Moon

August 30, Saturn will be 2.5° north of the Moon



2023 Hurricane Season Preparedness

Shirley Vuille

The Atlantic Hurricane season is from June 1 through November 30 each year. Now is the time to plan and prepare for these storms. Each county has developed a guide for their residents. Please take time to look at the information where you live or work, and make plans and preparations for you and your family by scanning the QR codes.

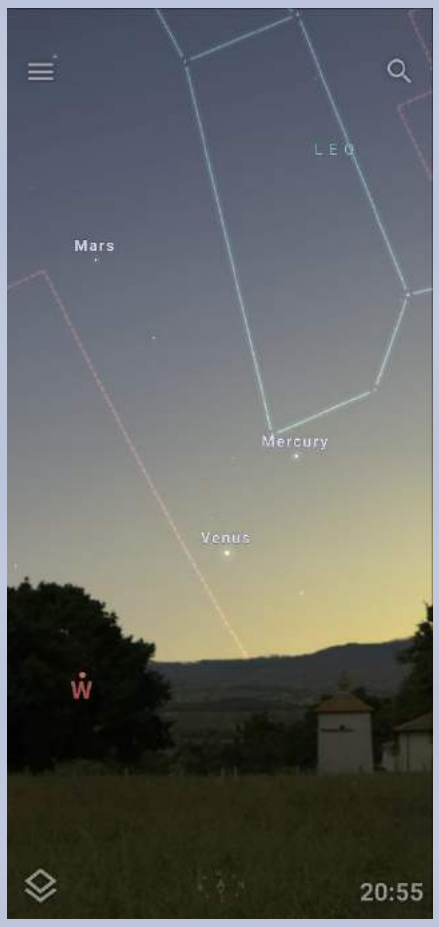
Pinellas County

Hillsborough County

Mercury Rising

Guy Earle

A quick planetary update for this month regarding Mercury, which is notoriously hard to see because of its position being so close to the Sun. Naturally, as it has an inner orbit from the Earth and is the closest planet to the Sun, wherever the Sun goes so too does Mercury (Venus too). Venus is easy to see since it's so bright and can get quite high above the horizon. Mercury, however, only can be seen just at or after sunset, or before sunrise only a couple times a year. We're coming up on one of those occasions, even if it is a pretty low still this time around. Look west around sunset the week of July 24th, if the sky is clear, for Venus around 8:45; if you can see Venus then look just up and to the right, about a Telrad's distance or about ½ a degree. There's Mercury.



In Memoriam

Howard Ritter

If you've been reading the Examiner the past few years, you have undoubtedly seen some of Howard Ritter's amazing photographs. A long-time SPAC member and benefactor, he posted frequently on our club Facebook page and more than a few times his images have been singled out as the outstanding astrophoto of the month.

Here is an amended version of his obituary: *Dr. Howard L. Ritter, Jr. of Perrysburg, Ohio peacefully passed away surrounded by his family on Sunday, 2 July at Hospice of Northwest Ohio. Howard had a 24-year career in the United States Air Force, and was very proud to have served in the Armed Forces and retained the rank of Colonel at retirement in 1991. Howard returned to civilian life where he practiced oncology/hematology at the Toledo Clinic until his retirement from medical practice in 2014.*

Howard was a unique individual who followed many intellectual hobbies including a love of photography, books, cars, amateur radio, history, travel, and especially his favorite pastime of astronomy and astrophotography. He loved to visit astronomical dark sky sites and belonged to many astronomy clubs throughout the country. He especially liked to teach neighbors and children about the moon and night sky hoping they would develop a love for the sciences and astronomy.

On clear Halloween nights, Howard would set up his telescope so the neighborhood trick-or-treaters could view the night sky.

Howard will be greatly missed by his fellow SPAC members. Part of his final wishes was to generously think of the club and donate a 20" Teeter f/3.5 Dobsonian reflector to SPAC, which will be used for public events in his honor. Howard's astrophotography images are stunning, with just a few of them showcased below.

SPAC Image Gallery

I have decided to break with tradition this month, and instead dedicate the entire SPAC Image Gallery to Howard Ritter's stunning astrophotos.

SPAC Mirror Lab

Brad Perryman

Three years ago, I was figuring my 16” mirror, adding the parabolic shape into the smooth spherical surface of the glass. At the same time, Mike Partain was also finishing his 16” mirror. Both our mirrors had roughly the same focal length. When the mirror lab shut down, we moved the work to Ron Jones house, where he had an area to polish the mirrors and a makeshift Foucault testing spot in the hallway.

I was a couple of hours from completing the mirror and shipping it out for coating. Unfortunately, during the Foucault testing we started to notice an anomaly. At first, we weren’t sure it was anything at all, then it became unavoidable to deny. The mirror had an astigmatism. The back of the glass was not flat. So, as I was figuring the mirror from side to side, more glass was being removed from the thicker side than the thinner side, creating the astigmatism. More work was now needed to correct this issue. Then covid shut us down.

Mike has since finished his mirror, built his telescope and is now providing beautiful images. While observing at the New Moon Weekend, I realized something that was not going to work for me. While observing objects higher in the sky, I needed a stepstool to look through the eyepiece. I had a decision to make. Do I fix the astigmatism or start the whole process over. The only option really was to start over.

But, with all of my home projects and COVID, it has taken three years to have time to work on this project again. Ron was very encouraging. He suggested that I use his mirror grinding machine to save time. The goal is to move the f/ratio from f/5 to f/4.5. That doesn't seem like a lot, but that is a difference of 8". I started with a medium size tool with a little weight. This process will make the surface rough and spherical again. After four hours, the surface roughness was evenly spread across the mirror, and we only dropped the center by a few thousandths of an inch. So, the following week I started using a smaller tool. Using a smaller tool meant that I would have to rub by hand again, but instead of walking around a table, I allowed the machine to spin the glass for me. After forty-five minutes we stopped to check my progress. As I was cleaning up, I noticed that physically something was a little off with my body. I thought, "should I be worried about this?". After a minute I realized my inner ear was not happy about me watching a spinning piece of glass for nearly an hour. The motion sickness dissipated quickly, and I was fine the rest of the day.

After two more hours of grinding, I was within five thousandths of the 250-inch depth I needed to reach. At this point, I switched back to the larger tool to finish the cutting and blend any irregularities created by the smaller tool. It has been quite the experience up to this point. My goal is to have the finished telescope ready before the next OBS. And…Don't worry, I will schedule 'First Light' before the Star Party.

SPAC Business Meeting

Our next business meeting is **Wed., August 9th, 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

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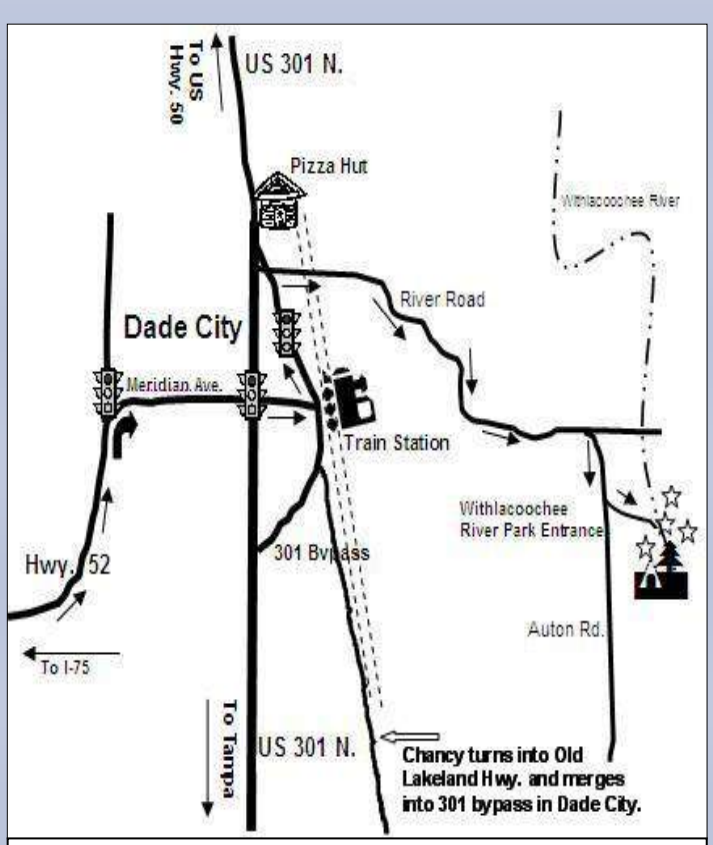

Withlacoochee River Park – Dade City, FL
Detailed directions can be found at:
www.StPeteAstronomyClub.org

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.

St. Petersburg Astronomy Club

Recognition of Patrons & Benefactors

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Ben Groves & Veronica Bynum	Patron
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Sharon Herman & Melissa Hughes	Patron
Charlie & Linda Hoffman	Patron
Matt Hughes & Manuel Ordonez	Patron
Bruce King	Patron
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Bill Larsen	Patron
Joe & Shirley Litton	Patron
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Leeann Muszynski	Patron
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Dominick Oppolo	Patron
Stephen Oros	Patron
Michael & Carli Partain	Patron
Brad & Lisa Perryman	Patron
Alan Polansky	Patron
David & Jenny Powell	Patron
Thomas & Andy Prince	Patron
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Jonathan Stewart	Patron
Tom & Michelle Sweet	Patron
Alexie Velez & Yanira Hernandez	Patron
Elizabeth Wood	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.