



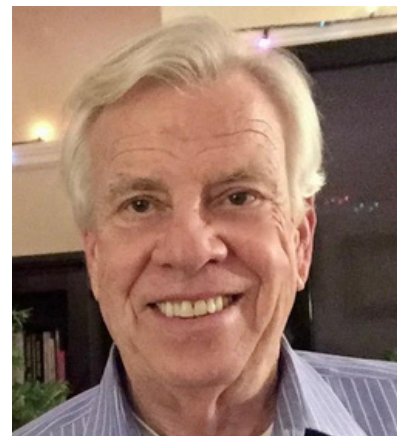
PAStimes

A Publication of the Phoenix Astronomical Society

Stu's Views • Stu Brackney, President PAS

Good day to all. We have some busy activities going on at PAS, even though too many of our nights recently have been cloudy and rainy.

Of course, the solar eclipse on Monday April 8th. We are not in the path of totality, there will be **NO TIME** during this partial eclipse for you to view the eclipse without eye protection., PLEASE pay close attention to your children as they try to use protective glasses, that they stay on!



Saturday April 20th is Our Night Sky Training event. We are looking for some of you to assist with training. It's all about the basics of astronomy, so if you are interested in teaching, contact me: stuartbrackney@pasaz.org

Elections are coming up in May. If you have leadership skills, love astronomy and some free time, you may want to become a candidate for our Board of Directors. Look at the news item in this newsletter about nominating yourself or others.

Finally, as a member of PAS you can borrow, for free, a telescope or eye pieces, for one month! For more information contact: telescope@pasaz.org.



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April Upcoming Events

April 2024 brings our normal schedule of events, plus two special chances to bring your special glasses or solar filter to enjoy a spectacular view of the partial solar eclipse (64%).

April 4th – Monthly Lecture Series - "The Search for Extraterrestrial Life in the Universe"

April 6th – Public Star Party – Our regular star party site – Apache Wash Trailhead

April 8th – View the partial solar eclipse – a special daytime event

April 18th – Telescope Workshop 101 – What to Buy

April 18th – Telescope Workshop 201 – Operating Your Telescope

April 20th – Night Sky training Session – Apache Wash trailhead



For more information and to register for these events, go to the [PAS Event Calendar and Registration Site](#)

It is important to register for all events. In case of an event change or cancellation you will be notified via email.



April Lecture Series-

by Paul Facuna

The April 4, 2024 speaker is James Renn. The title of his presentation is: "Searching for Life in Creation"

At this time the search for Extraterrestrial Life in the Universe is philosophical since no evidence of extraterrestrial life has yet been found.

After a detailed discussion of the current methods of searching for alien life and how the Vatican's telescope – the 1.8-meter Vatican Advanced Technology Telescope located at Mount Graham near Safford Arizona – participates in the search, he will offer the opinions of the astronomers at the Observatory, and yes, even the opinion of the Pope, on what it will mean to discover Extraterrestrial Intelligence (ETI).

There is a great public fascination with this search, and a concern that the detection of ETI might have an adverse effect on our planet. He will encourage the audience to ask questions during the presentation to focus on each topic as it is presented.

James Renn has been a Board member of the Vatican Observatory Foundation since 2018 and has presented astronomy lectures to the public and school groups since 1970. He has been interested in astronomy since the age of 10. He was a planetarium lecturer at the College of San Mateo in San Mateo, CA starting when he was 19. He has also given presentations at the Star Barn Planetarium in Cave Creek.

He is currently a member of the Vatican Observatory Outreach Committee, and his presentations focus on the relationship of faith and science and how they provide complementary, not contradictory, explanations for physical reality.

The mirror for the Vatican Advanced Technology Telescope was manufactured in the mirror laboratory of the University of Arizona. The website for the Mount Graham International Observatory where the Vatican Telescope is located is: [Home | Mount Graham International Observatory \(arizona.edu\)](https://www.vaticanobservatory.va/en/)

The Vatican Astronomical Observatory in Italy offers a summer class and observatory museum tours: <https://www.vaticanobservatory.va/en/>

Mr. Renn gave a presentation to PAS at the March 6, 2019, meeting. The title of his presentation was "The Vatican Observatory and Quantum Cosmology."

There will be a "Meet and Greet the Speaker" dinner before the meeting.

For more details and to register for the meeting and presentation go to the PAS Event Calendar and Registration Site: [PAS Event Calendar and Registration Site](#)



Dr. James W. Head of Brown University was the speaker at the March 7, 2024 Lecture By Paul Facuna

The title of his presentation was: "What is next in The Chinese Lunar Exploration Program?"



Dr. Head gave an excellent summary of the Chinese lunar exploration program. He began by giving an overview of the organization of the Chinese space program with an emphasis on the lunar exploration program. Some of the areas he covered were:

- a) the science and engineering of China's space station Tiangong
- b) Chinese Academy of Science document "Science and Technology in China: a Road Map to 2050" outlining its strategic planning
- c) FAST Telescope: 500-meter aperture spherical radio telescope
- d) Chang'E-1, Sept. 2007: lunar orbiter that photographed and mapped the abundance and distribution of various chemical elements
- e) Chang'E-2, Oct. 2010: lunar orbiter; test for CE-3 and Telemetry, Tracking, and Control System; extended mission to L2 and explored asteroid Toutatis
- f) Chang'E-3, Dec. 2013: lunar lander and a Yutu-1 rover
- g) Chang'E-4, Dec. 2018: landing on the far side of the moon with a Yutu-1 rover
- h) Chang'E-5, late 2020: lunar sample return from the near side of the moon

Planned future missions:

- i) Chang'E-6: lunar lander and far-side sample return mission
- j) Chang'E 7-8, ILRS – International Lunar Research Station: lunar polar missions 2026 through 2028
- k) long-term lunar research station in the 2030's

To see this very interesting presentation and other presentations, go to the recorded Lecture Series Videos found on the PAS website PASAZ.ORG

PAS 2024 Election of Officers

All active members will receive an email with a link to our 2024 Nomination Form. By submitting this form, you may nominate yourself or another PAS member for each of the Board of Director's offices. We thank all PAS Members for taking the time to vote in this election.



April 4th - Nomination forms are sent via email to all active PAS members

April 11th - Nomination submission deadline

April 18th – Voting ballots sent via email to all active PAS members

April 25th – Voting submission deadline

May 2nd – Results of vote are announced at the Monthly Lecture Series meeting

March Outreach Events

The PAS outreach program included several excellent events in March.

Dark Site Star Party – Antennas North

A good-sized group of PAS members travelled West of Phoenix to the Antennas star party site on Saturday the 9th and joined two of our sister astronomy clubs for a night of star gazing. Members from both EVAC and Saguaro clubs were attempting the Messier Marathon capturing glimpses of as many of the 110 objects as possible. Andrew Stone, our Star Tours Manager, was able to find and view a personal best number of “M” objects.

Public Star Party

Our regular monthly star party scheduled for March 16th had to be cancelled due to very poor sky conditions including an almost complete cloud cover.

Star Tours – Sonoran Trails Middle School

Star Tours – Sonoran Sky Elementary School exciting event

The Star Tours outreach program held an event for 250 students and parents at the Sonoran Trails Middle School on the 20th. Roger Anzini displayed his meteorite collection. Stu Brackney with his Celestron 8 SE telescope. The school was conducting a STEM (science, technology, engineering and mathematics) fair. “ I say exciting because many of these students for the first time were be exposed to so many topics, like astronomy, for the first time. Big eyes and many questions from these curious young people.”-Stu Brackney



Telescope Workshop 101 – What to Buy

March's 101 workshop on the 21st at PVCC was cancelled as no students signed up this month.

Telescope Workshop 201 – How to Operate My Telescope

Our monthly "Operating Your Telescope" workshop this past month met with five owner/operators and some of our organization's experts on a fabulously clear night. La Luna was near full moon status, but seeing was exceptional.

What was most interesting about this event was the scopes people brought and how well they knew their equipment. A few wanted refresher skills and a few were first time owners. Because of our location we attract hikers and visitors to the park, which is always fun as it affords up the opportunity to invite them to visit our website by handing out our generic business cards. An experience that again is worth the annual membership donation.

March's 201 workshop on the 21st at the Apache Wash Trailhead was taught by Damon Finnel, Stu Brackney, Mason Klenklen, Richard Pipkin, and Richard Sauerbrun. A total of five students showed up with their telescopes and received tips and instruction to improve their observing skills.



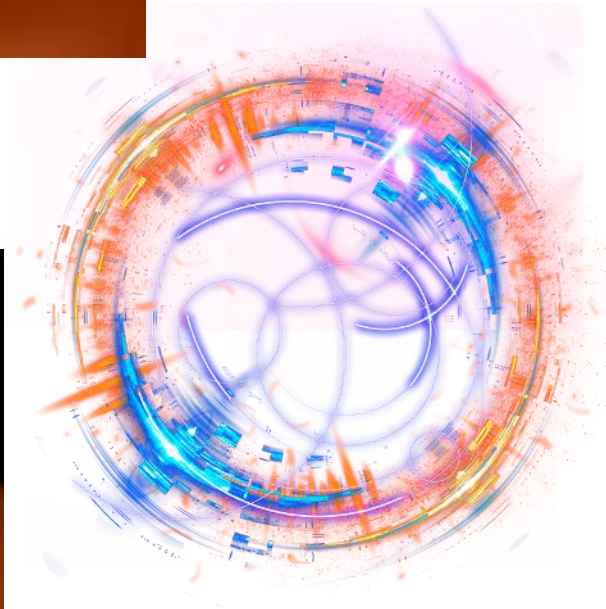
Member Astro Images



sun-mark johnston



sun-richard meyers



My Second Messier Marathon at Hovatter Road

by Mike Cawley

My, how time flies! It seems like I just unloaded the car after the All Arizona Star Party only to start marking things off my checklist for my second trip to the new Hovatter Road observing site west of Phoenix for the Annual Messier Marathon, which pays homage to comet hunter Charles Messier for whom this special star party is named. Charles got tired of being notified by his fellow observers of comet "discoveries" only to find out that the "discovered" object was already known. So, he started the catalog that bears his name. Today, it numbers 110 objects of various types, bright enough to be visible with telescopes used during his lifetime.

With the car gassed up and loaded, I headed out on the I-10. The trip was quick due to light traffic and I was soon at the Hovatter Road exit. The gravel road heading north to the viewing site is maintained and fairly smooth, with minimal ruts or dips. A regular car shouldn't have a problem getting to the site. Upon turning the corner at the gravel pit mine entrance, I noticed the attendance this year was much greater than my previous visit. I calculated that approximately 35 vehicles were spaced around the generous observing area.

Great! That meant more people to chat with, check out their gear, and enjoy the comraderie. Officers from EVAC, SAC and PAS were in attendance to answer questions, hand out those all important checkoff lists, and man the refreshment yurt (yep a yurt!). Even more important were the porta potties with a separate washup station located near the center of the site. Much appreciated!

Walking around the viewing site, I marveled at the great assortment of scopes on the field. All types and sizes were out in force, ranging from a 25" Dob to a gorgeous Questar on a pier. A few participants had brought astrophotography setups, and I saw some tripod mounted binoculars too. The next morning, I noticed what looked like a huge 14" Meade on the large field tripod (3" diameter legs)--quite the impressive rig.

You would expect to see telescopes at an astronomy get-together, but a couple of observers had brought something else! Near the middle of the observing field was a vehicle with a pole mounted windsock. Huh... I figured maybe they were using it to check wind speed before breaking out the large Dob (my Dob loves to act like a weathervane!), but instead they were monitoring the wind prior to hauling out their motorized parasails! We were treated to an aerial show for a few minutes as one pilot flew around the field approximately 50 to 75 feet up in the air.

Speaking of wind, this year seemed to be a little better with almost no wind until about midnight, when some breezes blew on and off till morning. Temperatures ranged from 70 degrees down to about 45 degrees at sunrise. Hot drinks from the yurt helped considerably! Clouds were plentiful on the way out to the site but by twilight they had vanished leaving a clear canvas of stars.

Due to the timing of the Moon and the event, it seemed like the opening salvo of targets (all galaxies!) were a little easier this year. Armed with my 1600mm focal length Dob coupled with a 27mm eyepiece (approximately 60x magnification), I started the list out of order and tried to nab M33 first. It eluded me last year but I laughed when I saw that vague oval sitting in the eyepiece. Success! M77, M31 and M32 all were checked off in short order. M110 was another one that hid from me last year. I bagged it shortly after scanning for a few seconds. I was off to a great start. Clear skies helped, but that clarity must extend down close to the horizon in order to get these. However, the face on spiral M74 was a no show this year. Panning back and forth slowly for about 3 or 4 minutes yielded nothing. Face on galaxies look wonderful on photos, but I think they take effort to see visually.

Now humbled, I diligently scan for the higher targets above the minor glow on the horizon. I think the first 6 targets can make or break your night but the checkoff list gives some relief by suggesting some real fireworks to look at. Lots of brilliant globular clusters, open clusters and bright nebula (easier with the proper filtration) just jump out of a sky not like anything near or in the Phoenix Metro area. Scanning higher up and gazing thru less atmosphere at the viewing site allowed those elusive galaxies to be real showpieces! M82 looked like a torn hole in the sky. M104 really did look like a flying saucer, and M13 looked like a fuzzy version of the Time Square ball on New Year's Eve. From my backyard in Phoenix, M42 looked like a glowing bat, with just the two bright areas straddling the Trapezium asterism. From the Hovatter site, the nebula blossomed into a ball shape with the two wings extending enough to almost touch, with enough detail to tempt you to spend way too much time savoring the view.

Next, I moved on to the Virgo super cluster of galaxies--next on the list! I didn't have to swing my scope very far to see little ghosts everywhere. M58, M60, M89, M90, and Markarian's Chain were all there for the picking. I will have to bring a binocular on my next trip. The limited field presented with my scope just hints at the collective majesty that a wide low power view would reveal.

If you're a real starhopper pro, have a "push-to" scope, or were pushing buttons slewing the scope around picking off targets left and right, you've come to the realization that Earth isn't spinning fast enough to keep up with you! To pass the time waiting for fresh targets to rise from the east, some observers catch a few winks, others make the rounds to see how fellow 'gazers are doing, or make a quick pilgrimage to the yurt for some hot chocolate or coffee. By that time, it was getting a little windy and the temps were around 55 degrees, so a hot refresher really hit the spot. Me? I passed the time revisiting some targets that were really low on the southern horizon at this time of year. Zipping over to M13 (the Great Globular Cluster) and then panning over (and way down!) to the south to view NGC 5139 with the same power eyepiece reveals how misnamed M13 is. Omega Centauri looms over the southern horizon, just about filling my eyepiece view with an incredible cloud of stars. It must look just amazing from the southern hemisphere! Panning up, I observed Centaurus A, another southern sky showpiece! The southern horizon sky at Hovatter is blessed not to have much light pollution so the dust band that makes this galaxy so interesting shows up quite well. Yes, it does look like a hamburger!

What I thought were high thin cirrus clouds turned out to be the rising summer Milky Way! Looking over to the galactic center, I saw Scorpius and Sagittarius coming up with loads of new targets. Sagittarius is home to the Teapot asterism, my favorite since the "spout" points towards a bright spot of distant star clouds that give the effect of "steam" rising out of the spout. More summer globulars are on tap here with a sprinkling of open clusters and one really famous nebula (M57, the Ring).

Once again, if you're fast you will soon start waiting for the sky to catch up with you again. Close to dawn, the last targets were coming up thru the cloud of light pollution from the Phoenix Metro area hanging to the east. But due to the timing of the event this year, the last couple of small globular clusters were rising just before dawn started to wash out everything. I missed M72 due to my scope not being able to swing low enough for me to see it before the dawn. I also missed M30 which was hidden by the dawn glow of the rising sun. In fact, I checked Sky Safari and I'd be surprised if anyone that night bagged M30. If somebody did, my hat's off to you.

I really enjoyed my night out under the stars again with fellow stargazers, seeing various types and sizes of telescopes, eyepieces and camera setups. The restroom accommodations are out there for a few days before and after the main event so if you feel like pitching a tent and staying the whole time, feel free. Maybe you'll get ambitious and start tackling the NGC catalog, all 7,000 of them!

Yes, I'll be back again next year. My final score total was 107. Two better than last year!

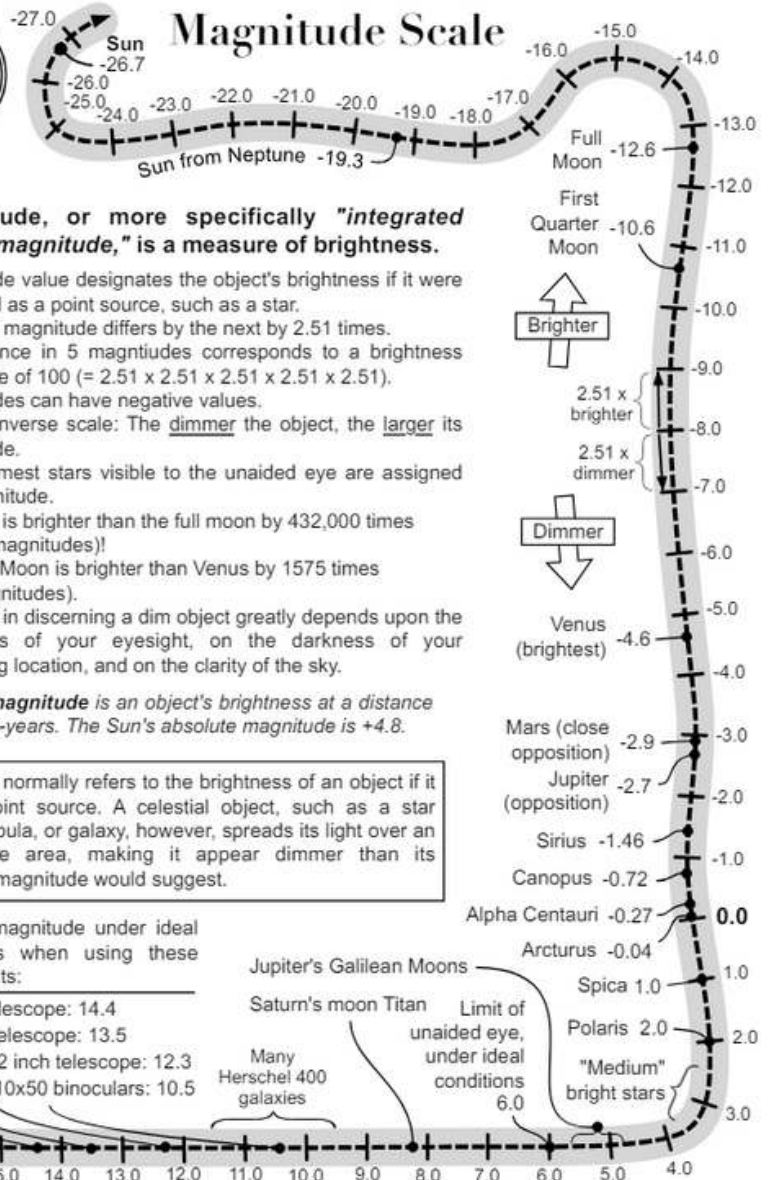
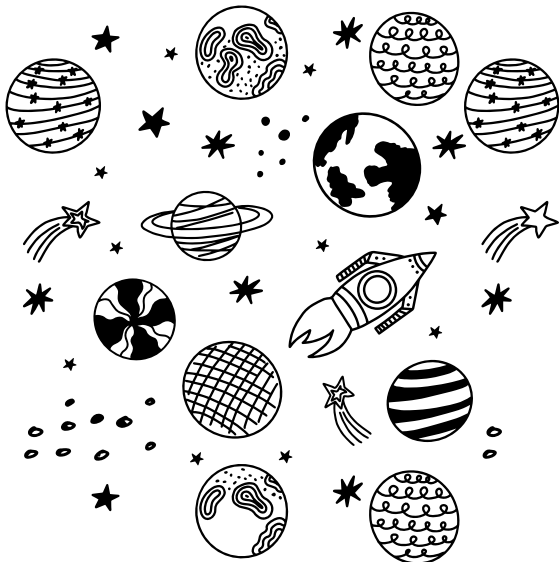


7 Telescope Targets for April

Each month we feature 7 good targets for small telescopes that should be visible in the evening

1. Leo Triplet Trio of galaxies: M65, M66, and the 'Hamburger' galaxy
2. Algieba Gamma Leonis is a tight yellow/yellow binary star
3. Tau Leonis Yellow blue binary beside a white/white binary
4. NGC3242 Ghost of Jupiter Bright planetary nebula in Hydra
5. M81/82 Two of the brightest galaxies in the northern sky, side by side in Ursa Major
6. M101 The Pinwheel Galaxy is a large face-on spiral just above the handle of the Big Dipper
7. Mizar/Alcor A double quadruple system, seen as a visual binary and telescopic triple. Used as an eyesight test since ancient times

Cosmic Classroom (CC)



ZWO Seestar S50 Smart Telescope (Part 1 of 3)

Phil Hoppes

In the astronomical community, the new ZWO Seestar S50 smart telescope has been making quite the splash since its release around Q2 of 2023. I chose to be one of the early adopters and was lucky to purchase one at the early release price of \$399. I received mine in mid-October of 2023 and I've been imaging with it ever since at both my residence in Phoenix (Bortle 6-7) and my other place up in Overgaard (Bortle 1). I've had the chance to image in both locations and since October of last year, I've imaged with my Seestar on about 30 different nights/mornings on approximately 60 targets. I have used my Seestar in all its photographic modes and being the geek I am, I thought I would put together a short synopsis of what I have found. I have organized this overview in about the same order as what a user would do to set up and image with the S50 so it can also be used as a quick setup guide.

Disclaimer – I have no association with ZWO. I have personally purchased my Seestar along with all the accessories I use. All opinions and conclusions are my own.

Specification – The ZWO Seestar S50 is a self-contained, robotically controlled telescope. The optical path consists of a 50mm apochromatic triplet with a focal length of 250mm (f/5). The imager is a Sony IMX462 color imager which features a 2.9um pixel size, 5.6mm x 3.2mm image sensor size with 1936x1096 resolution. This is the color version of the imager that can be found in the ZWO ASI462MM planetary camera. The mount is Alt/Az, although with newly enabled software features it can be mounted on a wedge to be used in EQ mode. The processor is based on a custom Raspberry Pi4 configuration with onboard WIFI (5G/2.4G), USB-C, Bluetooth, and 64Gb of storage. The working temperature is 0C – 40C (32F – 104F). Battery capacity is 6000mAh. The net weight of the unit is 2.5kg or about 5.5 lbs.



Figure 1 – Basic Seestar S50 on its supplied tripod

Settings – On first powerup, you need to allow the S50 to connect to your portable device, IOS or Android, via Bluetooth. There is a quick start guide that walks you through the procedure. The startup screen looks like this:

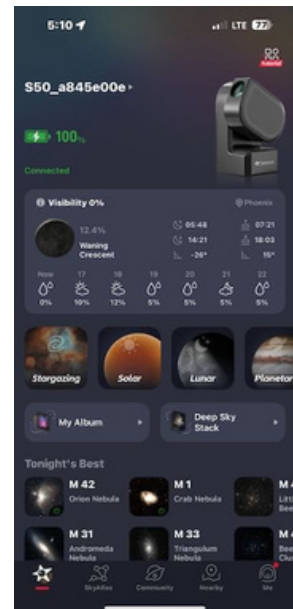
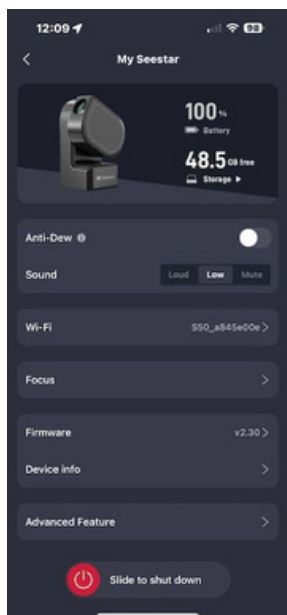


Figure 2 – Seestar startup screen

After you have completed the initial start-up items, on a typical imaging night you will power up your S50 and click on the S50 icon in the top right corner. This will take you to the settings tab.

Figure 3 – Seestar settings tab

On the settings, you can see your current battery level and available storage space. Below that is an Anti Dew switch. If you think you will have dew over the evening you would want to turn this on. Next is the sound setting where you can adjust the audio level of the talking assistant. This is then followed by the WIFI settings. If you click on this tab, you can then enable Station mode. At-home station mode is quite handy as the S50 will connect into your home network, assuming you have adequate WIFI coverage of where you have placed your S50. The focus tab is next where you can adjust the current focus settings. Once you have used the S50 for a while you will get an understanding of the focus points for most objects such as the sun, planets and DSO objects. It is handy to write these down. Focus changes every day due to temperature, clouds and other environmental conditions but knowing some general settings will help you get close to the focus point for your targets. Note, your focus will be changed significantly from night imaging to taking daytime pictures so having a handy guide to start from will be helpful. System configuration such as Firmware version and device info is next followed by Advance Features which will be discussed next. At the bottom is your software Off Switch so you can remotely power down your S50.



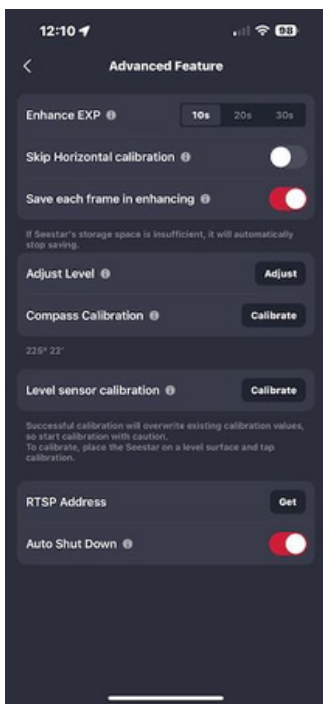


Figure 4 – Advanced Features

This is a very important tab so you should become familiar with it. At the top is where you set your desired shutter speed for the images taken in Stargazing mode. The default is 10 seconds. You can change to 20 or 30 seconds should you desire. Below that is a switch to disable horizontal calibration. You will use this if you want to place your S50 on a wedge and use it in an equatorial mode vs Alt/Az. Below that is the switch to enable saving all the subs that were good and used to generate your final S50 image. Next are Adjust Level and Compass Calibration. On a typical imaging session, you will want to adjust first your compass and then your level calibration. If you do not perform these tasks, you will most likely have issues both pointing and guiding. If you perform the compass calibration last you will mess up your level calibration as the compass calibration requires you to lift and rotate your entire Seestar, tripod and all in usually two complete rotations. Obviously if you lift the whole assembly, you will destroy your leveling setup. The next button below is for Level sensor calibration. You probably never have to touch this unless you are having serious issues trying to level your S50. My recommendation is leave this alone unless you are instructed to do so by a ZWO support person. The next button is to generate your RTSP address. I had to look this up as I did not know what it is. RTSP is Real Time Streaming Protocol. This allows you to set up a streaming address for your device. If you have a group of people with portable devices, you can stream to them with this address. Last on this tab is the Auto Shut Down, which you usually will want to have enabled.

Operating Modes – The Seestar has 5 operating modes: Stargazing, Solar, Lunar, Planetary, and Scenery. You can see these buttons to set these modes on the initial landing page of the S50.

Stargazing – This is where you would take all your DSO images. Opening this mode is a little confusing at first as you are presented with a preview pane after you hit the Stargazing button.

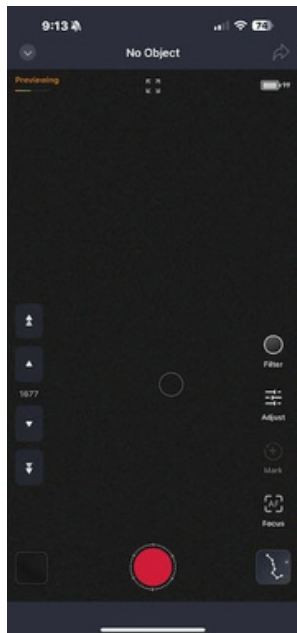


Figure 5 – Imaging Screen

This is the screen you see when you are imaging. To select what you want to image you next tap on the big dipper on the bottom right. This takes you to the framing screen.

Figure 6 – Framing Screen

Here, if you are adept and dragging around the night sky you could drag on the screen until you find what you want. An easier process would be to now click on the magnifying glass on the top right to finally open the database screen.



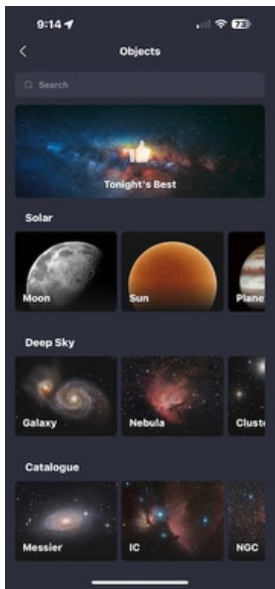


Figure 7 – Database Screen

On this screen you can easily select from either Tonight's Best, Moon, Sun and the other sorted objects. If you know the name of your object, you can now input the name in the top search field and you can find your object this way.

Figure 8 – Object Screen

The object screen has lots of valuable information about your object. There is a photo, a description and most important an elevation graph by time for your object. This allows you to easily see how high and when the object is visible. If you press on the graph, it will open the framing screen and start to move the Seestar to your selected object. I have some tips on how to image but I will cover that later in the article as much applies to all the modes. Here is a quick shot of M42 taken with my Seestar. Note this is ONLY a 2-minute image. M42 is very bright and even with such a short exposure you will see color.

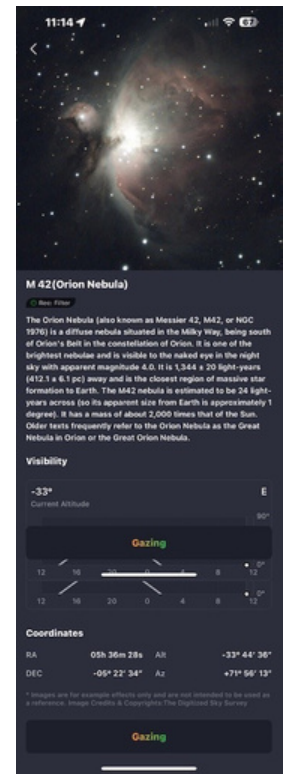


Figure 9 – M42 the Orion Nebula

Solar - As the name would indicate, this is the mode you select to image the sun. It should go without saying but NEVER use this mode without the supplied solar filter. You will damage and probably ruin the imager in your Seestar without the filter. When you select this mode the Seestar will first give you this prompt.

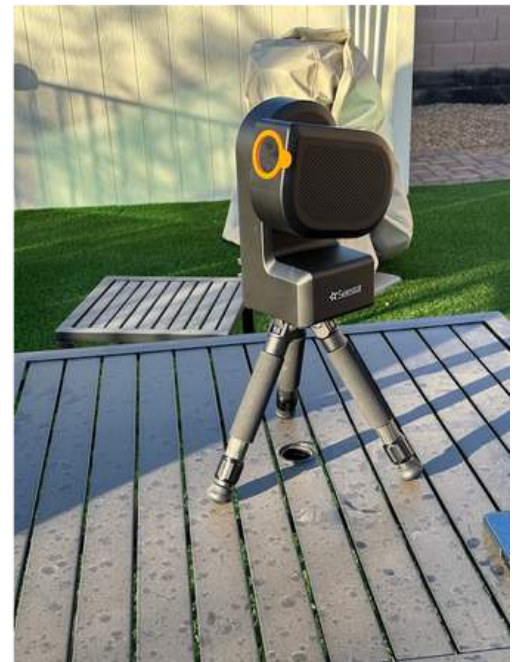
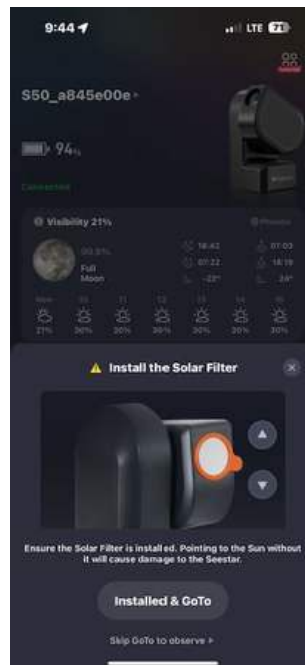


Figure 10 & 11 – Install your solar filter for solar imaging mode. My Seestar with solar filter.

If you have done the compass alignment and level alignment on your Seestar it should find the sun. I have had instances where it still misses it. You can manually position the Seestar by tapping on the small circle in the Solar Imaging screen. You will see a large double circle pop up with a Slow Fast label above the circle. It takes some practice, but you can point the Seestar first fast and then slow by carefully sliding your finger/circle combination across the screen. If you align your filter so the small hole on the orange tab is either on top or on the side open as the picture above, the sun will cast a ray through the hole that should be visible on the top/side of the Seestar to help manual position the sun if that is required. When you have the sun in the approximate center of the screen, either automatic or manual, the Seestar will prompt you if the sun is in the FOV. Tap yes and it will automatically center the sun. If you don't like that final position, you can move the sun L/R, U/D with the screen gizmo and when you release it will start tracking. If you move it out of the FOV it obviously will no longer track so you need to have most of the sun in the screen to allow the Seestar to track. Remember with the Seestar your main camera is also your guide camera. If your object is not in the FOV of the screen it will not track. When the solar imaging screen come up you can shoot a still, a time lapse or a video. You will also have the option for 1x, 2x or 4x magnification. The magnification is a digital scaling, not an optical one so your images will lose resolution and look blurrier as you increase the magnification. You can adjust your exposure on screen for solar shots. This will be your exposure setting for your stills, video and timelapse. Your stills will be saved directly to your portable device. Your time-lapse and video you must download from your Seestar after imaging. Always autofocus your shot before you start shooting for the best possible results. You can manually change your focus with the controls on the bottom left side of the screen.



Figure 12 – Solar imaging screen showing a time lapse setup.



Figure 13 & 14 – A DOF example of the sun in background with foreground focus and a 4x closeup of the sun.

Solar mode operates basically the same as Scenery mode for imaging in that you can specify a focus point. For the picture above I simply place my finger on the plant for autofocus and the Seestar brought the plant to a crisp focus and then the sun in the background has a nice soft focus. When you finish taking solar images, manually move the Seestar off the sun to a safe position so you can remove the solar filter. After that take some scenery images if you wish or shut the Seestar down. In Scenery mode, the Seestar will not protect you if you happen to point it at the sun so since you do not have your solar filter installed be very careful. Like the stargazing mode, I will have more solar imaging and processing tips at the end of the article.

End Part 1 of 3

Helpful Astronomy Websites

by Mark Johnston

The following websites are great free resources to help you plan and enjoy your astronomy adventures

Astromart astromart.com/ This is one of the top two sites for buying and selling used astronomy gear, product reviews, and forums where you can discuss any aspect of astronomy with other enthusiasts. A small fee is required.

Astrometry.net <https://nova.astrometry.net/> This site will take any astronomy image you send it (galaxy, starfield, nebula, etc) and then tell you what it is and where it is in the sky.

Astronomy Tools astronomy.tools/calculators/field_of_view/ This site has a lot of capabilities but I use it primarily to figure out how a target (e.g. the Helix nebula) will look in my eyepiece or astronomy camera. You pick your scope, camera, eyepiece and target and the site does the rest.

Astrospheric www.astrospheric.com/ Probably the best short term astronomy weather forecasting tool, providing predictions of clouds, transparency and seeing.

Clear Sky Charts www.cleardarksky.com/ Excellent source of astronomy seeing conditions forecast. Also a great tool for finding observing sites with lower light pollution.

Cloudynights www.cloudynights.com/ This is one of the top two sites for buying and selling used astronomy gear, product reviews, and forums where you can discuss any aspect of astronomy with other enthusiasts. Free.

Dark site finder darksitefinder.com/map/ Great website for finding a dark observing location.

Heavens above heavens-above.com/ Top site for predicting naked eye observations of satellites. See when the ISS is visible in your neighborhood!

Jupiter transits shallowsky.com/jupiter/ For anyone with a small telescope, this is a great site. You can find out when the Great Red Spot and Jupiter's satellite transits are visible.

Solar Dynamic Observatory (SDO) <https://sdo.gsfc.nasa.gov/data/> Find out how the Sun looks right now, at various wavelengths. If you own a solar telescope, this site coupled with Astrospheric is all you need to plan fabulous solar observing!

Telescopius telescopius.com/ This site is very helpful in planning an observing evening. It will tell you when any particular target is rising and setting and when is the best time to observe it. This allows you to sequence your observing in a planned manner.

Additional Information

2024 PAS Sam Insana Student Scholarship winner at Paradise Valley Community College is Zakry Kruk. Your membership fees allow us to do this each year.

March 16,2024

Dear, Phoenix Astronomical Society

I am writing to express my gratitude for being selected as a recipient of the Phoenix Astronomical Society Scholarship and to convey how happy I am to have won. I deeply appreciate the generosity and support for this given opportunity and want to show how thankful I am.

As a space enthusiast, this scholarship will help me pursue a higher education in astrophysics and other related fields to that. It will help me pay for university once I transfer from my two years at Paradise Valley Community College. Going into community college, I always have been stressed about trying to save a certain amount for university, so receiving this \$1000 will help ease the stress and give me some breathing space which I am thankful for.

I assure you this scholarship will be put to good use, aiding me in achieving my educational aspirations. This will help pay for my bachelors, which eventually helps my goal in getting a masters degree where I can further my education and help gain experience for my career goals. Someday I will like to work for a space agency such as NASA or to work in any space related field which will make me the first in my family to have a job like that while being the first to get a degree.

I want to thank you again for your generosity in supporting me and my future, and how I will utilize this very well. I am honored to be the recipient of the Phoenix Astronomical Society Scholarship, and look forward to using this scholarship for my future.

Sincerely,



Zakry Kruk
Paradise Valley Community College