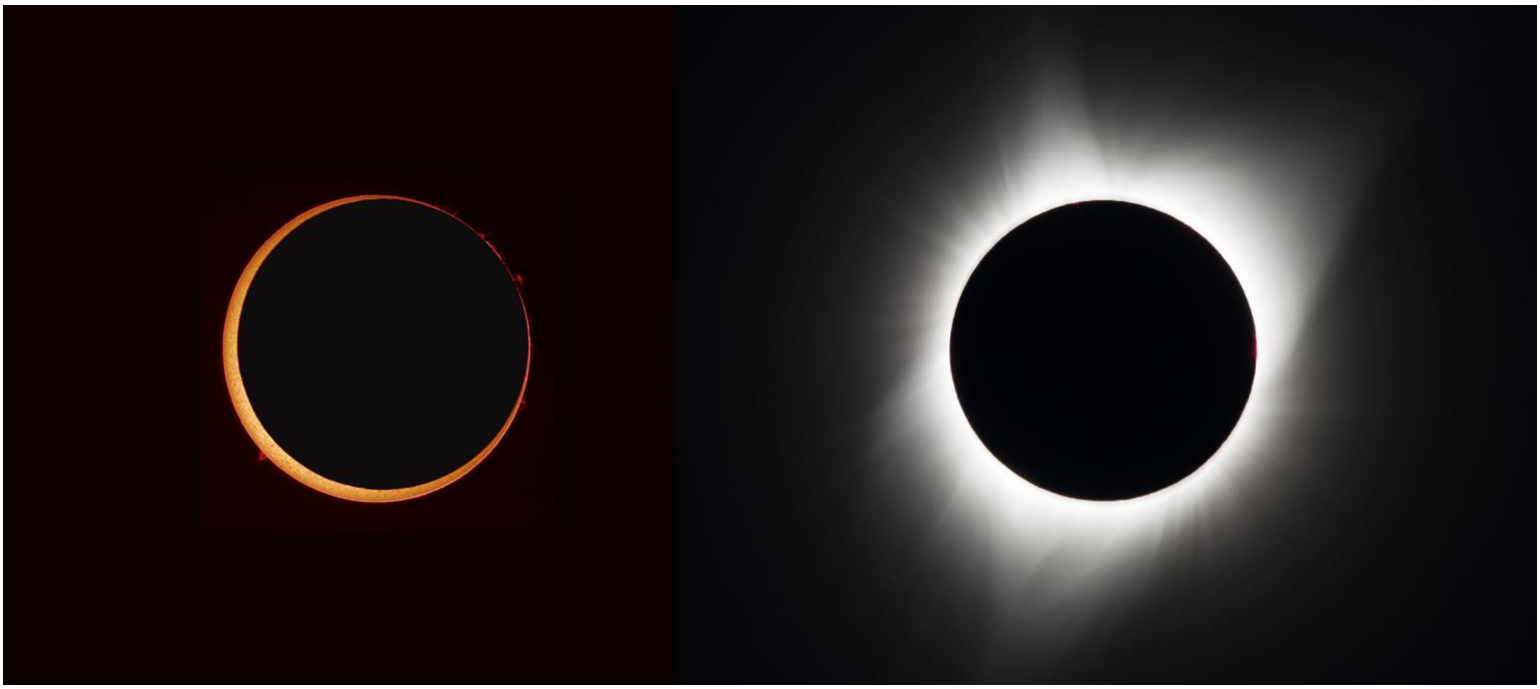
EVENT HORIZON

The SAN MATEO COUNTY ASTRONOMICAL SOCIETY

July – Sept. • 2023 Issue

797th General Meeting: July 15
798th General Meeting: Sept. 1
799th General Meeting: Oct. 6



Annual Solar Eclipse (left) October 14
Total Solar Eclipse (right) April 8

See page 9

Table of Contents

Cover: Photos of an annular total solar eclipse (left) and a total solar eclipse (right). Note that the annular eclipse is shown with a dark background, as it is only safe to view with protection – a small portion of the Sun is still visible as the ring around the moon. On the right, you can see the Sun's wispy corona, visible only during totality itself, when the moon completely – or totally – hides the Sun from view. A total solar eclipse is only safe to view without protection during totality itself; it is absolutely necessary to protect your eyes throughout the rest of the eclipse! *Left photo by Stefan Seip (Oct 3, 2005). Right photo by NASA/Aubrey Gemignani (August 21, 2017).*

Upcoming Events

The Society and the City of San Carlos Parks Department host public Star Parties at Crestview Park, 1000 Crestview Drive, San Carlos. Click here to see the schedule for the entire year. *See page 23 for directions and guidelines.*

Saturday, July 8: Star Party – At sunset (8:33 p.m.) – Crestview Park

Saturday, July 15: Star-B-Que – 6 p.m. – Crestview Park. The Society's annual summer event to conclude the elections of board members with a celebration of food, followed by a Star Party. See page 5 for more details.

Saturday, August 12: Star Party – At sunset (8:05 p.m.) – Crestview Park

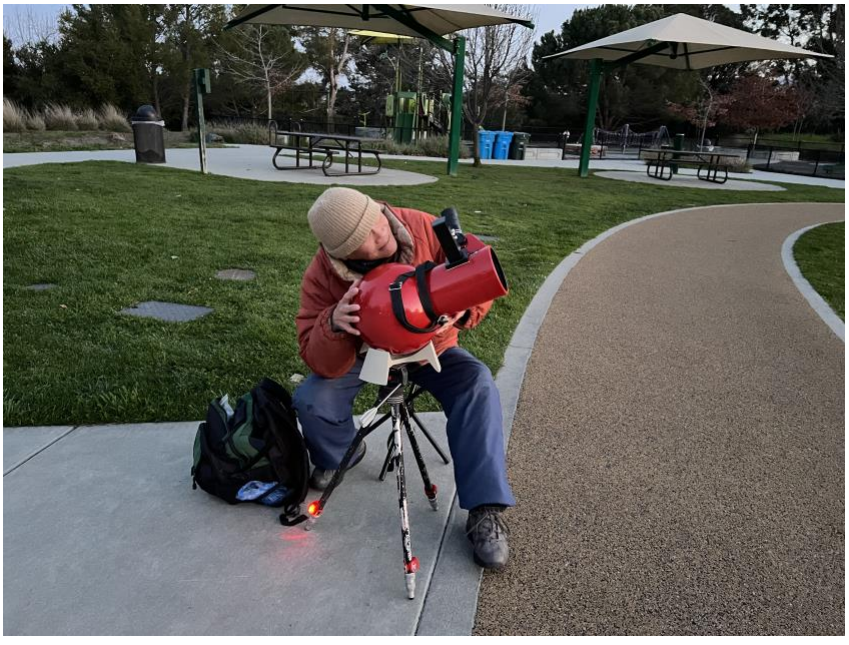
Saturday, August 19: Star Party – At sunset (7:56 p.m.) – Crestview Park

Friday, September 1: SMCAS General meeting, 7 p.m., College of San Mateo, ISC Room (#110) and lecture by a speaker that's yet to be determined, 8 p.m. in the Planetarium. Be sure to check your emails and the website for updates. See page 24 for directions to CSM.

Saturday, September 9: Star Party – At sunset (7:27 p.m.) – Crestview Park

Saturday, September 16: Star Party – At sunset (7:15 p.m.) – Crestview Park

Saturday, September 30: College of San Mateo's Annual Family Science and Astronomy Festival, Science Building. Check your email for more details and see page 24 for directions to CSM.



Ed Ching aligns his Astroscan telescope at the March 25 Star Party.

Prez's Corner

Greetings to the Society,

I hope you all got to see the early fireworks from M101, the Pinwheel Galaxy, where a type II supernova, called SN 2023ixf became visible in May. Though this event happened some 21 million years ago, as that is how long it has taken the light to reach us. There's a small piece on it on page 7. Also, be on the lookout on July 28 and 29 for the peak of the Delta Aquarids Meteor Shower. The Perseids meteor shower's peak coincides with August 12's Star Party. Considering that it starts July 17 and goes through August 24, we should be in store for a good show! So, if it's been a while since you've been to a Star Party, mark your calendars for this one. The moon will be a waning crescent so conditions should be ideal.

The heavens continue to put on a good show for us and on October 14, we will be treated to an annular eclipse. Eclipses of this type are sometimes called "ring of fire" eclipses because the moon is too far from Earth to fully block the Sun but creates a ring-like effect when it reaches totality. The eclipse's path runs through parts of Oregon, California, Nevada, Utah, Arizona, New Mexico and Texas. See page 9 for more details about it.

It is Star-B-Q time! It'll be Saturday, July 15 at 6 p.m. That means it is also time for elections for board positions. Currently nominations are open and will close Wednesday, July 5. Voting begins the following day online. Look for a voting ballot in your email. Voting concludes at the Star-B-Que, then we'll install the officers. See page 5 for additional details about it.

This year the board made some headway in modernizing our website and making it more mobile friendly, thanks to Ravi Kumar and his son. I hope we can continue with these efforts. We were able to bring in some great speakers this year, I would like to hear about who your favorite was. But significantly we had some very special talks by club members, Frank Seminaro on astrophotography and Kevin Simpson on an intro on how to setup a Dobsonian telescope. These are just part of our goals to provide content to new astronomy members as well as seasoned members. I hope we can extend both of these programs next year.

A second shoutout to Kevin for all his efforts in spreading the word about the Society and getting new people to come to our events. Our Club is now at almost 70 members and 200+ in the news groups. One goal I think we fell short on is getting more feedback and engaging more of our 70 members with the activities they would like to do. I hope the next board continues to look for directions from the membership instead of the other way around. Here is to clear skies and new adventures.

From cloudy skies in Taiwan,

Michael Cooke
SMCAS President
tfbsaxman@hotmail.com

The SMCAS Board Invites You to the Annual Star-B-Q Party

Saturday, July 15, 2023

6 p.m. to 11ish p.m. (Arrive when you can)

Crestview Park – 1000 Crestview Dr, San Carlos, CA 94070

This is a family friendly event bring the kids, arrive and leave at your convenience. Our party will be a potluck BBQ, our board members will provide burgers, veggie burgers and polish sausages. You can bring any vegetables, salads, side dishes, and desserts and nonalcoholic beverages you would like to share. Try and label food for food allergies. Utensils will be provided but feel free to bring your own non-disposable to be green plus serving utensils for your dish. The SMCAS is allowed to use the back two picnic tables for our Star-B-Q. Please let Ken Lum know at lum40@comcast.net as to how many people in your party are coming so we know how much meat to purchase.

We will also be closing the voting and installing the 2023-24 SMCAS board.

There will be a Star Party following so bring your telescope or just stay to look through other members' scope. That will happen at sunset, around 8:30 p.m.

You can email the board SMCASBD@groups.io if you have questions. We look forward to seeing you there!

Please Submit SMCAS Board Nominations by July 5

A reminder: Nominations for the SMCAS Board of Directors and Officers, opened at our May meeting and will close Wednesday, July 5 at midnight. Please consider serving!

The current Board encourages anyone with an interest in learning more about how SMCAS runs or is interested in participating more actively in planning and helping achieve our goals, to serve on the Board. It is a great experience and of value to SMCAS no matter what level of time you can put into serving.

If you would like to nominate yourself or another SMCAS member who agrees to serve, please forward the nomination to Marion Weiler by close of nominations at mgwe@pacbell.net or call/text me at 650-787-8984. In addition, feel free to contact me if you want to discuss further before making a nomination.

In your nomination request, note whether the person is being nominated for one of the four Officer positions (President, Vice President; Secretary or Treasurer) or as a Board Member at Large.

Under our current By-Laws, anyone who is nominated and willing to serve as a Board Member at Large can be elected. We do not have a limit on the number that can be serve. It is important for SMCAS to engage as many capable members as are interested and available, so anyone willing to serve is pretty much guaranteed a spot.

Board terms are for one year, from installation at the July 15, Star-B-Que until the following year's Star-B-Que.

When serving on the Board or as Officer, there is no financial cost to you beyond your member dues. Board service is voluntary, and if you need to miss a meeting, or even withdraw from the Board, you would be able to do so at any time, with minimal notice.

The election process will be via email and is planned start Thursday, July 6 and close prior to our Star-B-Que July 15. We hope to hear from you! ◆

The Board still meets virtually or via Zoom, once a month.

Bright Supernova in M101, Ursa Major

By Ken Lum

As most everyone now knows, there is a new supernova in **M101**, the **Pinwheel galaxy**, in Ursa Major about 21 million light years distant. Named **2023ixf**, it was discovered May 19 by Japanese observer **Koichi Itagaki**. It has reached about magnitude 11 so it is very bright and is ideally situated near the north-to-south meridian near the north circumpolar region and zenith of the sky allowing it to be observed for most of each clear night this summer.

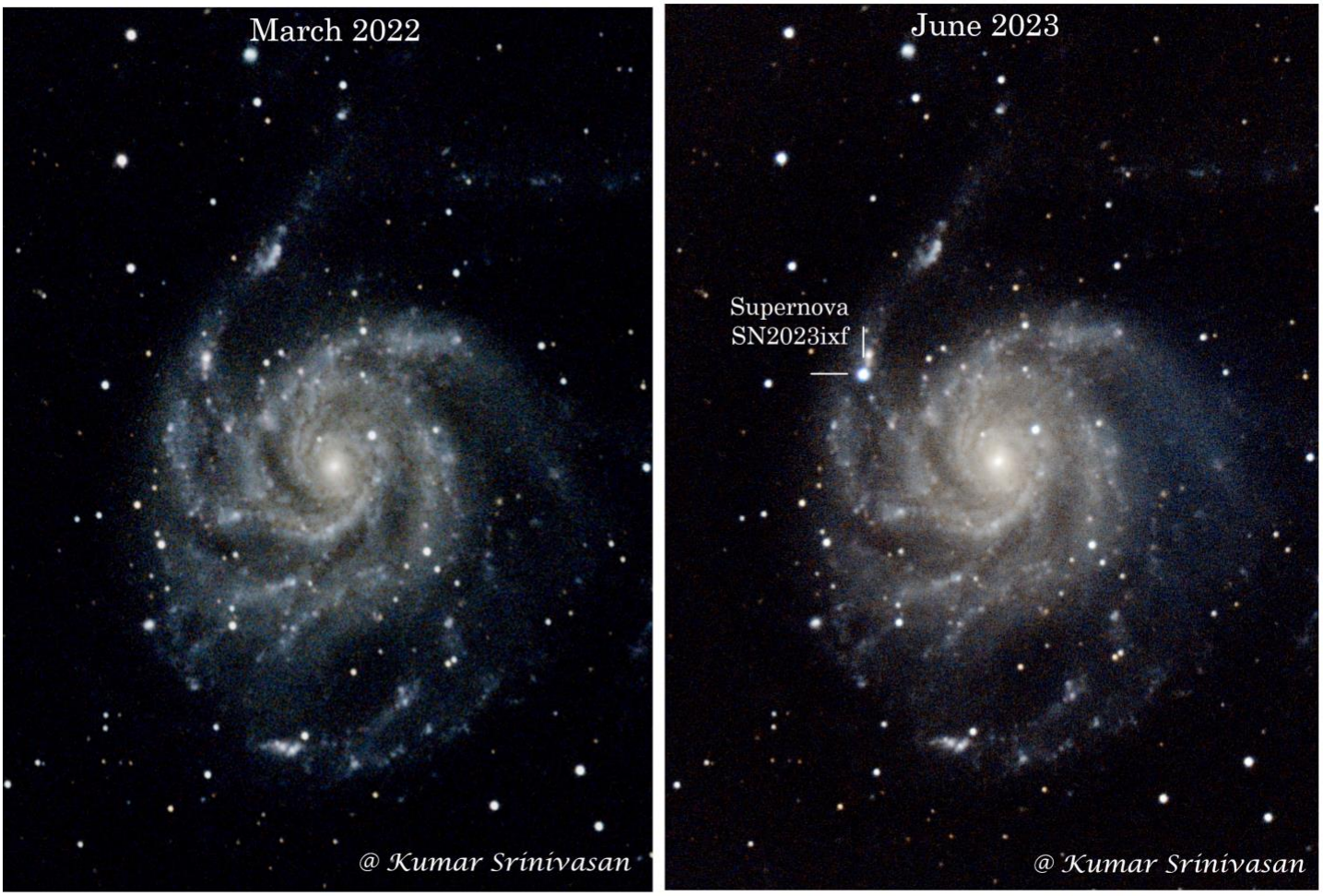
Below are my own before and after comparison photos taken from my backyard. It is located next to a stellar nursery cataloged as NGC 5461. The new supernova is said to be a **type II supernova** due to stellar core collapse. Before the current supernova, the last one in M101 was in 2011 which was a Type Ia due to the collapse of a white dwarf in a binary system. I hope others will also have the opportunity to observe this rare event.

(continued on page 8)

(Left) M101 taken May 8, 2021 with a 30-minute exposure using an eVscope. (right) M101 taken June 16, 2023 with a 60-minute exposure using an eQuinox 2 telescope. Supernova 2023ixf indicated by tick marks on the star in the spiral arm left of the galactic nucleus. *(Photographed by Ken Lum.)*

Bright Supernova in M101, Ursa Major (cont'd)

And here are a couple of additional pictures done by Kumar Srinivasan using a C8 telescope. ◆



(left) Pre-SN photo of M101 in 2022. (right) M101 with SN 2023ixf June 4 2023, indicated by tick marks in the spiral arm left of the galactic nucleus. (Photos by Kumar Srinivasan)

NASA Night Sky Notes
Solar Eclipses Are Coming!

By David Prosper

This detailed solar eclipse map shows the paths of where and when the moon's shadow will cross the USA for the upcoming 2023 annular solar eclipse and 2024 total solar eclipse, made using data compiled from multiple NASA missions. Where will you be? This map is very detailed, so if you would like to download a larger copy of the image, you can do so and find out more about its features at: https://svs.gsfc.nasa.gov/5073 *Credits: NASA/Scientific Visualization Studio/Michala Garrison; eclipse calculations by Ernie Wright, NASA Goddard Space Flight Center.*

Have you ever witnessed a total solar eclipse? What about an annular solar eclipse? If not, then you are in luck: we will see two solar eclipses darken the skies for observers in the continental United States, Mexico and Canada!

Solar eclipse fans get a chance to witness an **annular eclipse** this fall. On **Saturday, October 14**, the moon will move exactly in front of the Sun from the point of view of observers along a narrow strip of land stretching across the United States from Oregon to Texas and continuing on to Central and South America. Since the moon will be at its furthest point in its orbit from Earth at that time (known as *apogee*), it won't completely block the Sun; instead, a dramatic "ring" effect will be seen as the bright edge of the Sun

(continued on page 10)

NASA Night Sky Notes
Solar Eclipses Are Coming! (cont'd)

will be visible around the black silhouette of the moon. The distinct appearance of this style of eclipse is why it's called an annular eclipse, as *annular* means *ring-like*. If you are standing under a tree or behind a screen you will see thousands of ring-like shadows projected everywhere during maximum eclipse, and the light may take on a wan note, but it won't actually get dark outside; it will be similar to the brightness of a cloudy day. This eclipse must only be observed with properly certified eclipse glasses, or other safe observation methods like pinhole projection or shielded solar telescopes. Even during the peak of the eclipse, the tiny bit of the Sun seen via the "ring" can damage your retinas and even blind you.

Just six months later, a dramatic **total solar eclipse** will darken the skies from Mexico to northeast Canada, casting its shadow across the USA in a strip approximately 124 miles wide, Monday**, April 8, 2024**. While protection must be worn to safely observe most of this eclipse, it's not needed to witness totality itself, the brief amount of time when the moon blocks the entire surface of the Sun from view. And if you try to view totality through your eclipse viewer, you won't actually be able to see anything! The moon's shadow will dramatically darken the skies into something resembling early evening, confusing animals and delighting human observers. You will even be able to see bright stars and planets – provided you are able to take your eyes off the majesty of the total eclipse! While the darkness and accompanying chilly breeze will be a thrill, the most spectacular observation of all will be the Sun's magnificent *corona!* Totality is the only time you can observe the corona, which is actually the beautiful outer fringes of the Sun's atmosphere. For observers in the middle of the path, they will get to experience the deepest portion of the eclipse, which will last over four minutes - twice as long as 2017's total solar eclipse over North America.

While some folks may be lucky enough to witness both eclipses in full – especially the residents of San Antonio, Texas, whose city lies at the crossroads of both paths – everyone off the paths of maximum eclipse can still catch sight of beautiful partial eclipses if the skies are clear. The Eclipse Ambassadors program is recruiting volunteers across the USA to prepare communities off the central paths in advance of this amazing cosmic ballet. Find more information and apply to share the excitement at eclipseambassadors.org. NASA has published a fantastic Solar Eclipse Safety Guide which can help you plan your viewing at bit.ly/nasaeclipsesafety. And you can find a large collection of solar eclipse resources, activities, visualizations, photos, and more from NASA at solarsystem.nasa.gov/eclipses. ◆

Eclipse Ambassadors Needed at CSM Sept. 30

By Ken Lum

Plans for the CSM's Family Science and Astronomy Festival on Sept. 30 are being made and it's been decided that eclipse ambassadors are needed to explain the upcoming annular eclipse on Oct. 14, that will be just a mere two weeks away from this event and the total eclipse taking place April 8. If possible, the preference is a younger person with good mobility and endurance.

Ken Lum will be setting up his Lunt 100 H-alpha scope and cannot simultaneously explain eclipses to people. He's wondering if anyone is available and will be happy to supply whatever is needed, such as, maps, solar glasses and a video of the 2006 eclipse from Turkey to show to people on a laptop. If interested or would like more details, email lum40@comcast.net to contact Ken.

◆

The Golden State Star Party

By Frank Seminaro

Frank Seminaro's and Bill Lockman's imaging rig setup for this year's Golden State Star Party. *Photo by Frank Seminaro.*

The 2023 Golden State Star Party was held June 14 through June 18 in Adin, California. This is the annual dark sky astronomy event going on for a number of years. The event is still recovering from COVID and this year's attendance cap was set at 350. It is held at Frosty Acres, a working cattle ranch in the shadow of Mount Shasta. In addition to myself, Bill Lockman, former SMCAS board member, also attended. Due to the remote location, dry camping expertise is a must. You must bring in everything you will need to exist for five days. A good tent or RV is highly recommended. The event does supply well maintained Porta Potties and offers prepared dinners for two of the nights.

This years' event showed how much astrophotography has taken over compared with previous years. The vast majority of participants were doing imaging. But there was still a contingent of dedicated visual observers with very large Dobsonian telescopes. Most

(continued on page 13)

The Golden State Star Party (cont'd)

Bill Lockman's first light RedCat 51 photo.

all of the large Dobs were located together so one could venture down "Dob Alley" at night to sneak a peek. The whole reason to attend GSSP is the dark sky and this remote site delivers. The Milky Way is easily visible from horizon to horizon. Visible stars are 100x what you can see at a Crestview Star Party. The differences between images taken from Crestview and GSSP are remarkable.

Bill and I parked our RV's together forming our base camp with four imaging rigs between us. We had high expectations heading into our first night of imaging, we had planned our shots, cleaned our equipment, made lists, etc. But, as Mike Tyson said, "Everyone has a plan until they get punched in the mouth." Bill realized he left his counter-weight home for one of his mounts and my power plug on my mount decided to disintegrate into multiple pieces. So, we were down to two functioning mounts on the first night. However, it turns out we produced our best images that night. The star of the night was Bill's new Red Cat 51mm refractor on a ZWO AM5 mount. This scope produced one of the finest wide field images I have seen out of the box. Here is the image with very little post processing. The second and third nights were basically the same weather with

(continued on page 14)

The Golden State Star Party (cont'd)

from other astronomers and look through some amazing telescopes. Other astronomy clubs make this an annual event. The Santa Cruz Astronomical Society was located nearby and had a large and lively contingent that stayed up all night long.

We will both be spending the next few weeks processing the images we captured and posting on the SMCAS Facebook page. The next major event is the Oregon Star Party July 18 through July 23. ◆

slightly poorer seeing. The event coordinator mentioned the clear weather was the first the site has seen since October. In fact, the night before the event, a large thunderstorm with hail passed through. The soaking did keep the usual dust to a minimum for the duration of the Star Party. Bill stayed with his single imaging rig for the duration of the event and I was able to find an alternate power cord to bring my other rig online for night two. I did accomplish my goals while there. I was able to shoot mosaics of both the entire Veil Nebula complex and Sagittarius starfield. The weather forecast for the fourth and final night predicted clouds and high winds with a chance of a thunderstorm. As a result, most attendees packed up and departed Saturday. I would highly recommend this event to other SMCAS members. It doesn't matter how much experience you have or if you even own a telescope. It's a great way to learn

(above) M16 – The Eagle Nebula (Pillars of Creation). Taken with C14 HyperStar 20x60sec. (below) M13 or Great Hercules Cluster. Taken with an 8-inch RASA 20x60sec. *Photos by Frank Seminaro.*

Review of Available Live-Stacking Telescopes

By Ken Lum

Unistellar eQuinox 2 telescope being prepped for observing.

Judging by the recent proliferation of Unistellar eVscopes in the SMCAS, it would seem that these computerized live-stacking smart telescopes are becoming a revolutionary new technology Judging by the recent proliferation of Unistellar eVscopes in the SMCAS, it would seem that these computerized live-stacking smart telescopes are becoming a revolutionary new technology now widely available to amateur astronomers. **Live-stacking** means these telescopes can provide an enhanced view of faint celestial objects by taking many short-exposure individual images of an object and digitally stacking them to add up the image densities to produce a final enhanced image showing much more detail than visual views even using much larger (and heavier) telescopes.

The big attractions of these instruments are their light weight and tremendous ease of use in completely self-contained packages not needing much assembly, disassembly or accessories. In addition to their simple-to-use photographic capability, they also have **GoTo** and **Tracking** capability so objects can be located quickly on demand and accurately tracked during the exposure.

They also leverage wireless smartphone and tablet Wi-Fi connections to provide the user with quick photo-recordings of their observing experiences that can be readily shared with others reinforcing amateur astronomy as a social activity. And their photographic abilities also enable easy use for Citizen Science projects. How much more fun can that be?

Not surprisingly, there is now a rapid replication of this telescope format in more products at different price points and sizes giving consumers ever more choices. This article is written to inform our membership of the choices now available and their differing fields of view (FOV) to show how much sky each telescope type can image. No doubt, even more options will be entering the market from various manufacturers in the future. And so, it seems astrophotography is now entering a snap-shot era making this activity easier than ever.

Tables 1 and 2 are a summary of presently available live-stacking telescopes and some of their features. I have also made illustrations of the FOVs of each telescope with M 42 serving as example celestial objects as calculated using https://astronomy.tools**.** Because of the need for brevity for the **Event Horizon,** I am only including illustrations for all the telescopes using only M42. I will send a more complete and longer version of this article with all the FOV illustrations with M31 and M42 to everyone via SMCASnews as a document attachment later.

Of course, readers can use the specifications in the Tables to calculate their own FOVs with whatever object they want that is available in https://astronomy.tools. For Mac users, I recommend using the Chrome browser from Google. The Safari browser sometimes does not work.

(continued on page 16)

Review of Available Live-Stacking Telescopes (cont'd)

Table 1: Comparison of Unistellar and Vaonis live-stacking telescopes				
Company	**Unistellar**	**Unistellar** unistellar.com	**Vaonis** vaonis.com	**Vaonis** vaonis.com
Telescope	**eVscope** V.1 (original)	**eQuinox 2/ eVscope 2**	**Stellina**	**Vespera Pro (Announced 6/16/2023!)**
				
Diameter	114mm (Mirror)	114mm (Mirror)	80mm (Lens)	50mm (Lens)
Focal Length	450mm (f/3.9)	450mm (f/3.9)	400 mm (f/5)	250mm (f/5)
Sensor		Sony IMX347 (1/1.8 inch) CMOS	Sony IMX178 (1/1.8 inch) CMOS	Sony IMX676 CMOS
Resolution		2688 x 1520 (4.09 MPx) (6.2 MPx per Unistellar)	3096 x 2080 (6.4 MPx)	3536 x 3536 (12.5 MPx)
Pixel Size		2,9 µm	2.4 µm	2.0 µm
Fields of View (FOV)	0.5° or 30' dia.	34 x 47 Arcmin	1° x 0.7°	1.6° x 1.6°
Focus	Manual Focus	Manual Focus	Autofocus	Autofocus
Limiting magnitude		18.2		16
Weight.	9 kg	9 kg (20 lbs.)	11 kg (24.25 lbs.)	5 kg (11 lbs.)
Filters	1 ¼" Can be installed Solar optional	1 ¼" Can be installed Solar optional	Light pollution filter built -in Solar optional	Proprietary, sold separately. Add around $800 for filters, accessories
Price	No longer available	$2,499/$4,899	$3999	$2,499 $1,999 Preorder Delivery May 2024

(continued on page 17)

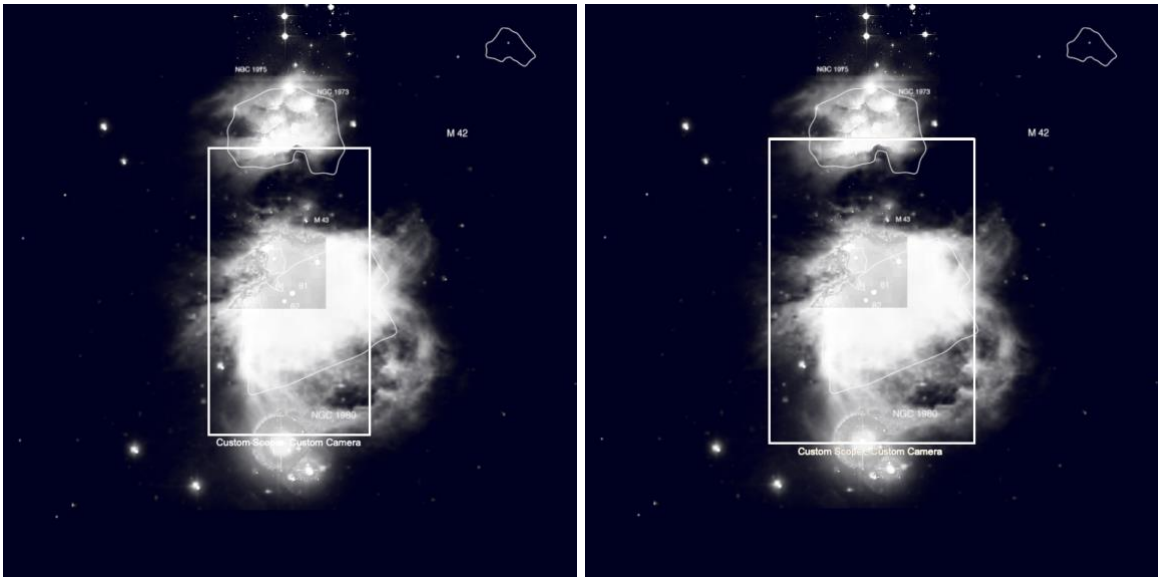
Review of Available Live-Stacking Telescopes (cont'd)

Table 2: Vaonis Vespera and products from ZWO and Dwarflab in the smaller and less expensive range			
Company	**Vaonis** vaonis.com	**ZWO** https://astronomy-imaging-camera.com	**DwarfLab** https://dwarflab.com
Telescope	**Vespera**	**Seestar S50**	**Dwarf II**
			
Diameter	50mm (Lens)	50mm (Lens)	24 mm (Two Lenses)
Focal Length	200mm (f/4)	250 mm (4.9)	100 mm/48 mm Two focal lengths f/4.2 & f/2.4 and two sensors
Sensor	Sony IMX462 (26.5 mm x 26.5 mm) CMOS	Sony IMX462 (26.5 mm x 26.5 mm) CMOS	Sony IMX415 (12.0 mm x 9.3 mm) CMOS
Resolution	1920 x 1080 (2 MPx)	1920 x 1080 (2.1 MPx)	3864 x 2192 (8.47 MPx & 2 MPx(2x2 binning))
Pixel Size	2.9 µm	2.9 µm	1.45 µm
Fields of View (FOV)	1.6°x 0.9°	1.29° x 0.73°	3° & 50°
Focus	Autofocus	Autofocus	Autofocus
Limiting magnitude	16		
Weight.	5 kg (11 lbs.)	3kg (6.4 lbs.)	1.2 kg (2.6 lbs.)
Filters	Proprietary, sold separately. Add around $800 for filters, accessories		1.25" filters useable
Price	$1,499	$499. Delivery est. August 2023	$459

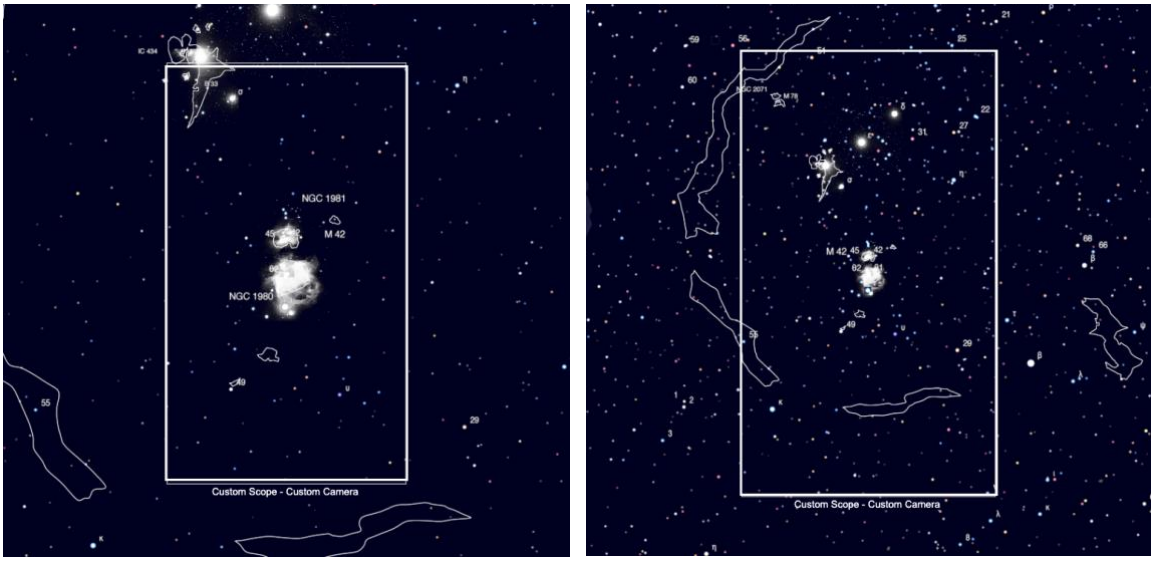
(continued on page 18)

Review of Available Live-Stacking Telescopes (cont'd)

Sample Illustrations of Fields of Views for different live-stacking scopes as calculated on https://astronomy.tools using M42 or the Great Orion Nebula as an example celestial object.



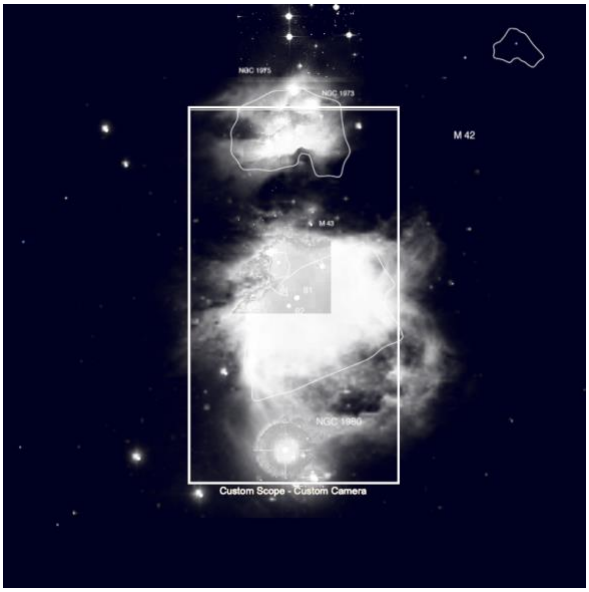
Estimated fields of view as seen with the **Unistellar eQuinox 2** and **eVscope 2** on the **left** and with **Vaonis Stellina** on the **right**.



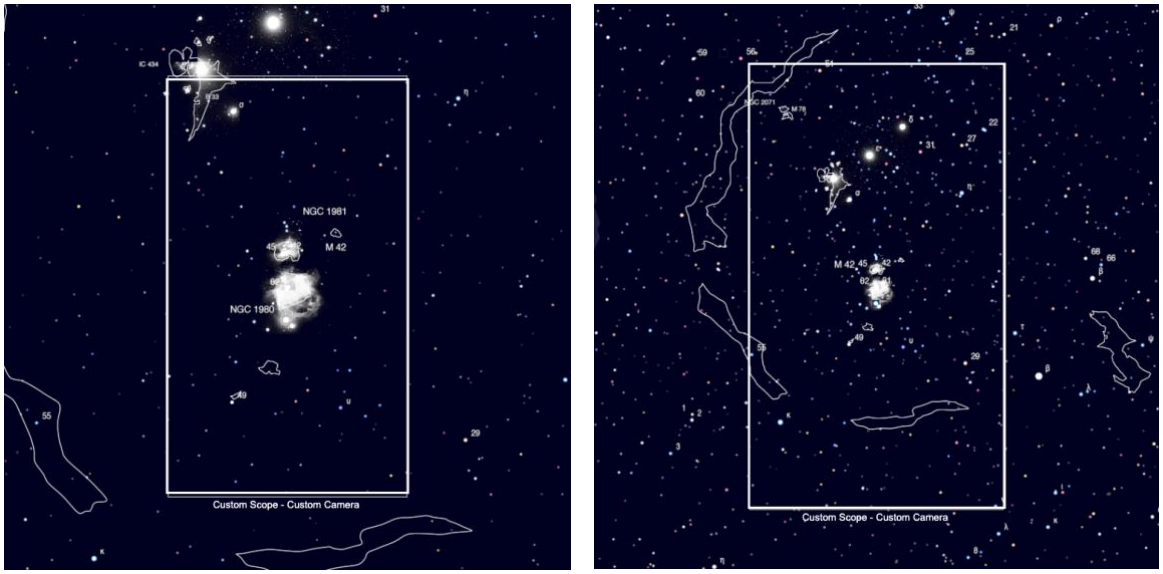
Estimated fields of view as seen with the **Vaonis Vespera Pro** on the **left** and the **Vaonis Vespera** on the **right.**

(continued on page 19)

Review of Available Live-Stacking Telescopes (cont'd)



Estimated fields of view as seen with the **ZWO Seestar.**



Estimated fields of view of as seen with the **Dwarf II** at **100 mm** focal length on the **left** and **48 mm** focal length on the **right**.

(continued on page 20)

Review of Available Live-Stacking Telescopes (cont'd)

Some Comments and Conclusions

One of the problems with live-stacked telescopes is that it is not possible to change the magnification and FOV of a given telescope. The exception is the **Dwarf II** which does this by building two telescopes of different focal lengths into a single housing. And so, it is mostly necessary to purchase separate telescopes to acquire the ability to photograph at different magnifications and FOVs. Changing magnification and FOV can be done with more conventional astrophoto setups by switching components around, but the compact single package layout is lost.

The best solution to enable changing magnification and FOV is to introduce a stand-alone camera that has a built-in battery power supply and Wi-Fi for wireless communication that can be switched around to different telescopes. A brief search showed some cameras with these features, but I did not have time to investigate these products thoroughly.

The very large $2,400 price difference between the **Unistellar eVscope 2** and the cheaper **eQuinox 2** seems primarily due to the presence of a Nikon electronic eyepiece on the former. Otherwise, the two telescopes seem mostly the same. Why the Nikon eyepiece should cost so much is a mystery to me. When I owned the original eVscope V.1, I did not find its eyepiece that useful, and so I did not feel the need for this feature when I upgraded to the eQuinox 2 for much less money. Others, however, may disagree and find the eyepiece to be necessary.

The announcement of the new **Vaonis Vespera Pro** around June 16 suggests that these products will be introduced very rapidly every few months causing prospective customers to get yo-yoed around chasing whatever looks like the latest and greatest live-stacked photo telescope product. This will make for a very volatile product market.

The **ZWO Seestar** seems to have a very similar FOV compared to the **Unistellar** and **Vaonis** telescopes with the latter providing better resolution while the Seestar offers a much smaller and lighter housing and much lower price.

The **Dwarf II** comes across as a technical tour de force that offers not only two separate telescopes in the same housing but is also useable in an equatorial as well as alt-azimuth configuration. It can also be used for daytime photography and is even able to automatically track rapidly moving objects such as flying birds for video clips as well as make for a terrific eclipse video and photographic platform. And all that in a package weighing less than 3 pounds for only around $500!

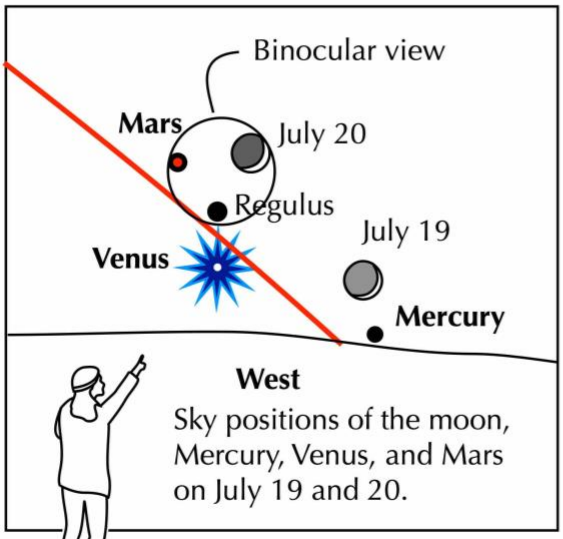
The smaller units such as the **Seestar** and **Dwarf II** are also small and light enough to chuck into your luggage for a quick trip to some faraway place such as Australia without having to pay for separate shipping costs!

Finally, it must be said that Vaonis offers an extremely expensive $45k live-stacking telescope built around a 6-inch refractor called the **Hyperia** using a 61 MPx CMOS sensor. I did not include this telescope in this review as I suspect few would have an interest in such an expensive item. Click here if you'd like to check it out on Vaonis' website.

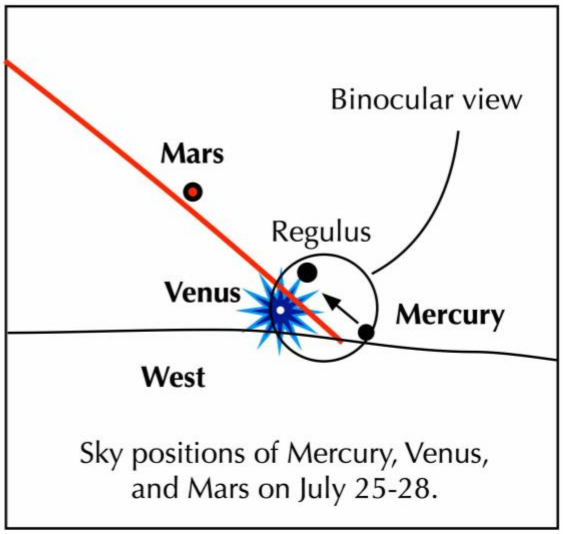
The great science-fiction writer, **Arthur C. Clarke**, once wrote that "Any sufficiently advanced technology is indistinguishable from magic." These products certainly affirms this impression! ◆

Astronomical League July Activities

If you can see only one celestial show in the evening this July, see this one.



Sky positions of the moon, Mercury, Venus, and Mars on July 19 and 20.

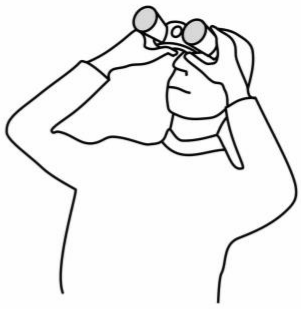


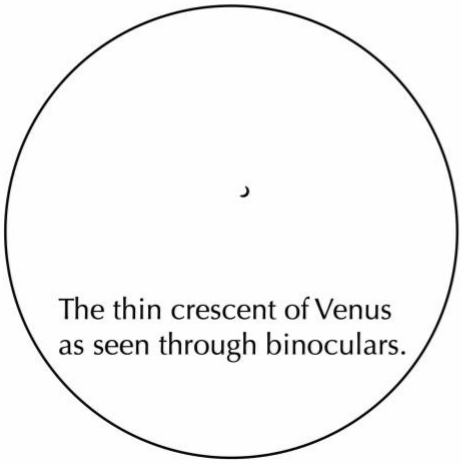
Sky positions of Mercury, Venus, and Mars on July 25-28.

All the rocky planets, all at once!

On the evenings of July 19 and 20, look towards the west 30 minutes after sunset.

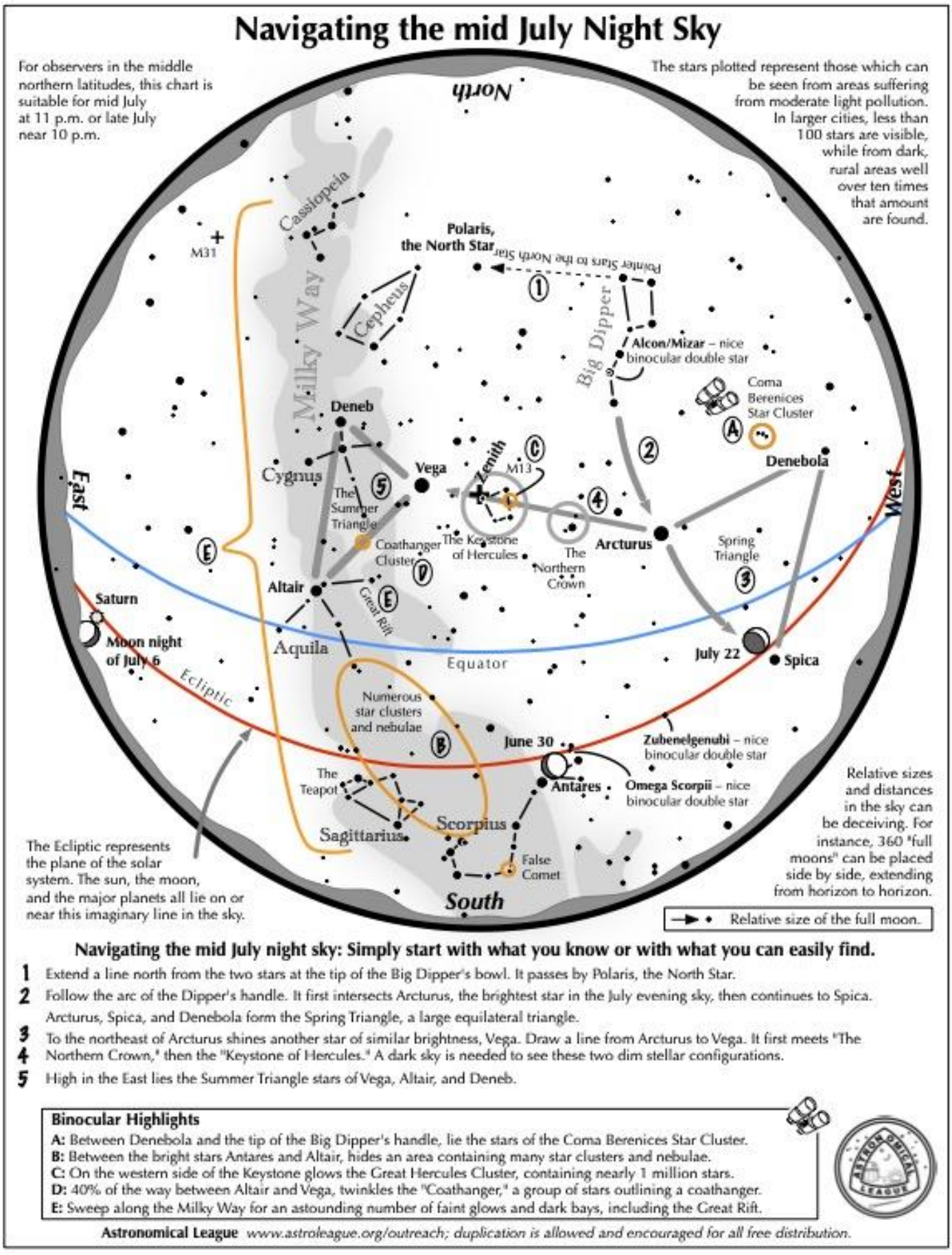
- Brilliant Venus will be seen as a tiny crescent in steadily held binoculars.
- On the first evening, the thin crescent moon, full with earthshine, hangs above Mercury. The little planet might be lost in the bright twilight.
- On July 20, the moon forms a triangle with Regulus and Mars. Venus sinks below them. Mars, having lost its splendor from last fall, might be difficult to spot in the bright twilight. Binoculars will help.
- Mercury climbs somewhat higher over the remaining evenings in July. On July 28, it lies directly next to Regulus, which has dropped much closer to the horizon. Venus may lie too close to the horizon to be spotted. Because of their low alittude, very clear skies and a low horizon are needed to see this.





The thin crescent of Venus as seen through binoculars.

Astronomical League July Activities (cont'd)



Directions to SMCAS Public Star Parties (Weather Permitting)

From Hwy 101 or El Camino: Take Brittan Avenue in San Carlos, west (toward the hills). Follow Brittan 2.3 miles (from El Camino) to Crestview Drive. Turn right on Crestview. In half-a-block, you will see a small, blue-posted sign with an arrow, indicating the entry road into Crestview Park. It lies between houses with addresses 998 and 1000 Crestview Drive.

From Highway 280: Take Edgewood Road exit. Go east (toward the Bay) about 0.8 miles. Turn left at Crestview Drive. Go 0.5-mile uphill to where Crestview meets Brittan. Again, drive the half-block, to the small blue sign on the right, and the entry road on the left.

From Hastings and Club Drives: From Belmont, take Carlmont Drive to Hastings Drive. Follow Hastings about 1.5 miles, first uphill, then down, to San Carlos where it becomes Witheridge Road, then ends a block later at Club Drive. Turn right and climb Club Drive to Crestview Drive. Turn left and continue some 2 miles, first up, then down past Leslie Drive, to the small blue Crestview Park sign on the left. Turn right into the Crestview Park entry road.

From San Carlos, take San Carlos Avenue to Club Drive, and climb to the 5-way intersection. Take the half-right to continue on Club Drive past Witheridge Road to Crestview Drive. Proceed as above to Crestview Park.

Crestview Park - San Carlos

Come on out, and bring the kids,
for a mind-blowing look at the Universe!

Bring your binoculars, telescopes, star guides, and lounge chairs for some informal star gazing at Crestview Park.

Dress warmly and wear a hat. Only visitors with telescopes should drive in. Others should park on the street and walk in or arrive before dark so that car headlights don't affect the observers' dark adaptation. Bring small flashlights only, covered with red cellophane or red balloon.

These measures avoid safety issues of maneuvering in the dark, as well as ruining the night vision of the viewers.

Please don't touch a telescope without permission. And parents, please don't let children run around in the dark.

Note: If bringing a telescope and arriving after dark, please enter the Park with your headlamps and white interior lights off. If you aren't bringing a telescope, whether before or after dark, please park along Crestview Drive, and walk in.

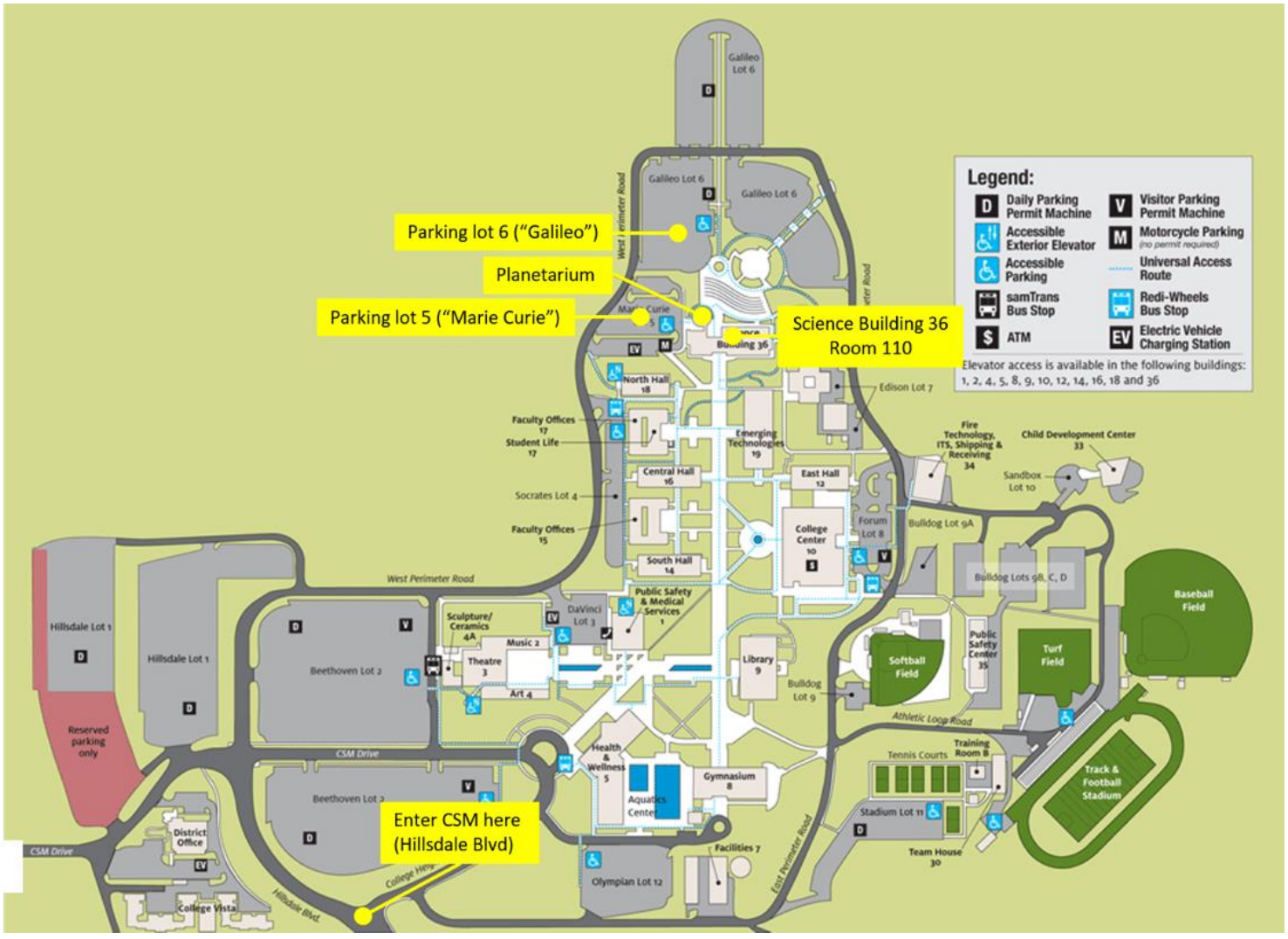
Crestview Park is residential, adjacent to homes and backyards. Before inviting potentially noisy groups, please call Ed Pieret at (650) 595-3691 for advice and advisories**. Call Ed also to check the weather and 'sky clock' and to see whether the Star Party is still scheduled.**

Crestview Star Party schedule is here:
http://www.smcasastro.com/crestview-park.html

Directions to SMCAS Meetings at The College of San Mateo:

Directions to the CSM Planetarium for Meetings:

After exiting Hwy 92 at Hillsdale Blvd, climb the hill towards CSM, passing two traffic lights to the stop sign at the top of Hillsdale Blvd. Continue straight onto West Perimeter Road and follow it until you reach Lot 5, "Marie Curie", or Lot 6, "Galileo." Science (ISC) Bldg. (36) and the Planetarium lie straight ahead. Enter Bldg. 36 either through the door facing the lot or walk around the dome to the courtyard entrance. We meet in ISC room, #110 for pizza and soft drinks one hour prior to the talk in the Planetarium (Pictured below.)



San Mateo County Astronomical Society
Membership Application

SMCAS@live.com; P.O. Box 974, Station A, San Mateo CA 94403; (650) 678-2762

rev 02272020

Become an SMCAS Member Today! Here's what you get:

- **Members Community**

Friendly advice and guidance from experienced recreational astronomers; access to SMCAS group emails, which provide general orientation information, announcements of astronomy events, file access and exchange.

- **SMCAS Events**

General meetings are held the first Friday of most months, at 7pm in the Integrated Science Center (ISC) Room and Planetarium in the Science Center (Bldg. 36) at the College of San Mateo (CSM), 1700 W. Hillsdale Blvd., San Mateo. Meetings include lectures and presentations on space science, an activity session, and refreshments (usually pizza).

We also offer stargazing two Saturdays a month, weather permitting. Visitors and those without telescopes are welcome; members are glad to share! SMCAS also has sponsored dark-sky campouts at Fremont Peak State Park, field trips to SLAC, KIPAC and Lick Observatory, plus **member-only events, including Star-B-Ques and quarterly potlucks.**

- **Subscriptions** (free with your membership)

The Event Horizon, SMCAS' newsletter, with SMCAS and member information, viewing tips and articles.

The Reflector, published quarterly by the Astronomical League, a national alliance of astronomy groups like SMCAS.

- **Significant Discounts on Equipment and Publications**

Discounts on purchases at Bay Area astronomical equipment retailer Orion Telescope Center, on sky calendars and ephemerides, and on such periodicals as *Sky & Telescope* and *Astronomy*.

- **Access to Loaner Equipment**

Use of SMCAS loaner telescopes and other astronomy equipment.

- **Sharing your Appreciation of Astronomy and Space Science with the General Public.**

Your SMCAS membership helps bring astronomy to interested lay people, especially students and children

Annual Dues: (SMCAS is a tax-exempt non-profit 501(c)(3). Dues may be tax deductible; consult your tax advisor):

$30 Regular Family Membership; $15 Student Membership

Every membership includes all members of your immediate family, (including your kids).

To join you can:

Send application (see reverse side), with payment, to: SMCAS, P.O. Box 974, Station A, San Mateo CA 94403.

- Bring the completed application and payment to a meeting or event and give it to any SMCAS officer.
- Go online at http://www.smcasastro.com, click on the Membership tab and pay via PayPal.

Membership Application on next page

San Mateo County Astronomical Society
Membership Application

SMCAS@live.com; P.O. Box 974, Station A, San Mateo CA 94403; (650) 678-2762

rev 02272020

Date: _____ Please check one: [ ] New Member or [ ] Renewal

[ ] $30 Regular Family Membership; [ ] $15 Student Membership

All members, please indicate areas of interest below. New members, please complete entire form. Renewing members, please provide your name and any information that has changed in the last year.

We will list your name, address, email address, and phone number(s) in our membership roster unless you have checked the box preceding that information. The membership roster is distributed to active members only.

Each member's name and mailing address must be provided to the Astronomical League (AL), SMCAS' umbrella organization. If you don't want AL to have your phone number and email address, indicate below.

[ ] Name(s) _____ [ ] Email Address _____

[ ] Address _____

[ ] City & Zip Code _____

[ ] Phone Number(s): _____ [ ] Do not provide my phone number(s) to the AL.

[ ] Don't provide my email address to the AL. (Checking this means you can ONLY get ***The Reflector*** by regular mail)

Please check one: send ***The Reflector*** [ ] by mail, or [ ] by email.

Areas of Interest:

SMCAS encourages member involvement. We invite you to provide additional information about your interests, skills, occupation and prior experience. Please identify SMCAS projects and functions that you might like to help facilitate.

_____

Please indicate which of the following activities might be of interest to you:

____ **Star Parties - Do you own a telescope you can bring: Yes ( ) No ( )**

____ **General Meetings - Finding (or being) a Speaker. Official greeter. Set up or take down ISC or refreshments.**

____ **Family Science Day & Astronomy Festival (Usually at CSM the first Saturday in October).**

____ **Social Events - Equinoctial and Summer Solstice potlucks, Summer Star-B-Que, Holiday Potluck.**

____ **SMCAS Membership and Promotional Drives**

____ **Communications – 'Event Horizon' Newsletter, Website(s), Facebook page, group email, Publicity posting.**

____ **Educational Programs – School, museum and library star parties, Bay Area Astro teacher assistants.**

Other/Comments: _____