

The SAN MATEO COUNTY ASTRONOMICAL SOCIETY

Jan. – April • 2021 Issue

773rd General Meeting: January 23
774th General Meeting: February 20
775th General Meeting: TBD
776th General Meeting: TBD



EVENT HORIZON

Founded in 1960, the San Mateo County Astronomical Society is a 501(c)(3) non-profit organization for amateur astronomers and interested members of the public. Visitors may attend Society meetings and lectures on the first Friday of each month, September to June, and Star Parties two Saturdays a month. All events are free for visitors and guests. Family memberships are offered at a nominal annual cost. Detailed membership information is found at <http://www.smcasastro.com/membership.html> where those who want can join via PayPal. Membership also includes access to our Event Horizon newsletter, discounted costs and subscriptions to calendars and magazines, monthly star parties of the Society and the College of San Mateo, use of loaner telescopes, field trips, social occasions and general meetings presenting guest speakers and programs. For additional information, please email us at SMCAS@live.com or call (650) 678-2762.

Membership forms are available near the end of this newsletter beginning on page 18.

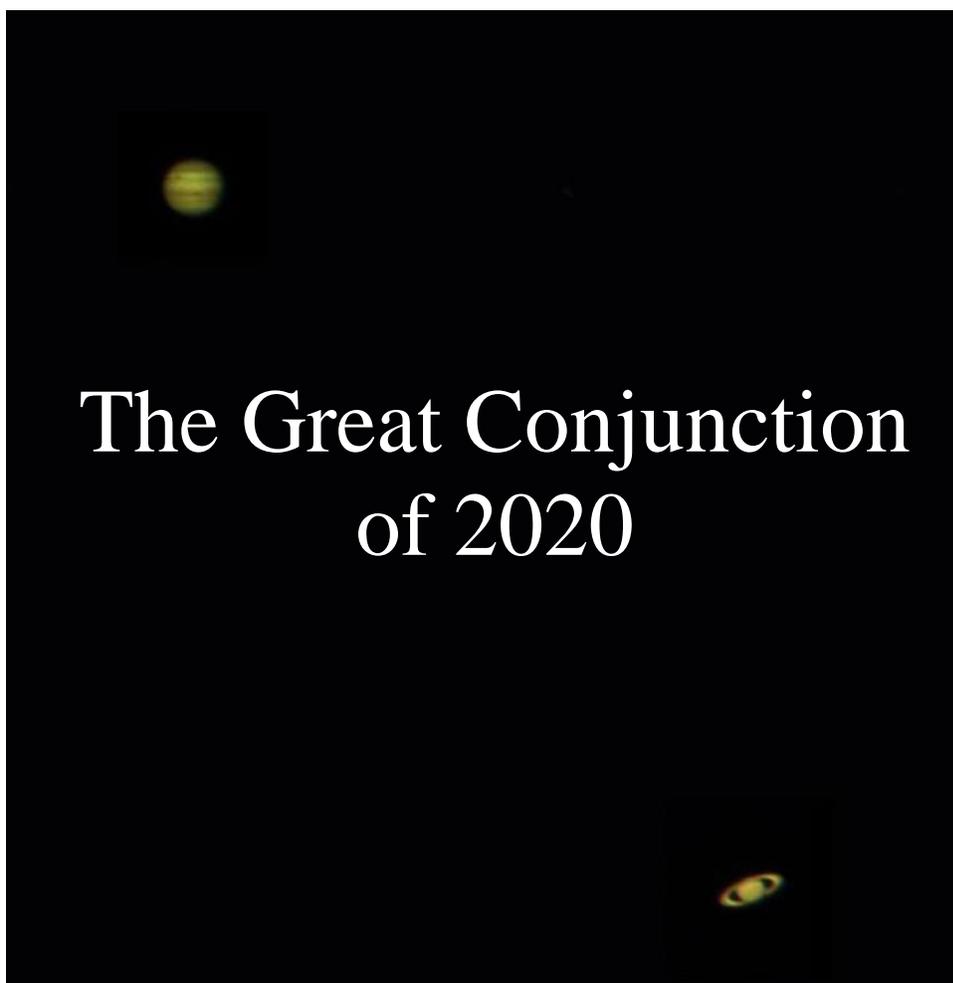


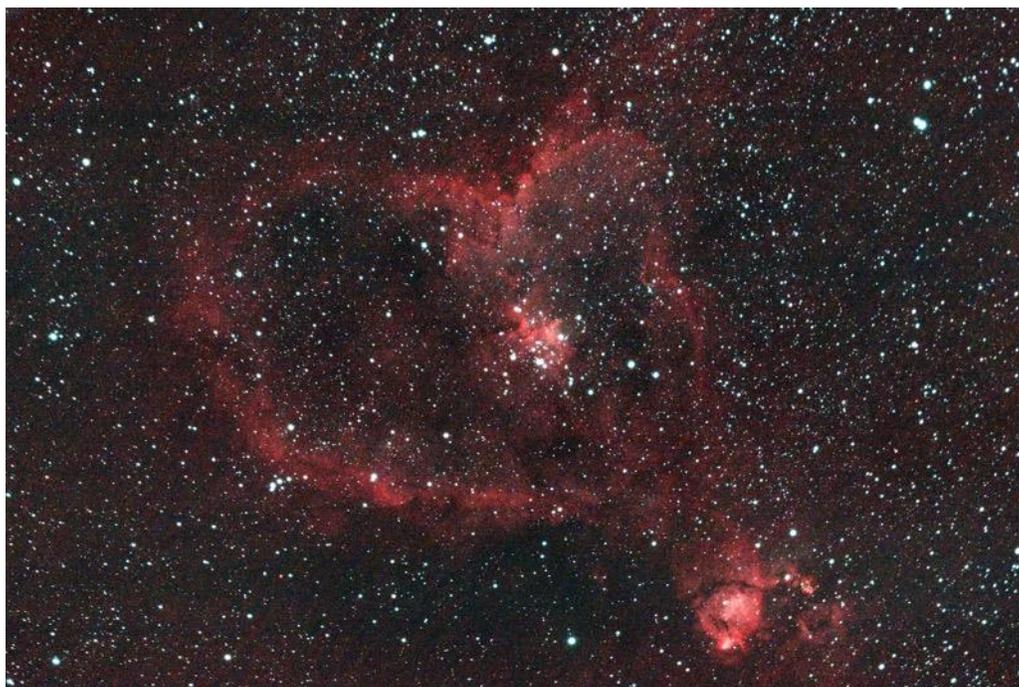
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PLEASE NOTE: CSM is still closed due to the pandemic. SMCAS events are online until further notice.

Cover: The Great Conjunction of 2020 photographed by Chanan Greenberg.

Below: The Heart Nebular photographed by member Kumar Srinivasan.



From the Prez

Hi All. While I know these have been trying times, I join the other Society Board members in hoping that you all enjoyed a fun, pleasant and healthy holiday season. We've continued to offer virtual lectures and Star Parties to our membership, even though the facilities at the College of San Mateo remain closed. We had hoped that situation would abate by year's end, but that clearly has not happened. So we'll continue as we have been.

The dearth and slow pace of restricted events has made it impractical to publish an issue of the Event Horizon with our previous frequency, so this issue, like the one before it, covers a nominal four months. As additional events and announcements become known, we're just supplementing the EH with emailed announcements to the SMCAS Members' (smcas@groups.io) and Members'/Guests' (smcasnews@groups.io) newsgroups.

With the easing of some restrictions on public outdoor gatherings (up to 50 people with social distancing), we had been able to make some use of Crestview Park for livestream Star Parties last summer. However, four members of our Club (Ed Pieret, Mike Cooke, Ken Lum and Bill Lockman) have now received and mastered their Internet-capable eVscopes. And, with Chanan Greenberg putting to good use the 5-inch APO refractor he bought from Ken, combined with his new planetary camera, it's now become unnecessary for observers to gather at a central viewing spot, or have to seek a clear sky and unobstructed horizon. That's because our observers can now alternately broadcast imagery from their

backyards which are widely separated, and so can usually sample different sky conditions.

And, if we are clouded out or encounter wind or cold, the observers can use their stored archives of past Star Party observations to display representative images, so that we can nearly always enjoy a Star Party, no matter what the sky conditions or individual technical issues.

I want to once more thank member Inge Ruano, who lives in the East Bay, for inspiring us to begin this approach to our Star Parties. Her idea was a great contribution. We also owe a debt of gratitude to Chanan Greenberg who, assisted by Ed Pieret, has become a prolific developer and presenter of astronomical lectures. He's done it for us three times since August 2020, and is set to do so again on Saturday, January 23. The upcoming lecture is titled, "The Life Cycle of Stars." His prior efforts have been: "Size of the Universe," "Why is Pluto no longer a Planet" and "As Long as the Sun Shines." And Chanan has done it for us while residing in San Jose. Of course, he works in Redwood Shores.

Our other recent programs have included an historical retrospective of studies and stories about the moon by Bob Garfinkle, and a study and analysis of planets attending binary star systems, by Dr. Lea Hirsch. We may have one for February, but are now looking for other speakers and programs to feature. So, if any among you has an idea or suggestion, feel free to address it to the Board directors at smcasbd@groups.io.

From the Prez (cont'd)

Also, on Saturday, September 26, the Society participated in the planning and presentation of 2020's CSM Family Science Day and Astronomy Festival (FSD&AF). We, SMCAS, began its origins in 2003, and it has just become the longest-running annual public outreach event ever featured at the College of San Mateo, surpassing the discontinued "Jazz on the Hill." The FSD&AF will henceforth be regularly scheduled on the final Saturday in September, each year. And, by the way, 2022 will mark the centennial (100-year) anniversary of the San Mateo County Community College District. Besides Darryl Stanford's "The Sky Tonight" presentation, SMCAS provided the rest of the astronomy portion of the day's events. Ed Pieret reprised his role as "The Comet Chef," demonstrating yet again his favorite (if inedible) frozen dessert. Some 10 of our SMCAS members, augmented by some CSM staff, served as a panel for the 90-minute event called "Ask the Astronomers." Watching it on a ZOOM screen suggested a throwback to the old "Hollywood Squares" TV gameshow.

The final event of the day was our SMCAS virtual, livestreaming Star Party, powered by Ed Pieret's and Mike Cooke's Unistellar eVscopes, and accompanied by descriptive narration from Mike Ryan and Ken Lum, of the featured deep-sky objects (DSO's). All of the day's presentations were posted on CSM's YouTube channel (not to be confused with SMCAS's). [Click here to watch it](#). If you you'd like to see the activities for the day with additional viewing link, [click here](#).

I'll remind you all that superb graphic designer, Lisa Cooke, has redesigned our logo into a beautiful 3.5" diameter 3-D color version as well as created striking 2x2" logo stickers. Every member is entitled to one of the former and two of the latter. You can either email me or give me a call (see below). Or you can mail me a

stamped, self-addressed envelope (SASE), and I'll send them back. If you want more, the patches are \$3 and the stickers are \$1 apiece. You can enclose a check with the SASE.

Thanks again to our Event Horizon editor, Michelle Morales Torres. She does a great job for us.

A few days ago, we got some sad news. Gene Cross, one of our highly estimable and accomplished members passed away from ALS, aka Lou Gehrig's Disease, recently; a prince of a fellow by all accounts. And he was not just a member of our club, but he made contributions to both professional and amateur astronomy throughout the Bay Area, and beyond. Our Board member, Bill Lockman, a longtime friend and neighbor of Gene, has generously prepared an excellent retrospective on Gene's life, career and interests, and has provided it for inclusion in this issue of the Event Horizon. Gene's memorial service is being deferred until the pandemic conditions ease, but donations are urged in his name, to the ALS Association at the request of his widow, Denise Stewart. The Society will miss Gene and wishes his family well in all things.

Email me at jmrastro@yahoo.com, or call me at (650) 678-2762 with any questions, comments or patch/sticker orders. Take care all.

Mike Ryan, President,



SMCAS

Upcoming Events

Saturday, January 23, 7pm: 669th General Meeting, Chanan Greenberg program; 'The Life Cycle of Stars', see below

Saturday, February 20, 7pm: 770th General Meeting, tentative, check email for confirmation

Crestview Star Party 2020 schedule: www.smcasastro.com/crestview-park.html

PLEASE NOTE: CSM is still closed due to the pandemic. SMCAS events are online until further notice.

San Mateo County Astronomical Society Presentations Now in Conjunction with Star Parties

In keeping with the pandemic physical distancing requirements, the San Mateo County Astronomical Society has moved our normal first Friday general meetings and presentations to occur via Zoom teleconferencing in conjunction with a monthly Zoom Star Party. The evenings will start at 7pm with a short SMCAS members meeting, then presentation, followed by the Star Party. Our Zoom meetings and presentations are open to the public. Children are welcome although the subjects may be too advanced for some.

The scheduled for these combined lecture and Star Party events is listed above. The rest are still to be determined so look for details in emails about them. Be sure you are subscribed to SMCASNews@groups.io to receive the Zoom details to join these events.

We will resume our normal first Friday in-person meetings once CSM has reopened for public events.

Here are the Zoom details for Saturday, January 23 Meeting

<https://us02web.zoom.us/j/2539262920?pwd=U1puVE1nQVZHUW1vaGUrbGczMGxwQT09>

Meeting ID: 253 926 2920

Passcode: SMCAS

One tap mobile: (669) 900-9128

My Memories of Gene Cross

By Bill Lockman

I am saddened to report that we lost our dear friend and astronomy club colleague Gene Cross to [Amyotrophic Lateral Sclerosis Disease](#). Also known colloquially as Lou Gehrig's Disease, ALS is a progressive neurodegenerative disease that affects nerve cells in the brain and the spinal cord. There is no known cure for this horrible disease and the progression from initial diagnosis to death can take months or years. Stephen Hawking lived with this disease for over 55 years. Gene was initially misdiagnosed and treated for [Myasthenia Gravis](#) beginning in June 2019. In January 2020, his diagnosis was changed to ALS. Gene's condition rapidly worsened the following month. He passed away peacefully on December 10, 2020 at the Kaiser San Leandro Hospital with his wife Denise Stewart and stepson, Michael Ghali, at his side.

Gene's love of astronomy was inspired by his third-grade teacher. By having her students' sight along her arm and pointing finger, the teacher demonstrated that Venus was actually visible to the naked eye during the day, provided you knew where to look.

For 42 years, Gene's day job was optical engineering, including the design and fabrication of telescopes. Prior to retirement in 2017, Gene was an Optics Engineer and Senior Staff Member at Lockheed Martin Space Systems Company's Advanced Technology Center. There, he developed optical testbeds and payloads for space-borne applications. His aerospace instrument projects involved laser metrology, wavefront sensors, and optical-

mechanical systems. The design of optical system architecture and optical components for producibility was his forte. He was considered the primary corporate resource for optics vendor knowledge and capabilities, including optical fabrication and coatings.

Gene was a member of a team of volunteers who removed the historic 20-inch aperture achromatic lens of "Rachel", the historic large refracting telescope at the Chabot Space and Science Center, for the purpose of major maintenance and refurbishment of the lens and lens cell.

Gene was also an active member of several Bay Area amateur astronomy clubs, including the Peninsula Astronomical Society (PAS) and the San Mateo County Astronomical Society (SMCAS). Gene joined PAS in 2000 and as Program Committee chairperson from 2011 to 2017, he used his industry connections and expertise to recruit top-notch lecturers for the monthly PAS club meetings. He made a special effort to recruit women speakers and encouraged other men to promote women in science as well.

Gene helped organize the PAS premeeting dinners at Hong Kong Restaurant in Palo Alto. One of his favorite questions to the speaker was, "What got you interested in astronomy and when?" The response to that often provoked a lively discussion among the attendees. At each dinner, he also had a photograph taken of those in attendance. The last such group photograph with Gene is shown here and was taken one month prior to the COVID-19 lockdown in March 2020.

My Memories of Gene Cross (cont'd)



*February 14, 2020
PAS pre-meeting
dinner.*

*Left to right: Jim
and Terry Terman,
Gene Cross,
Ed Ching,
Rick Baldrige,
Bill Lockman, and
Galina Sokolova*

Gene and I would commute together from Fremont to PAS and SMCAS monthly meetings after Gene became too ill to drive himself. On occasion, we would also attend [Andrew Fraknoi's Silicon Valley Astronomy Lectures](#) together at Foothill College and star parties at Foothills Park (PAS) and Crestview Park (SMCAS). At one such Crestview star party in August 2019, Gene helped me re-collimate my 8-inch Schmidt Cassegrain telescope. That adjustment greatly improved my views of Jupiter and Saturn and allowed me to see Jupiter's Red Spot through that telescope for the first time.

I recall that Gene and SMCAS Board Member Ed Ching would often travel together to the Riverside Telescope Makers Conference in years prior to its shutdown in 2019. Gene enjoyed networking with those in attendance, including contacts he established from his amateur astronomy groups in Southern California before he came to the Bay Area, and also those from his day job as an optical engineer. Gene also enjoyed comparing the optical qualities of the various types of telescopes being

exhibited and used there under dark sky viewing conditions. He was a fortunate individual who worked in a field so very closely related to the one he enjoyed in his spare time.

Gene was a kind, caring, thoughtful and thoroughly professional individual who used his optical engineering expertise to help his amateur astronomy colleagues improve their stargazing experience. To deepen their interest in the hobby, Gene often gifted his friends with books related to amateur astronomy. Those of us who got to know Gene well will miss the enormous fun we had discussing telescopes with him.

Gene is survived by his wife, Denise Stewart, stepson Michael Ghali and stepdaughter Renee Ghali from his marriage to Denise, and Ian Cross, son, and Renee Robelan, daughter, from his first marriage. A memorial service for Gene will be held after the COVID-19 pandemic subsides. In the meantime, in lieu of sending flowers to the survivors, Denise suggests donating money in Gene's name to the **ALS Association** at [ALS.org/donate](https://www.als.org/donate).

Accessory Table for the Unistellar eVscope

By Ken Lum

Now that I have acquired an Unistellar eVscope, I agree with Ed Pieret's assessment that it is a very impressive piece of technology. (See the December 2020 issue of "Sky and Telescope" for a thorough review by Richard Tresch Fienberg.) As I used it, however, I found a need for an illuminated accessory table to be placed under the tripod to serve as a place where I could put charts, my iPhone, and any other accessories I happen to be using with the telescope.



Wood tabletop attached to collapsible plastic stool designed by Ken Lum.

After thinking about what this table would look like, I developed a radially symmetric design that can be accessed by users anywhere around the tripod. The tabletop has extensions out from between the tripod legs to provide a large enough accessible space. It is supported by a collapsible plastic stool that is bolted under the tabletop to form a convenient single piece accessory.

The tabletop is made of quarter-inch plywood purchased for around \$15 from the Woodcraft store on El Camino Real in northern San Carlos. After a couple of failures with trying to make the odd shape with its non-orthogonal angles on a table saw, I came up with the idea of making a pattern with guide strips that could be used to make precise replicable table tops of the desired shape using a band saw and a router table equipped with a piloted trim bit. The pattern can be used repeatedly to easily make as many copies of the tabletop as I want. And the use of quarter-inch plywood results in a table that is very light weight. It is finished with spray-on lacquer.

The collapsible plastic stool used to support the tabletop was purchased from Amazon for \$29.49 and is called the Sposuit Retractable Folding Stool.

It's a very clever spring-loaded design of 16.5-inch height that can be extended to and locked in place with a twist. And it can be collapsed down with another twist. I like the yellow color version as it may be more visible in the dark.

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Accessory Table for the Unistellar eVscope (cont'd)



Wood tabletop attached to plastic stool collapsed down for storage.



Red USB lamp clamped to a tripod leg.

The stool is said to have a capacity to support up to 400 lbs. which is far more than needed for this application. It is bolted to the tabletop with two flat-head quarter-inch bolts and fits under the tripod perfectly when the most distal segments of the tripod legs are retracted.

I have also made a version of this table with folding legs which works pretty well. But this latter version is much more expensive, overly complicated to build, and somewhat heavier making it an inferior design in my opinion. To illuminate the table, I had hoped to use a battery powered circular red light attached to the bottom of the telescope mounting under the top of the tripod using stick-on magnets. But I could not find any suitable lamp to do this with from any vendor. So, I purchased, again from Amazon, a USB gooseneck lamp called an “Auray LED6-USB 6-LED Gooseneck Light” for \$18.28. It can illuminate in white and red light and is powered by a Power Bank 25000mAh Portable Charger High-Capacity USB Battery Pack which costs \$25. But any USB battery pack will do. This set up is strapped to one of the tripod legs with a wooden clamp to illuminate the table.

All in all, the accessory table costs around \$50 and the light with the battery pack costs about \$45. I think they add much convenient functionality to the telescope.

Geminid Meteor Shower

By Michelle Morales Torres

Partial article of astronomy column called Look UP from the San Mateo Daily Journal published December 12, 2020.

According to NASA.org, the Geminid are a unique meteor shower because their identified parent body is not a comet, but rather an asteroid. Of the meteor showers with known parent bodies studied by meteor scientists, the Geminid are the only shower to have an asteroidal parent body; all others are cometary origins. Asteroid 3200 Phaethon measures just a little over 3 miles in diameter! Considering the amount of debris or shooting stars that are seen, one would expect Phaethon to be much larger. In addition, it is the first asteroid to be discovered via satellite.

It has many speculating, how could an asteroid produce meteoroids that causes the Geminid? One theory is that Phaethon broke apart from another object, ejecting meteoroids as a part of the breakup. However this doesn't agree with other things that are known. Another theory is that a collision with another object thousands of years ago could have produced debris that Earth now travels through. This theory appears to be unlikely as well, based on other evidence. Another theory assumes Phaethon to be a dead comet (the spent nucleus of a comet whose ices had been sublimated away) that produced debris in the past that now intersects Earth's orbit. But no evidence for mass loss from the object has ever been reported ... until recently. In 2009 the NASA spacecraft

STEREO-A observed 3200 Phaethon to brighten by a factor of two, quite unexpectedly. This brightening at perihelion was likely due to a release of dust from the object, possibly due to heating and cracking of the surface rocks as Phaethon came close to the Sun. That brings us to the fourth theory, that Phaethon is a rock comet. The problem with this theory is that it doesn't account for the amount of dust in the Geminid stream. So what it comes down to is that the Geminid parent object is a mystery.

Phaethon was discovered on October 11, 1983 using the Infrared Astronomical Satellite and named after the Greek myth of Phaethon, son of the sun god Helios, due to its close approach to our Sun.

The other curious thing about the Geminid is that all major meteor showers have been observed for centuries or millennia but not the Geminid, according to Almanac.com. They were unseen until as recent as the mid-1800s. (When one views time from an astronomical watch, a couple of centuries is very recent.) It started as a modest shower that delivered only 20 meteors per hour. Over time, it's grown increasingly rich; now it delivers one to two per-minute.

In addition, the Geminid are much slower than either the famous summer Perseids or the hit-or-miss Leonids because they don't strike us head-on. They approach Earth sideways. At 20 miles-per-second, they travel at half the speed of the other major showers and it shows.

Here Come the Suns: Planets in Binary Star Systems

By Ken Lum

Dr. Lea Hirsch, of the Kavli Institute for Particle Astrophysics and Cosmology, generously came to our virtual meeting on November 14 to give us her insights into the current state of research of exoplanets with a special emphasis on the occurrence of exoplanets in binary star systems.

Depending on which source one reads, there appears to be some 4,000 confirmed exoplanets thus far discovered. This began with initial discoveries in the mid-1990s from ground-based observatories, accelerated in 2007 with NASA's space telescope-based Kepler mission which ended in 2018, and is now carried on mostly by NASA's Transiting Exoplanet Survey Satellite. Most of these discoveries were done using the planetary transit method wherein an exoplanet passing in front of its host star will cause the star's observed luminosity to drop by a measurable amount. The amount of this drop can be used to determine the diameter of the exoplanet. (See Figure 1.)

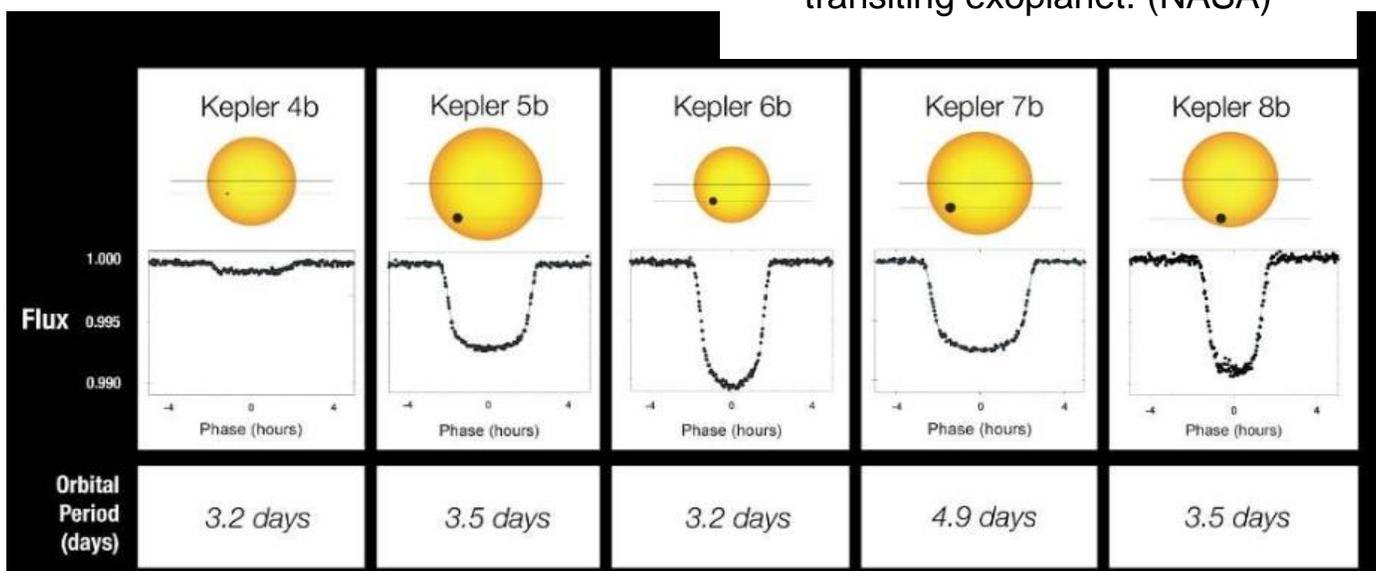
I. Current State of Exoplanet Research

The discovery of so many exoplanets have allowed astronomers to begin asking statistically relevant questions about planets on a population basis. Some of the big questions that have arisen listed by Dr. Hirsch are:

1. How do planets form?
2. How common are planetary systems like our Solar System?
3. How common are planets like the Earth?
4. Which smaller in size and are possibly habitable?

(continued on page 12)

Figure 1: *(below)*
Falls in stellar luminosity due to transiting exoplanet. (NASA)



Here Come the Suns: Planets in Binary Star Systems (cont'd)

Characterization of these exoplanets and their planetary systems have revealed the following findings:

- Relevant to the third question is that smaller, habitable planets appear to be fairly common between 0.37 and 0.6 planets per star, according to one publication, which is remarkably common!
- A finding that is relevant to the second question is that planets in the super-Earth to sub-Neptune size range is the most common outcome of planet formation generally occurring in the tightly packed systems with short orbital periods.
- Also, these systems often have multiple planets that are of similar size spaced out at similar distances from each other.
- Another finding is that smaller, rocky planets near their star with orbital periods less than 100-days fall, into two populations divided into those smaller than 1.8 Earth radii which mostly have had their atmospheres stripped away by the host star's stellar wind leaving

only a bare, rocky remnant in orbit and those bigger than 1.8 Earth radius which still retain their atmospheres.

- Giant planets from 30 to 6,000 Earth masses have a peak occurrence of at least three to five AU out from their host stars. At this distance, there is more rocky material available to form planetary cores rapidly. At the same time, volatiles such as water, ammonia, carbon dioxide, etc. can accumulate as ice, which are not being evaporated away. The distance from the host star where these phenomena begin to occur is known as the **Ice line**.

II. Exoplanets in Binary Star Systems.

In doing the initial exoplanet surveys, however, Dr. Hirsch noted that the investigators deliberately excluded binary star systems. She said that the reason to do this was that a transit occurring in a binary star system will cause the depth of the drop in luminosity to be less than what would be found with a transit in front of a single star. (See Figure 2.)

(continued on page 13)

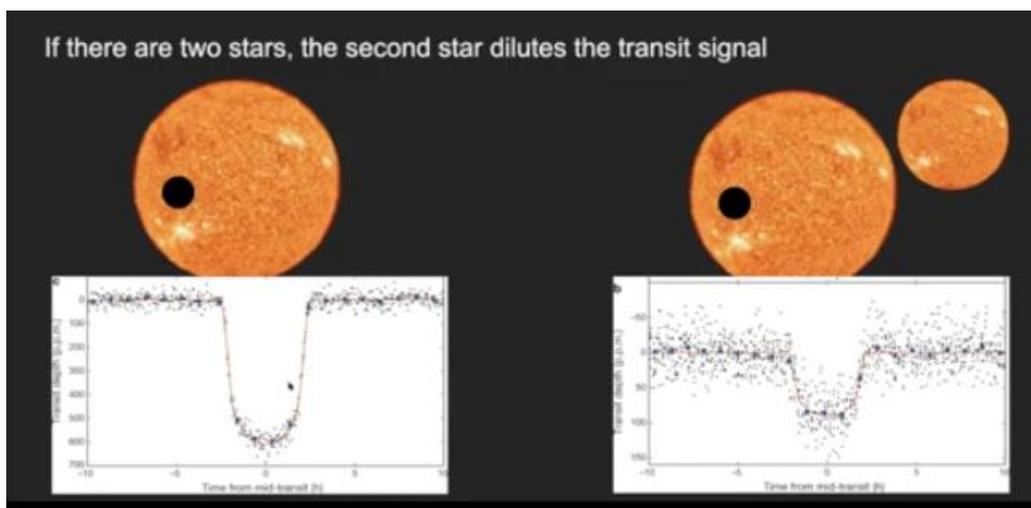


Figure 2:
Presence of a stellar companion in a binary star system (right) causes the depth of the transit curve to be less than in a single star (left).
(Dr. Lea Hirsch)

Here Come the Suns: Planets in Binary Star Systems (cont'd)

If one did not know that the star was binary, then one might falsely conclude that the planet was smaller than it really is leading to a misclassification of the exoplanet as a small planet where in fact it might actually be a large planet. In the case of the Kepler data, each star with its exoplanet candidate had to be examined at higher resolution with another telescope to see whether or not it was a binary star system potentially leading to artifactual conclusions. So, excluding binary stars was an easy way to clean up the data set to avoid such complications.

Nonetheless, about 50% of stars of interest in the search for exoplanets (e.g. spectral class F, G, K, M stars) are binaries so excluding these would remove a huge population of stars from the search for exoplanets. Therefore, it is useful to build a theoretical and methodological infrastructure that would account for these complications to enable searching for exoplanets in binary star systems.

Exoplanets can orbit around binary star systems in two distinct ways. One is called **Circumbinary** where the planets orbit around the center of gravity between the two stars orbiting around each other in the center of the system. The other type of system is called **Circumstellar** where the planets orbit around **each star** in the system. (See Figure 3.)

To date around 20 circumbinary systems have been discovered in the Kepler data, and Dr. Hirsch showed 29 examples of circumstellar systems where planets are each orbiting around widely separated stellar companions. Clearly, these systems cannot be too compact as complicated gravitational interactions can destabilize the planetary orbits.

Dr. Hirsch finished by describing her main research project of searching for giant planets around binary star systems-particularly circumstellar systems. She did this using the Lick Observatory 120-inch Shane reflector and 2.4-meter Automated Planet Finder which were telescopes used since the early days of exoplanet research.

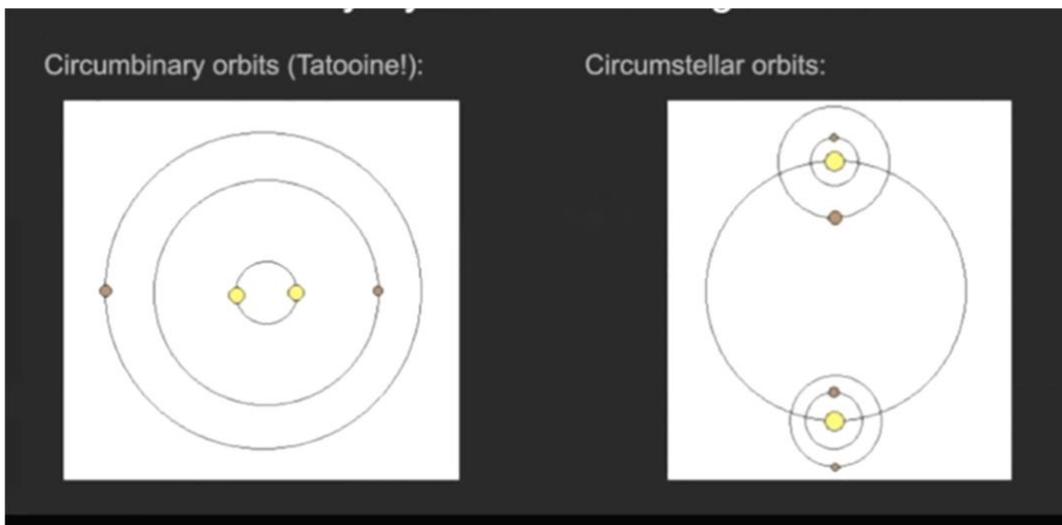


Figure 3. Circumbinary and Circumstellar planetary orbits. (Dr. Lea Hirsch)

(continued on page 14)

Here Come the Suns: Planets in Binary Star Systems (cont'd)

The theory of planet formation suggests that protoplanetary disks around binary stellar companions are truncated to a smaller size by the presence of a companion. (See Figure 4.) More so if the companions are close together. For this reason, planet formation should be inhibited in binary systems—particularly giant planets in binary systems that are of close separation.

Another effect is that stellar companions can destabilize the orbits of exoplanets causing such planets to be ejected from the system or spiral in towards one of the stars. In circumbinary systems, planets will destabilize if they wander too close to the binary stars at the center of gravity of the system. Planets in circumstellar systems will destabilize if they wander too far from their host star and fall into the gravitational influence of the other star in the system.

Dr. Hirsch selected some 300 binary Sun-like star systems to look for giant planets and characterize their orbits. **She found that**

separation) had just as many giant planets as single stars whereas closer binary systems (more than 100 AU separation) had fewer giant planets. These results are consistent with the predictions from Figure 4 that show closer binary systems inhibit planet formation.

Finally, she also found that single stars tended to have more giant planets at distances less than 1 AU from their host stars whereas wide binaries had their giant planets equally at distances less than 1 AU and more than 1 AU from their host stars. **This suggests that stellar companions in binary systems often caused giant planets to migrate toward their host stars which could be a mechanism of the origin of hot Jupiter so often found in exoplanet surveys.**

A terrific video of this talk can be found on YouTube at the SMCAS channel. It is worth watching again to learn more about how far exoplanet research has come in the past 30 years! ◆

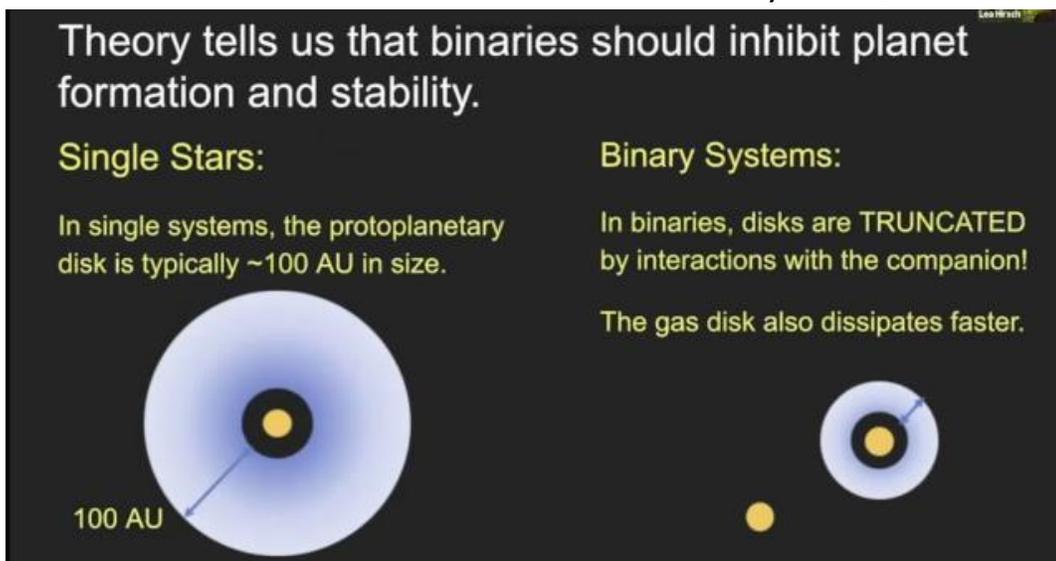


Figure 4. Protoplanetary disks are truncated in binary star systems. (Dr. Lea Hirsch)

wide binary systems (less than 100 AU



Good Light, Good Night

How to Use Light Wisely

Have you ever been under a really dark sky?

How did it feel?

What affects your ability to see the night sky?

Where do we put telescopes and why?

Can you think of other benefits of dark skies?



Shielding lights improves our safety, visibility, and vision of the night sky. It has health effects on animals, including people!

Light Pollution Uses Energy and Money

IDA estimates that least 30 percent of all outdoor lighting in the U.S. is wasted, mostly by lights that aren't shielded. Annually, we're wasting an estimated \$3.3 billion and 21 million tons of carbon dioxide! (We'd have to plant 875 million trees to offset that.)



Baby sea turtles attracted by artificial light. (NIH)

Hatchling turtles have followed the light towards the ocean, but now bright artificial light draws them away from safety.

Exposure to Artificial Light Can Harm Your Health

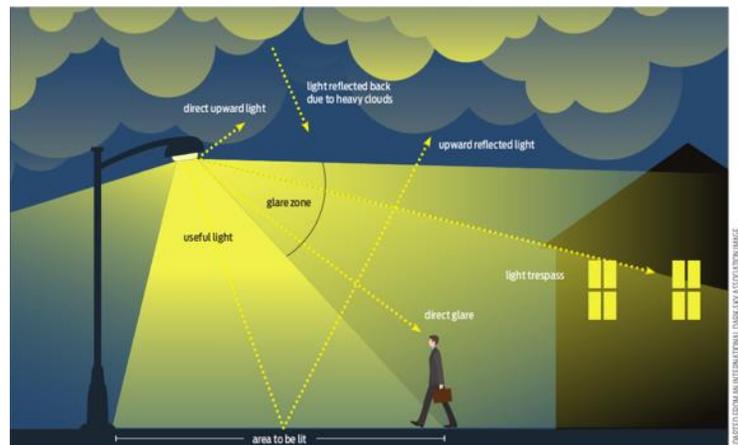
Research suggests artificial light at night can negatively affect human health, increasing risks for depression, sleep disorders, diabetes, and more.

Artificial Lights Disrupt the World's Ecosystems

Light pollution radically alters the sleep of nocturnal animals.

Artificial light can cause birds to wander off course and toward the dangerous nighttime landscapes of cities.

Migratory birds depend on cues from properly timed seasonal schedules.



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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.

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>

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.

Directions to SMCAS Meetings at The College of San Mateo:

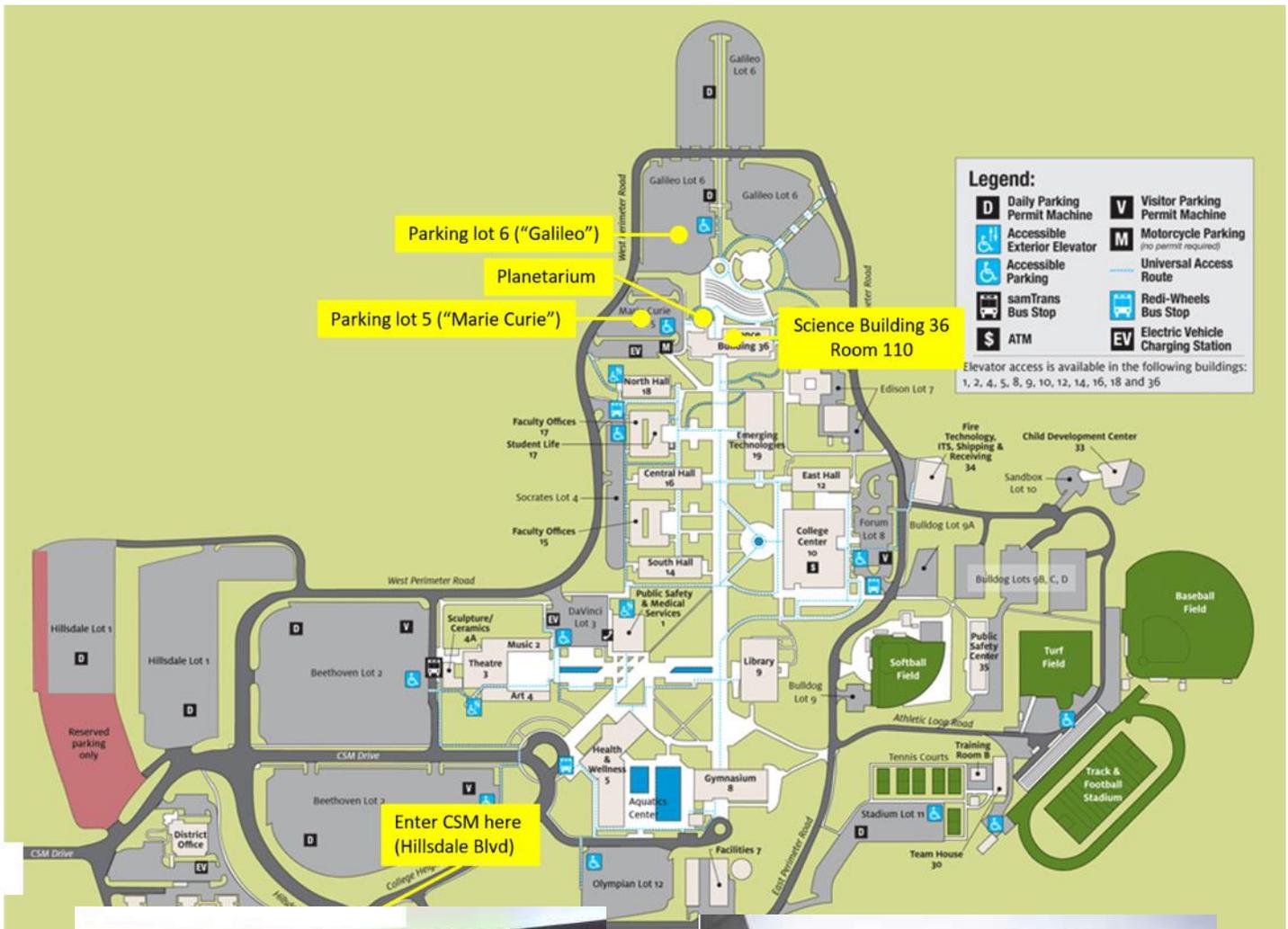
NOTE: CSM is closed due to the pandemic.

SMCAS events are online until further notice.

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

rev 02272020

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

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: _____