

The SAN MATEO COUNTY ASTRONOMICAL SOCIETY

September-October 2019 Issue: 662nd General Meeting Notice: November 1, 2019, Page 5



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 21.**



Figure 1: Charon and Pluto.



Figure 2: September 6, 2019 General Meeting speaker Dr. Ross Beyer (left) accompanied by SMCAS Board Member, Ed Ching (right). Ken Lum's recap of Dr. Beyer's talk, Charon, Pluto's Companion: "What We're Learning from New Horizons," is given on Page 6.

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October 2019 Events:

Friday, October 4, 2019, 7–9 pm: October Outreach Planning Meeting (no presentation)

Saturday, October 5, 2019, 1–11 pm: [CSM Family Science & Astronomy Festival](#)

Saturday, October 5, 2019, 7:30 pm: [CSM Family Science & Astronomy Festival](#)

Friday, October 11, 2019, 7:30–9:20 pm: [CSM The Sky Tonight Planetarium Shows](#)

Saturday, October 12, 2019, 6–9 pm: Fall Equinox Party, Crystal Springs Methodist Church

Tuesday, October 15, 2019, 7–9 pm: SMCAS Board Meeting, ISC Room, CSM

Saturday, October 19, 2019, 5–9 pm: SLAC/KIPAC Community Day, SLAC National Laboratory

Saturday, October 19, 2019, 6:30–10 pm: Crestview Star Party

Saturday, October 26, 2019, 6–10 pm: Crestview Star Party

October 2019 Solar System Rise and Set Times:

By Ron Cardinale

SMCAS 2019 (PDT)	<u>Oct 5 Rise</u>	<u>Oct 5 Set</u>	<u>Oct 19 Rise</u>	<u>Oct 19 Set</u>	<u>Oct 26 Rise</u>	<u>Oct 26 Set</u>
Sun	7:08 AM	6:45 PM	7:21 AM	6:26 PM	7:28 AM	6:17 PM
Moon	2:31 PM	Next Day	10:45 PM	12:54 PM	5:34 AM	5:54 PM
Mercury	8:56 AM	7:33 PM	9:30 AM	7:22 PM	9:32 AM	7:11 PM
Venus	8:17 AM	7:25 PM	8:49 AM	7:16 PM	9:06 AM	7:13 PM
Mars	6:13 AM	6:21 PM	6:03 AM	5:48 PM	5:57 AM	5:32 PM
Jupiter	12:36 PM	10:11 PM	11:51 AM	9:25 PM	11:29 AM	9:02 PM
Jupiter's moons	e i J c g		e J i g c		c e j i g	
8 PM, East on left	J=Jupiter, c=Callisto, e=Europa, g=Ganymede, i=Io					
Saturn	2:24 PM	12:05 AM	1:32 PM	11:08 PM	1:06 PM	10:43 PM
Uranus	7:41 PM	9:10 AM	6:45 PM	8:12 AM	6:16 PM	7:43 AM
Neptune	5:40 PM	5:10 AM	4:45 PM	4:13 AM	4:17 PM	3:45 AM
Pluto	2:52 PM	12:33 AM	1:57 PM	11:35 PM	1:30 PM	11:08 PM
- CSM Family Science and Astronomy Day on the 5th.						
- Star Party at Crestview, SLAC/KIPAC Community Date on the 19th.						
- Star Party at Crestview on the 26th.						

Rise set times from <http://www.almanac.com/astronomy/rise/CA/San%20Carlos/>

Jupiter's moons' positions from <http://www.shallowsky.com/jupiter/>

President's Corner:

On July 3rd, 1960, four high-school boys, as a summer school project in Robert's Rules of Order, formed the San Mateo Astronomical Society. It was the dawn of the Space Age, when there were barely a handful of orbital satellites, and Man had only just advanced into space. NASA was a newly-minted agency, and launch rockets routinely blew up on the launch pad.

The push into space was the tip-of-the-spear for John F. Kennedy's New Frontier. The burgeoning growth of space science became standard fare at coffee-table and cocktail-party conversation, with focus on space exploration, space physics, planetary geology, astrobiology, and the impact of spatial phenomena on the Earth, upon life on Earth, and upon the human condition.

There were few astronomical professionals then. So, libraries wanted amateur hobbyists to present the new activity of public 'Star Parties'. Schools were looking for assembly presenters, and prominent community figures were actively seeking knowledgeable, articulate invitees to help engage their guests at dinners and social events. It was into this dynamic that the young San Mateo Astronomical Society, later incorporated as the San Mateo County Astronomical Society, found itself thrust to prominence. And, along with our fellow organizations, we have succeeded in making a useful and enduring contribution.

Now, 60 years later, the task and opportunities have changed drastically. We are no longer an obvious go-to organization for education or information about astronomy and space science. The now-numerous professionals, and the easy abundance of instant information have largely supplanted us in the role of being a community resource. Others don't come to us nearly so much, so we must be much more proactive about carving out a niche and working to maintain our status and access. It isn't easy; much of what we managed to achieve has been lost, and we, like so many organizations of our type, have had to face the dilemma of how to maintain relevance in a world changing more rapidly, and more radically, than any of us in our wildest dreams, could once have imagined.

But there are still many among the public who seek a transition environment of knowledgeable amateurs, of semi-professionals, and of a show-and-tell or advisory resource such as we can still provide. Now, our task and challenge will be to ferret out where those opportunities lie, and to prepare ourselves to take advantage of them while providing benefit to others.

We should stay a step ahead of our public with self-study and continuous learning, and hone our presentation skills to make a compelling impression on our audiences. We should invoke our own intellects, not live by the logical fallacy of 'appeals to authority', and be neither uncomfortable nor intimidated about questioning assertions and conclusions that happen to be the popular meme at the time. And we should feel free to discuss fact-based alternatives.

I look forward to hearing your ideas, and to helping promote your worthwhile initiatives. Thank you and Clear Skies!

Mike Ryan, President,

San Mateo County Astronomical Society

jmrastro@yahoo.com

SMCAS General Meeting and Presentation Announcement, Friday, November 1, 2019

Dr. Simon Birrer, Stanford University - KIPAC

Probing Fundamental Physics with Strong Gravitational Lensing

Friday, November 1, 2019, College of San Mateo, Building 36

SMCAS General meeting at 7:00 p.m. ISC Room, Room 110

Presentation at 8:00 p.m. Planetarium

Free and open to the public, free parking.

In General Relativity, the presence of matter can curve spacetime, and the path of a light ray will be deflected as a result. This process is called gravitational lensing, analogous to the deflection of light by (e.g. glass) lenses in optics. In rare and extreme cases, light can take different paths to the observer and more than one image of the source will appear. Strong gravitational lensing is lensing that is strong enough to produce these multiple images, arcs, or even Einstein rings. Many useful results for cosmology have come out of using this phenomenon. Dr. Birrer will shed more light on how astronomers are utilizing strong gravitational lensing to probe the nature of dark matter and dark energy, the dominant but yet unknown components of our Universe.

Dr. Simon Birrer is a KIPAC Postdoctoral Fellow at Stanford University since Fall 2019. Before joining Stanford, he was a Postdoctoral Researcher at the University of California, Los Angeles (UCLA). He completed his BSc and MSc in physics and PhD in cosmology at [ETH Zurich](#). His research focus has been on dark matter and dark energy and how to probe fundamental physics with astrophysical observations. His scientific expertise is the interface between the exquisite data sets available on one side and the fundamental theory predictions on the other side. He is actively developing advanced computational and statistical tools and applies them to measure the expansion rate of the Universe and to constrain the properties of dark matter. He is actively involved in public outreach for science, from giving public lectures to being the national coordinator of the [Swiss Physics Olympiad](#) (2010-14) and then executive chairman of the [International Physics Olympiad](#) in 2016.



A Recap of Ross Beyer's September 6th Presentation: Charon, Pluto's Companion: What We're Learning from New Horizons:

By Ken Lum

September's [presentation](#) brought **Dr. Ross Beyer** of the **SETI Institute** to us to talk about what we now know of Pluto's big moon, **Charon**, based on the newest findings from the **New Horizons** space probe which was sent out to explore objects in the **Kuiper belt** - a region beyond the orbit of Neptune of small icy objects (including **Pluto** and **Charon**) slowly orbiting the Sun. **New Horizons** flew past the **Pluto** system in 2015 and took truly spectacular photos of its various components. The system's largest moon, **Charon** was discovered in 1978 on some Earth based photos taken by astronomer, **James Christy**, at the US Naval Observatory station near Flagstaff, AZ. It was named by Dr. Christy as a modification of his wife's name, **Charlene**, into **Charon** which coincided with the Greek name for the ferryman of the dead who took them into **Hades**, the abode of the dead and God of the underworld and named by the Romans as **Pluto**. The Pluto system also has four other smaller moons, **Hydra**, **Kerberos**, **Nix** and **Styx**.

Since the flyby, the mass of **Charon** was refined to 1.55×10^{21} kg or about 12.2% the mass of Pluto - big enough to form a spherical shape. Its diameter is 1212 km, making it very large relative to its parent body (Pluto dia.=2376 km). Its orbit around Pluto is very nearly circular at 39,280 km diameter with a period of 6.4 Earth days. Due to tidal locking, **Charon** and **Pluto** each always show the same face towards one another. The composition of **Charon** is mostly water ice with a rocky core. Ammonia is mixed in with the water for an average overall density of 1.7 gm/cm³.

The **Pluto-Charon** system is thought to have formed when two Kuiper belt objects collided, forming a ring of fragments consisting of water ice, some ammonia and rock, surrounding what was to become **Pluto**. Over time, the fragments accreted to form what was to become **Charon**.

Photos taken by **New Horizons** of **Charon** show a varied surface landscape dominated by a network of canyons dividing the crust into plates with the northern pole capped by deposits of a red material. A particularly large canyon of about 1,600 km in length and as deep as 9 km girds the equatorial region of the moon. While some parts of the surface are heavily cratered, other parts appear to have been covered over at



Figure 3: Charon as seen from the New Horizons spacecraft (NASA).

a later time by a molten material, behaving like lava, that froze to form a newer smoother surface (Figure 3).

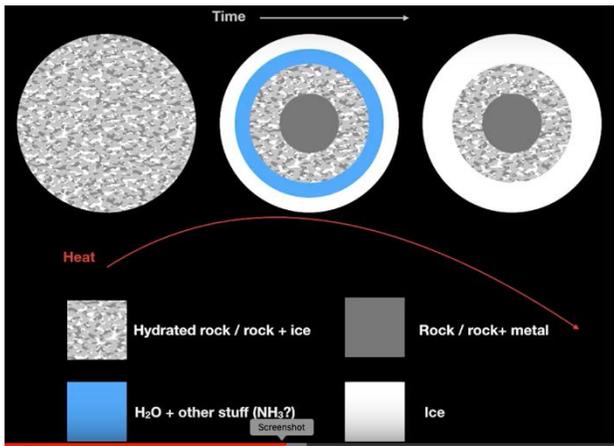


Figure 4: Differentiation of Ice, water, rock and ammonia during the formation of Charon. (Dr. Ross Beyer)

It is now thought that **Charon's** water differentially separated from the heavier rock which sank to the core and heated up from the accretion process and an accumulation of radioactive elements. The water that rose to the surface then froze to form an ice crust (Figure 4).

Water below the crust temporarily remained liquid and formed an internal ocean. The outer layers of this ocean began to freeze as **Charon** further cooled and expanded the moon's volume, leading to large cracks to form by distension of the inelastic external crust. These are the large canyons that we see today between the plates. This happened because water

expands its volume when it freezes.

The lava-like material that resurfaced much of the older external crust likely came from a liquid mix of ammonia and liquid water located deep in the moon near its core. During formation, **Charon's** internal ocean was actually a mix of water mostly and at least 1% ammonia mixed into the material of formation. As the outer parts of this ocean froze, the ammonia increasingly concentrated into the still liquid deeper layers due to **Fractional Crystallization** wherein ammonia is forced out of the crystalline lattice structure of water ice (Figure 5).

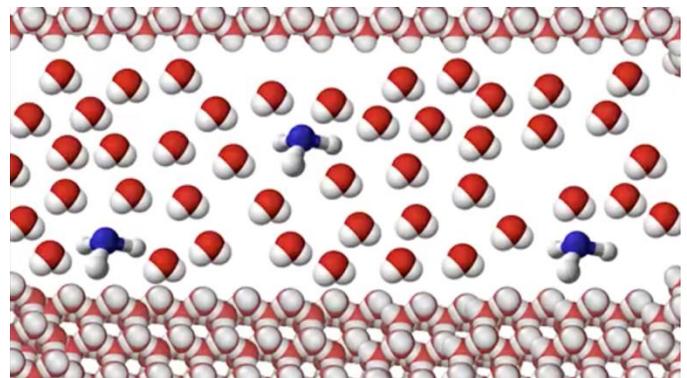


Figure 5: Differentiation of ice (Top and Bottom) from liquid water (red) mixed with ammonia (blue, middle). Photo from Dr. Ross Beyer.

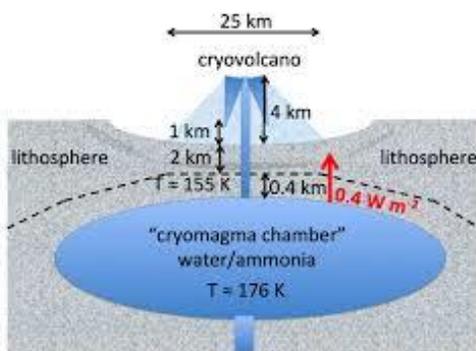


Figure 6: Cryovolcanism (Drs. Steve Desch and M. Neveu).

Ultimately, the ammonia concentration in the deeper liquid water layers reached as much as 30%. This ammonia-concentrated water antifreeze solution was less dense than the frozen ice above it and began to rise through cracks in the outer frozen ice of the internal ocean and external crust, forming **cryomagma chambers** under the surface. As this solution oozed out onto the crust as a form of lava, it formed mountains that froze on the surface. Further oozing of the antifreeze solution then

surrounded these mountains. The mountains pressed down on the surface and sank towards the **cryomagma chambers** to create a moat around these mountains (**Moat Mountains**). This process is called **Cryovolcanism** (Figure 6) and the feature now named **Kubrick Mons** (Figure 7) is a prime example of this process.

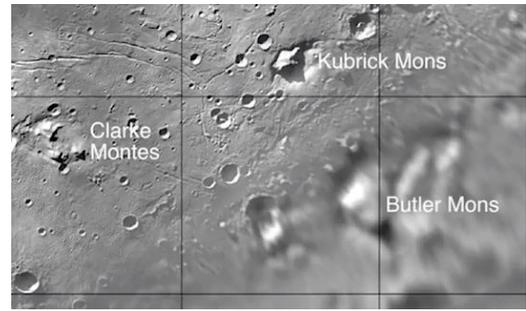


Figure 7: Moat Mountains on Charon. (NASA).

The red patch of material on **Charon's** northern pole seen in Figure 3 has been named **Mordor** after a desolated region of **Middle Earth** fictionally portrayed in **The Lord of the Rings** by J. R. R. Tolkien. The material seems to have derived from gases from **Pluto** that settled on **Charon's** surface and converted to organic materials called **Tholins** by exposure to solar radiation.

References:

- Ross Beyer, **Charon, Pluto's Companion: What We Learned from New Horizons**, Silicon Valley Astronomy Lecture video (2019).
<https://www.youtube.com/watch?v=mtGVgh6aA4Q>
- S. J. Desch and M. Neveu, **Differentiation and Cryovolcanism in the Pluto-Charon System**, School of Earth and Space Exploration, Arizona State University, 47th Lunar and Planetary Science Conference (2016).
<https://www.hou.usra.edu/meetings/lpsc2016/pdf/1647.pdf>

Visit to Lick Observatory:

By Mary Ann McKay



Figure 8: Mary Ann McKay and friends in front of the Shane 3-meter telescope building at Lick Observatory.

On Thursday August 29, 2019, SMCAS member Mary Ann McKay (on right) with friends Gail Burns (on left) and Jan O'Flaherty (in middle) at Lick Observatory in front of Shane 3-meter telescope (Figure 8) for Lick's public evening summer series.

Their 5-hour visit included a walking tour starting at the main building visitor center on Mount Hamilton, learning about the history of the world's first permanently occupied mountaintop observatory, watching a slide presentation about pioneer James Lick and the construction of the observatory, and viewing celestial objects through the historic 36-inch Great Refractor telescope (Figure 9).

Tickets for next summer's series should be available online April 2020."



Figure 9: Inside the dome of the 36-inch Great Lick Refractor. Photo by Laurie Hatch.

NASA Night Sky Notes:



The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.org to find local clubs, events, and more!

Find Strange Uranus in Aries

David Prosper

Most of the planets in our solar system are bright and easily spotted in our night skies. The exceptions are the ice giant planets: Uranus and Neptune. These worlds are so distant and dim that binoculars or telescopes are almost always needed to see them. A great time to search for Uranus is during its **opposition on October 28**, since the planet is up almost the entire night and at its brightest for the year.

Search for Uranus in the space beneath the stars of Aries the Ram and above Cetus the Whale. These constellations are found west of more prominent Taurus the Bull and Pleiades star cluster. You can also use the Moon as a guide! Uranus will be just a few degrees north of the Moon the night of October 14, close enough to fit both objects into the same binocular field of view. However, it will be much easier to see dim Uranus by

moving the bright Moon just out of sight. If you're using a telescope, zoom in as much as possible once you find Uranus; 100x magnification and greater will reveal its small greenish disc, while background stars will remain points.

Try this observing trick from a dark sky location. Find Uranus with your telescope or binoculars, then look with your unaided eyes at the patch of sky where your equipment is aimed. Do you see a faint star where Uranus should be? That's not a star; you're actually seeing Uranus with

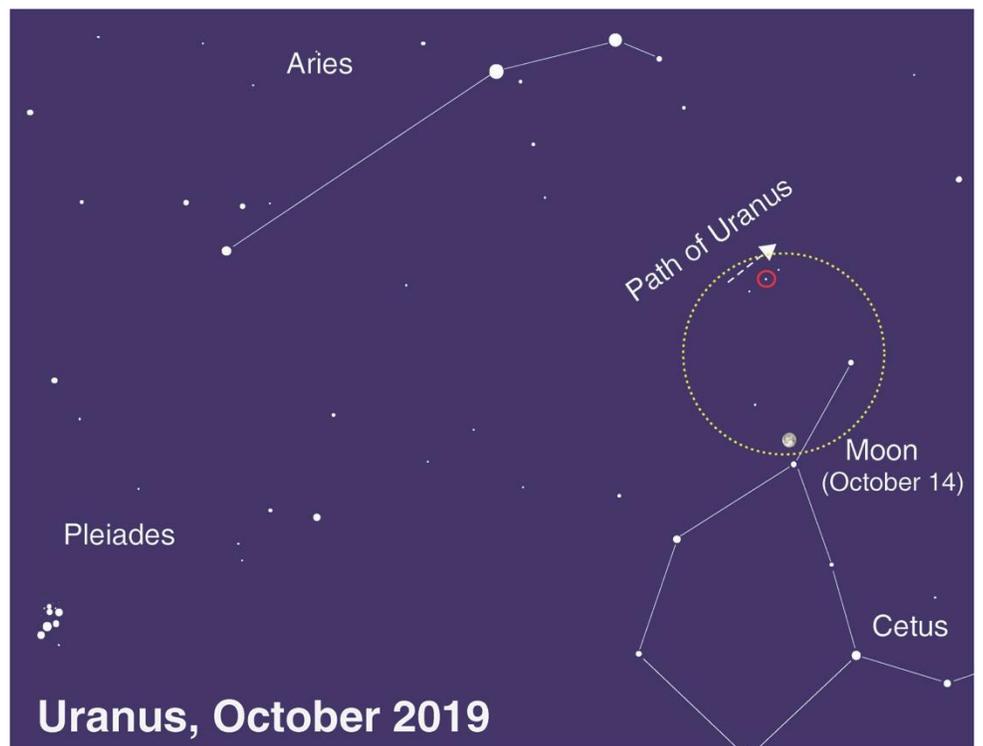
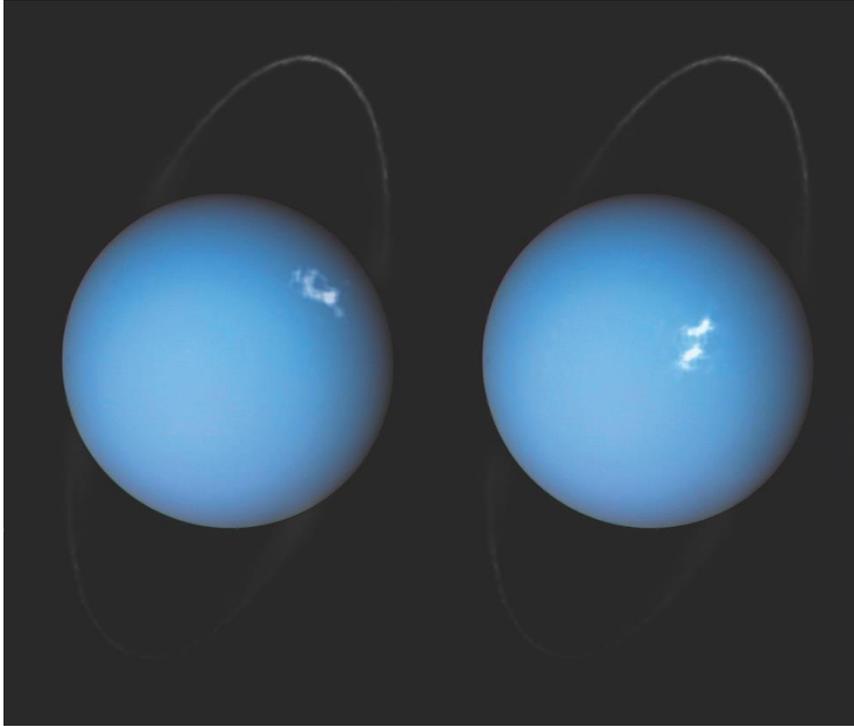


Figure 10: The path of Uranus in October is indicated by an arrow; its position on October 14 is circled. The wide dashed circle approximates the field of view from binoculars or a finderscope. Image created with assistance from Stellarium.

your naked eye! The ice giant is just bright enough near opposition - magnitude 5.7 - to be visible to observers under clear dark skies. It's easier to see this ghostly planet unaided after first using an instrument to spot it, sort of like "training wheels" for your eyes. Try this technique with other objects as you observe, and you'll be amazed at what your eyes can pick out.



By the way, you've spotted the first planet discovered in the modern era! William Herschel discovered Uranus via telescope in 1781, and Johan Bode confirmed its status as a planet two years later. NASA's Voyager 2 is the only spacecraft to visit this strange world, with a brief flyby in 1986. It revealed a strange, severely tilted planetary system possessing faint dark rings, dozens of moons, and eerily featureless cloud tops. Subsequent observations of Uranus from powerful telescopes like Hubble and Keck showed its blank face was temporary, as powerful storms were spotted, caused by dramatic seasonal changes during its 84-year orbit. Uranus's wildly variable seasons result from a mas-

Figure 11: Composite images taken of Uranus in 2012 and 2014 by the Hubble Space Telescope, showcasing its rings and auroras. More at bit.ly/uranusauroras Credit: ESA/Hubble & NASA, L. Lamy / Observatoire de Paris.

sive collision billions of years ago that tipped the planet to its side.

Discover more about NASA's current and future missions of exploration of the distant solar system and beyond at nasa.gov.

Planning Meeting, October 4, 2019:

Instead of a general meeting (with a presentation) this October, we will hold a meeting to finalize planning for the CSM Family Science and Astronomy festival on October 5th (Page 12) as well as to go over the planning for the Equinox Party, October 12th (Page 15) and Community Day at SLAC, October 19th (Page 16).

Family Science and Astronomy Festival, October 5th:

By Edmund Pieret

The San Mateo County Astronomical Society (SMCAS) will hold its primary public outreach event on the First Saturday of October in 2019. The event will be held in conjunction with the College of San Mateo on their campus. Details are:

Family Science and Astronomy Festival
1:00 – 11:00 pm
October 5, 2019
The College of San Mateo Campus

The current schedule for the event is as follows:

- 2:00 – 6:00 pm: Interactive events and hourly Planetarium shows
- 7:30 – 9:00 pm: Speaker (this year, the speaker will be Brian Day)
- 9:15 – 11:00 pm: Public telescope access at the CSM Observatory

Every year SMCAS has provided exhibits with “Making a Comet Nucleus”, “Building a StarFinder (Planisphere)” and “Solar Observing”. We also provide additional interactive exhibits based upon the availability of members willing to provide support. Some of the most successful of these are:

- Solar System Models
- How Telescopes Work
- The Moon
- Causes of Moon Phases
- The Sun
- Gravity and Black Holes
- Making Craters

For all these activities and many more we have materials, banners, instructions and instructional videos.

Our biggest resource constraint is members willing to spend 4 hours interacting with the public explaining astronomy topics. No special knowledge of astronomy or previous education is required, and extensive background information is provided.

If you are willing to help, please send an email to EPieret@comcast.net or let one of the officers or board members know. You can choose one of the above topics or tell us what you would like to present. We probably have materials to support your topic.

Family Science & Astronomy Festival

+ Makerspace



Saturday, October 5, 2019 • 1–11 pm

1–6 pm – Planetarium Shows, with first show in Spanish

2–6 pm – Science and Astronomy workshops by CSM faculty, SMCAS, SLAC, and KIPAC

7:30 pm – Keynote presentation: “Lunar Landing Sites, Past and Future” by Dr. Brian Day

9:15 pm – Telescopic observation of the celestial bodies

And much more! Free and open to the public.

College of San Mateo, Science Building 36, Observatory & Theatre Building 3
1700 W. Hillsdale Blvd., San Mateo, CA 94402

collegeofsanmateo.edu/familyscienceday

Festival coordinator: Mohsen Janatpour, janatpour@smccd.edu, (650) 574-6272

Sponsored by CSM Math/Science Division, San Mateo County Astronomical Society, and the CSM Library.

Supported by MESA, METaS, SLAC National Accelerator Laboratory, and KIPAC.



College of San Mateo

Family Science & Astronomy Festival + Makerspace



Saturday, October 5, 2019 • 1–11 pm

2–6 pm – The CSM Library Makerspace welcomes you to our free, drop-in crafting and tinkering workshops. Join us for hands-on projects and skill-sharing in electronics, crafts, media, and more! Free and open to the public.

College of San Mateo, Library Building 9
1700 W. Hillsdale Blvd., San Mateo, CA 94402

collegeofsanmateo.edu/familyscienceday

Makerspace coordinator: Elnora Tayag, tayage@smccd.edu, (650) 574-6569

Sponsored by CSM Math/Science Division, San Mateo County Astronomical Society, and the CSM Library.



College of San Mateo

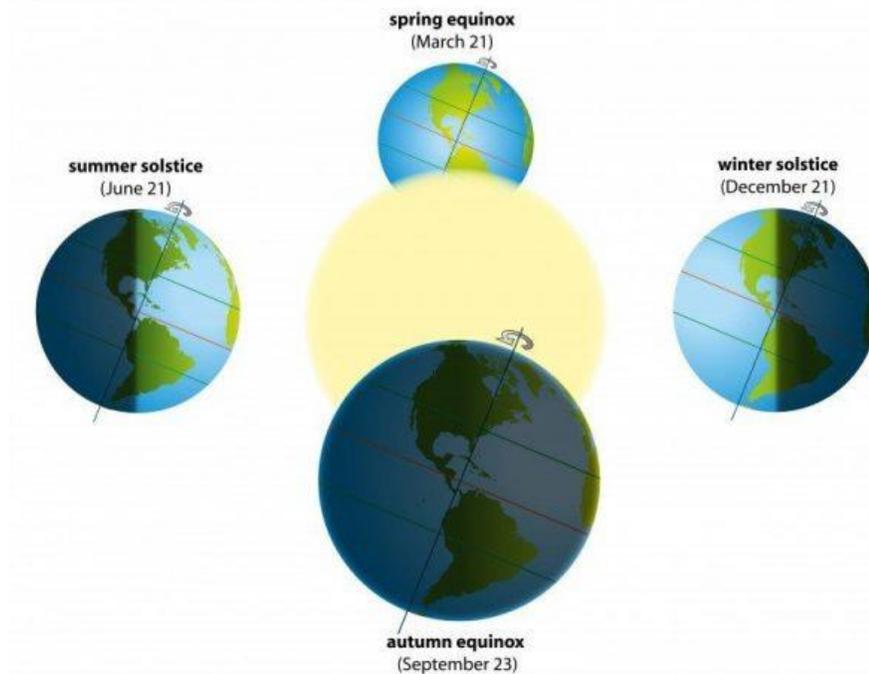
SMCAS 2019 Fall Equinox Party, October 12th:

By Bill Lockman

We have scheduled our annual **FALL EQUINOX PARTY** on **Saturday, October 12, 2019 from 6 to 9 pm at the Crystal Springs United Methodist Church**. The date was chosen to be on a Saturday nearest the full moon around the fall equinox to avoid conflicting with star gazing events. The church is located at 2145 Bunker Hill Drive, San Mateo, CA 94402. This party is a **MEMBERS ONLY** event, where 'member' means the primary member or associated family member(s). *However, if you know someone who would like to join SMCAS, please bring them along as guests.*

The event is pot luck, which means board members should bring an entree, and regular members should contribute a side dish or salad, hors d'oeuvre, vegetable platter, or dessert, together with a serving utensil. Soft drinks, plates and eating utensils will be supplied.

We hope to see you on Saturday, October 12, 2019 for a fun evening of great food and camaraderie with your fellow members. Clear Skies!



KIPAC/SLAC Community Day, October 19th:

By Bill Lockman

Join us for science fun at Community Day at SLAC on October 19th from 5 to 9 pm as an SMCAS volunteer!



SMCAS will be staffing the following events:

- solar viewing through a telescope (5 – 6 pm)
- star gazing through a telescope (7 – 9 pm)
- digiscoping (7 – 9 pm)
- making planispheres (5 – 7 pm)
- how a telescope works (5 – 7 pm)
- making a snowball comet (5 – 7 pm)
- solar system model (5 – 6:30 pm)

If you would like to **volunteer** for any one or more of these SMCAS sponsored events, contact Bill Lockman (wlockman@mac.com) and be sure to complete the [registration form](#) by October 2, 2019 to get a free t-shirt, a dinner ticket and access to Community Day.

More information on Community Day can be found here:

<https://www6.slac.stanford.edu/community-day>

2019 Year-End Publication Orders:

By Ed Ching (chinged@gmail.com)

We are ordering items from two different publication houses, each with their own deadlines. Orders (including payment) for year-end Astronomical League publications (RASC 2020 Observer's Guide or Explore Universe Guide) must be placed with me by **October 13th** to ensure delivery in November for distribution in December. Orders for Astronomy magazine 2020 Deep Space Mysteries Wall Calendars must be placed with me by **November 11th**. Only paid 2019 or 2020 SMCAS members will be accommodated, and all quoted prices include shipping. The publications we will handle are:

- 2020 Astronomy Magazine Deep Space Mysteries Wall Calendar: monthly wall calendars with astronomical images each month, and interesting events noted on appropriate days, including moon phases. Price is \$7.00 each, compared to the list \$12.99. See: <https://myscienceshop.com/product/calendar/68194>
- 2020 RASC Observer's Handbook: Price is \$27.00 each, compared to the regular about \$40.00. See: <https://secure.rasc.ca/ItemDetail?iProductCode=120US>
- RASC Explore the Universe Guide (2d ed.): A beginner's observing guide introducing proper practices and techniques with targets of stars, constellations, lunar, planetary, deep sky, and other objects, requiring only binoculars. Price is \$23.00, compared to the regular about \$29.00. See: <https://secure.rasc.ca/ItemDetail?iProductCode=407>

To order, please remit to me payment (checks written to San Mateo County Astronomical Society or cash in the exact amount) with your name and explicit instructions on how many of which publication(s) you would like. Payment must be received before the deadline (Astro League: **October 13** deadline, preferably at the October 12 Autumn Solstice dinner, or one of the other events (e.g., the CSM FSAD); Calendars **November 11**). Publications should arrive for distribution at the December general meeting. For those who cannot attend that meeting, efforts will be made to make items available for pickup (not delivery) thereafter.

Crestview Star Parties:

By Ed Pieret

Star parties are not what you normally think of when you hear the word party. There is no loud music, adult beverages, fattening food or raucous behavior. They are quiet events, held in the dark, to view and appreciate the wonders of the night sky.

SMCAS hosts a public star party at Crestview Park in San Carlos twice a month when the Moon is not present. At these events, members set up telescopes and share views and knowledge of the night sky. All ages are welcome. If you have kids interested in space or science, bring them here for a real time look at planets, nebula, star clusters, and galaxies.

If you own a telescope, bring it to the star party. If you need assistance setting up or finding targets in the sky, there will be experienced astronomers there to help you.

Astronomers gather and setup around sunset and observing starts about one hour after sunset. Arrive at sunset if you want to learn about telescopes and equipment. If you are thinking of buying a telescope, this is a time to learn about design, manufactures and features to look for.

In the event of inclement weather (rain, clouds, fog, or high winds) the star party will not be attended. Because each astronomer makes his or her own decision about attending and bringing a telescope, there is no official cancellation notice.

Email notices are sent out the day of the Crestview star party detailing sunset times and weather forecasts. If you would like to receive these and other announcements of local astronomy events, subscribe to SMCASnews@groups.io

For more information go to <http://www.smcasastro.com/crestview-park.html>.



Directions to SMCAS Public Star Parties (Weather Permitting):

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 flash-lights 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.



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 sign on the right, and the entry road on the left.

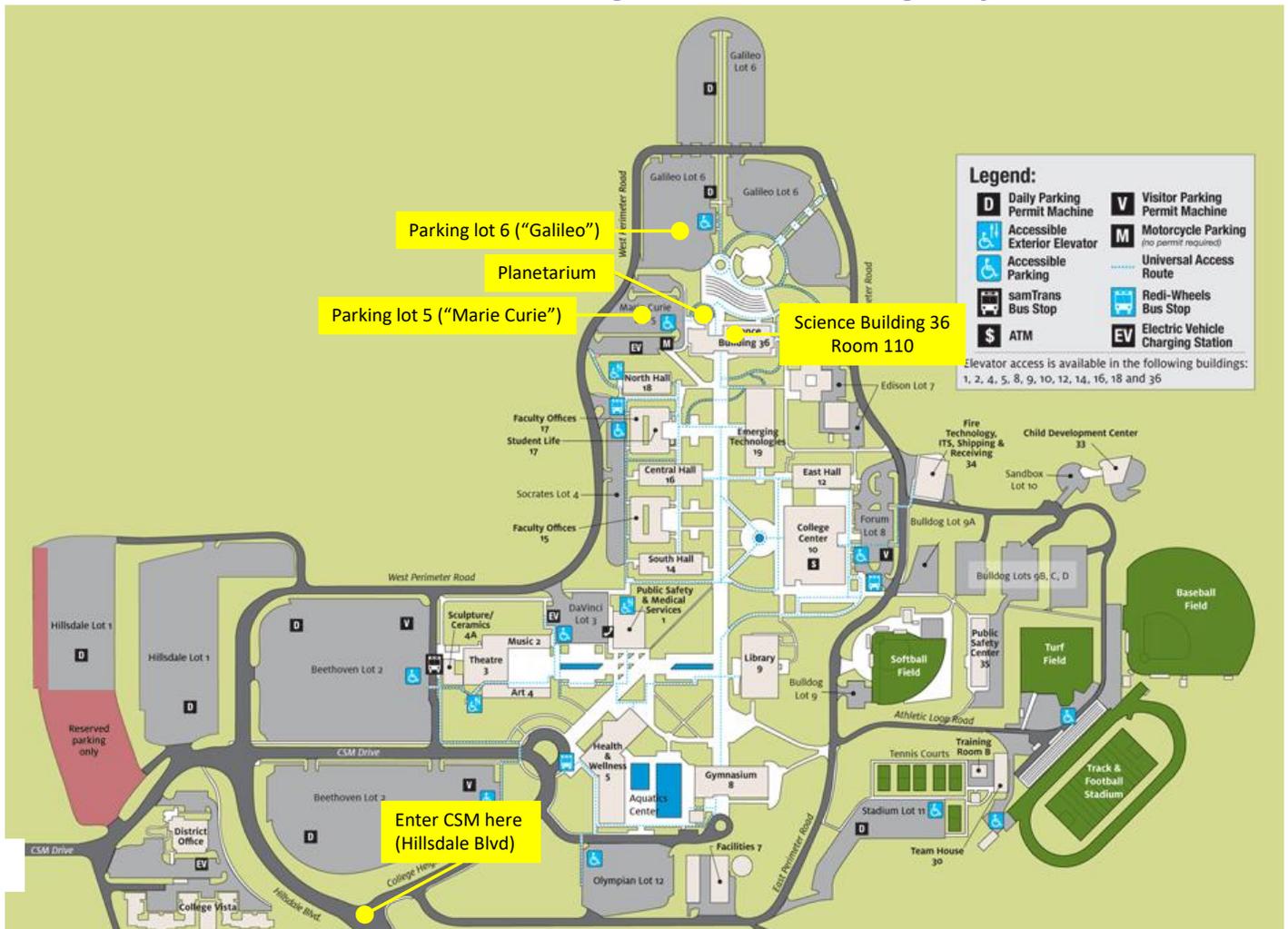
Note: If bringing a telescope and arriving after dark, please enter the Park with your headlamps and white interior lights off. If you aren't bringing a telescope, whether before or after dark, please park along Crestview Drive, and walk in.

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. Continue straight, bear right then, after the 2nd stop sign, bear left over the rise. Enter the next parking lot on the right, called 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

rev 04062019

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

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 7 pm 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' monthly 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.
- **Bring your completed application to your first meeting or mail it to**

SMCAS, P.O. Box 974, Station A, San Mateo CA 94403

Application Form on reverse side



San Mateo County Astronomical Society

Membership Application

rev 04062019

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' parent 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: _____