

# The SAN MATEO COUNTY ASTRONOMICAL SOCIETY

January February March 2020 Issue: 665<sup>th</sup> General Meeting Notice: March 6, 2020



## 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](mailto:SMCAS@live.com), or call (650) 678-2762.

Membership forms are available near the end of this newsletter beginning on page 21.



Figure 1: View of the Orion Nebula (M42) as recorded over 26 minutes in Ed Pieret's UniStellar eVscope. More about his new instrument on Page 13.

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## ***Upcoming Events:***

***Friday, March 6, 2020, 7–9:30 pm:*** 665<sup>th</sup> SMCAS General Meeting, Page 6

***Sunday, March 8, 2020, 2 am:*** Daylight Savings Time begins

***Friday, March 13, 2020, 7:30–8:20 pm and 8:30–9:20 pm:*** CSM Planetarium Shows: *Incoming! Asteroids, Comets, and the Hard-Hitting Stories of Our Cosmic Origins*

***Saturday, March 14, 2020, 6:15–9 pm:*** Spring Equinox Party, Crystal Springs Methodist Church

***Sunday, March 15, 2020, 12–4 pm:*** [Nueva School STEM Fair](#): We will provide solar viewing

***Tuesday, March 17, 2020, 7–9 pm:*** SMCAS Board Meeting, ISC Room, CSM

***Thursday, March 19, 2020, 8:50 pm:*** [Spring Equinox in the Bay Area](#)

***Saturday, March 21, 2020, sunset at 7:23 pm:*** Crestview Star Party, Page 18

***Friday, March 27, 2020, 6:30–8:30 pm:*** [Bayside Academy](#) STEM FAB Lab: We will demonstrate how a telescope works using our lens and mirrors optics display

***Saturday, March 28, 2020, sunset at 7:29 pm:*** Crestview Star Party, Page 18

***Friday, April 10, 2020, 7:30 pm:*** Mohsen lecture followed by stargazing, Page 15

***Crestview Star Party 2020 schedule:*** <http://www.smcasastro.com/crestview-park.html>

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## ***Seeking Volunteers to Staff Summer Star Party at Glacier Point:***

**By Bill Lockman**

The SMCAS Board is in the process of organizing this year's weekend stargazing trip to Glacier Point in Yosemite National Park. We are seeking volunteers to supply and man telescopes and also one or two volunteers to give a short presentation prior to the beginning of stargazing on each of the two weekend nights.

There is room for up to 30 volunteers, so if you would like to participate, please read the [Invite Letter and participation guidelines PDF](#) from David Balogh, the coordinator of the Summer Star Parties at Glacier Point 2020.

Also, please email the Board at [smcasbd@groups.io](mailto:smcasbd@groups.io) the following information: 1) your preferred weekend(s) to support this effort at Yosemite, 2) who and how many of you would plan to participate, 3) your contact information, phone and email, 4) what accommodations you would need, and 5) what astronomical equipment you would bring. Also, please indicate if you would like to help coordinate the arrangements and logistics on your chosen weekend.

So far, Mary Ann McKay and Ed Pease have [volunteered](#) to be Camp Coordinators and Camp Hosts on either of the following two weekends (Friday and Saturday): **July 17-18, 2020** (waning thin crescent moon) or **August 21-22, 2020** (waxing crescent moon). Marion and Colette Weiler [may be available](#) weekends in July but preferentially in August and the [Cooke family](#) has also expressed interest in attending.

Using your preferred dates, the Board will assemble a prioritized list of possible weekend dates our club can participate on. The due date for submitting this list to David Balogh is **March 15, 2020**. This means you have until **6 pm, Thursday, March 12, 2020** to email us your information. If you decide to participate, you will be rewarded with unparalleled views of the night sky at 7214' Glacier Point!

## ***Solar System Rise and Set Times:***

**By Ron Cardinale**

<b>SMCAS 2020 (PT)</b>	<b>Feb 29 Rise</b>	<b>Feb 29 Set</b>	<b>Mar 21 Rise</b>	<b>Mar 21 Set</b>	<b>Mar 28 Rise</b>	<b>Mar 28 Set</b>
Sun	6:39 AM	6:03 PM	7:08 AM	7:22 PM	6:58 AM	7:29 PM
Moon	9:55 AM	11:51 PM	6:15 AM	5:04 PM	9:27 AM	11:43 PM
Mercury	6:08 AM	5:26 PM	6:06 AM	5:04 PM	6:01 AM	5:11 PM
Venus	8:28 AM	9:42 PM	9:00 AM	11:15 PM	8:52 AM	11:24 PM
Mars	3:28 AM	12:58 PM	4:03 AM	1:43 PM	3:53 AM	1:39 PM
Jupiter	4:08 AM	1:48 PM	3:58 AM	1:42 PM	3:34 AM	1:19 PM
Jupiter's moons	g eJ i c (5AM)		e gJ i c (6AM)		c e Jgi (6AM)	
5/6 AM, East on left	J=Jupiter, c=Callisto, e=Europa, g=Ganymede, i=Io					
Saturn	4:39 AM	2:30 PM	4:22 AM	2:16 PM	3:57 AM	1:51 PM
Uranus	8:58 AM	10:19 PM	8:38 AM	10:01 PM	8:11 AM	9:36 PM
Neptune	7:06 AM	6:35 PM	6:45 AM	6:16 PM	6:18 AM	5:50 PM
Pluto	4:28 AM	2:09 PM	4:07 AM	1:48 PM	3:40 AM	1:21 PM
- DST starts on March 8.						
- Times are PST for the 29, PDT for the 21st and 28th.						
- Jazz Under the Stars is at CSM on the 29th						
- Star parties are at Crestview on the 21st and 28th.						

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:***

Best wishes to all for a happy, healthy, and successful new year in 2020. It was great to see so many of you at our holiday potluck.

Thanks to all of you who brought telescopes to Central Middle School in San Carlos on February 4<sup>th</sup>. It was a cold, windy night with a bright Moon, Venus and the Orion Nebula. It drew a lot of kids and their parents; around 500 in all. It was a pretty easy gig for those of us who turned out. There were only two major questions asked over and over: 1) "What are you looking at?" and 2) "What kind of telescope is this?" It's easy to impress those whose primary interest lies in getting those extra credit points. So, for those of you who've thought to volunteer, but haven't because you're afraid you don't know enough, believe me, you have nothing to worry about!

We had an entertaining talk at the February general meeting on the topic of satellite galaxies. The speaker was a charming young woman named Etak Patel from UC Berkeley. Interestingly, the Twitter handle she projected on the dome was @takeplate. It's actually an anagram of her name.

Now that I'm no longer in the pizza business, I brought pizza from the local Round Table. For the second time, it got good reviews. It's not the cheapest, but you tend to get what you pay for, and I have wangled a standing 25% discount on the whole order.

We're planning a Vernal Equinox Potluck Spaghetti Feed at our usual spot on **Saturday, March 14<sup>th</sup>**. This is the Saturday date nearest the March 19<sup>th</sup> equinox which is not in conflict with the upcoming Crestview star parties, so the Church has reserved the Fireside Room for us on that date.

The Society has been invited to apply to host a public star party this Summer at Yosemite's Glacier Point. The Board is in favor, but we'll need a group of volunteer members who may number as many as 30. I've sent out an invitational letter from the Yosemite coordinator, David A. Balogh, along with his guidelines for participants. I'll ask all of you to look it over carefully, and seriously consider whether you'd like to help make it happen.

Finally, I want to salute [Bill Lockman](#) who has done a superb job producing our excellent newsletter, the Event Horizon. Unfortunately, his was only a one-year stint, and he's preparing to hand it over next month (March). So, we need someone, or some group, for him to hand it to. It doesn't have to be difficult. It's morphed from a monthly to a bimonthly, and even a quarterly with the current issue. It can be produced by committee, dividing up the features and sections. And, much is already done by template, or provided by repeating content and contributors. This is a great way to get involved with the club, and plenty of help is available. So, come on folks...take a chance. Let one of the officers know.

**Mike Ryan**, President, San Mateo County Astronomical Society ([jmraastro@yahoo.com](mailto:jmraastro@yahoo.com))

## ***665<sup>th</sup> SMCAS General Meeting and Presentation, March 6, 2020:***

### ***Neutrinos: The Ghosts of the Standard Model of Particle Physics***

**Talk by Dr. Micah Buuck, Postdoctoral Research Associate, SLAC National Laboratory**

**Abstract and Bio provided by Marion Weiler**

*Friday, March 6, 2020, [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.*

Neutrinos are the lightest massive particles ever observed. For many decades it was unclear whether neutrinos were completely massless or instead just had a very small mass, but the results of several large experiments at the end of the 20th century convincingly proved that they do have a very small nonzero mass. That mass is also an important parameter in modern cosmological models, which now provide arguably the best constraints on its value.

Neutrinos are also the only candidates in the Standard Model of particle physics to be a type of particle -- known as a Majorana fermion -- that is its own antiparticle. As a graduate student at the University of Washington, Dr. Buuck worked on an experiment called the [MAJORANA DEMONSTRATOR](#) which looked for a process called neutrinoless double-beta decay that would prove neutrinos are Majorana fermions. This experiment is one of several around the world looking for evidence of this process, the discovery of which could help explain why the universe contains more matter than antimatter, and how neutrinos get their mass. Although no one has yet observed neutrinoless double-beta decay, it is an active area of research in particle and nuclear physics and the prospects for discovering it remain promising.

Micah Buuck is a Postdoctoral Research Associate at SLAC National Accelerator Laboratory, where he works on the [LUX-ZEPLIN](#) experiment trying to directly detect dark matter. He obtained his PhD in Physics from the University of Washington in August 2019, with a dissertation focused on creating a model of the radiogenic backgrounds of the MAJORANA DEMONSTRATOR neutrinoless double-beta decay experiment. Both experiments are located in the [Sanford Underground Research Facility](#) in Lead, South Dakota, with the MAJORANA DEMONSTRATOR taking data since 2016 and LUX-ZEPLIN currently under construction.



## ***Presentation at 664<sup>th</sup> SMCAS Meeting, February 7, 2020:***

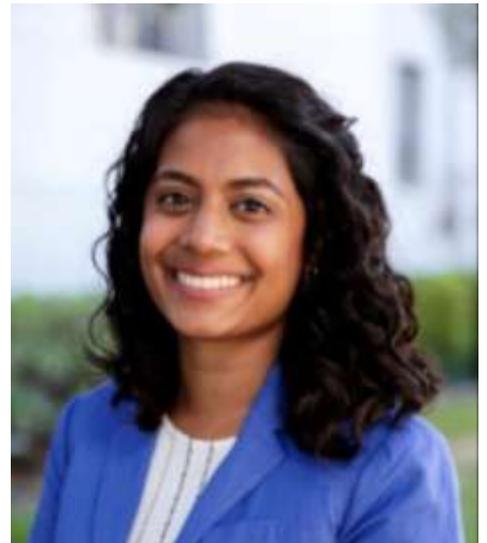
### ***Satellite Galaxies and Dwarfs in the Local Group***

**Talk by Dr. Ekta Patel, UC Berkeley, Miller Fellow, Astronomy Department**

#### **Abstract and Bio provided by Marion Weiler**

Our Local Group of galaxies is composed of our Milky Way; its twin galaxy, Andromeda (M31); and the dozens of small “satellite” galaxies orbiting around each of them. Satellite galaxies are thought to be the building blocks of more massive galaxies, therefore tracking the orbital histories of satellite galaxies in the galactic neighborhood is crucial to our understanding of how the Milky Way and Andromeda arrived at their current properties. Since galaxies are embedded in halos of dark matter -- the invisible matter that makes up 85% of the matter in the Universe -- satellite galaxies also act as tracers of this massive, mysterious matter. In this talk, Dr. Patel explained how the individual orbital histories of these galaxies help us learn about the evolution of satellites themselves. Additionally, she demonstrated how the collective motion of these systems of satellite galaxies can reveal important characteristics of their host galaxies, including the properties of their dark matter halos.

Dr Patel is a Miller Fellow in the Department of Astronomy at the University of California Berkeley. She received her B.A. in Physics from New York University in 2014, and her PhD in Astronomy and Astrophysics from the University of Arizona in 2019. At the U of A's Steward Observatory, she worked to analyze high resolution cosmological simulations, such as [Illustris](#), to help us understand the dynamical history of the Local Group. At UCB, she is continuing her work on understanding the dynamics of satellite galaxies orbiting around the Milky Way and Andromeda. She has actively engaged with the public in a variety of ways in her career so far, including past involvement with [Colors of Nature](#), [Project Astro](#), and [NOAO Teen Astronomy Café](#).



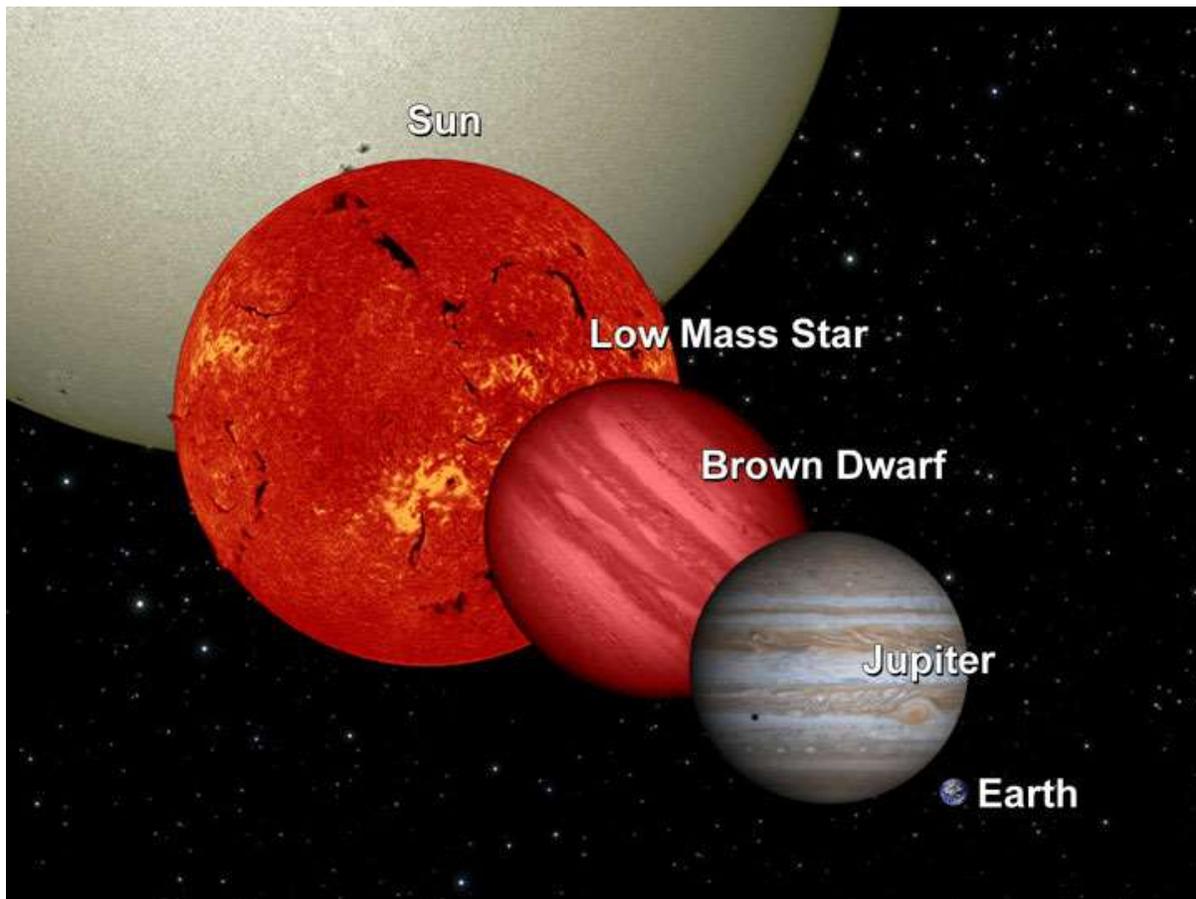
## ***Presentation at 663<sup>rd</sup> SMCAS Meeting, December 6, 2019:***

### ***Brown Dwarfs: Failed Stars or Overachieving Planets?***

**As explained by Ken Lum**

Our SMCAS meeting on December 6, 2019 featured Dr. Eric Nielsen of the SLAC National Accelerator Laboratory who came to discuss brown dwarfs and how they were possibly formed.

Stars come in an amazingly wide variety of masses and chemical compositions as well as pathways of evolution. However, there are bodies of hydrogen that are too low in mass to cause enough gravitational compression of their cores to initiate the thermonuclear fusion of hydrogen needed to make them shine as stars. These cool, small and faint objects were called brown dwarfs by Dr. Jill Tarter of UC Berkeley in 1975 when they were still only a theoretical construct and not yet discovered in fact (Figure 2).



*Figure 2: Size comparison of Brown Dwarf with Earth, Jupiter, Low Mass Star and the Sun (NASA).*

### ***Distinguishing Brown Dwarfs from Stars and Planets***

A stellar mass object needs to have a core temperature of around 3 million degrees Kelvin or more to [fuse hydrogen](#). That can only be achieved with a mass of around 75 times the mass of

Jupiter or 7 percent the mass of the Sun or greater (Figure 3). Brown dwarf masses are typically short of this requirement ranging from 13 to 75 Jupiter masses. So, they remain small objects shining faintly primarily in the infrared as a result of gravitational compression, but no hydrogen fusion. Because of this, brown dwarfs were not observed until 1995 when improved infrared detectors became available. To date, around 2,000 have been identified. But statistical extrapolation suggests the Milky Way may have as many as 25 billion brown dwarfs.

Brown dwarfs are generally confirmed by looking for spectroscopic signatures of elements or molecules in their atmospheres that are usually destroyed or do not form in the higher temperatures of true stars. That would include lithium which is found in brown dwarfs of all ages but not in old stars (> 100 million yrs.). Stars [convert lithium to helium](#) as they age, and this happens in bodies with masses above 75 times the mass of Jupiter thereby setting the lower mass limit for stars or upper mass limit for brown dwarfs.

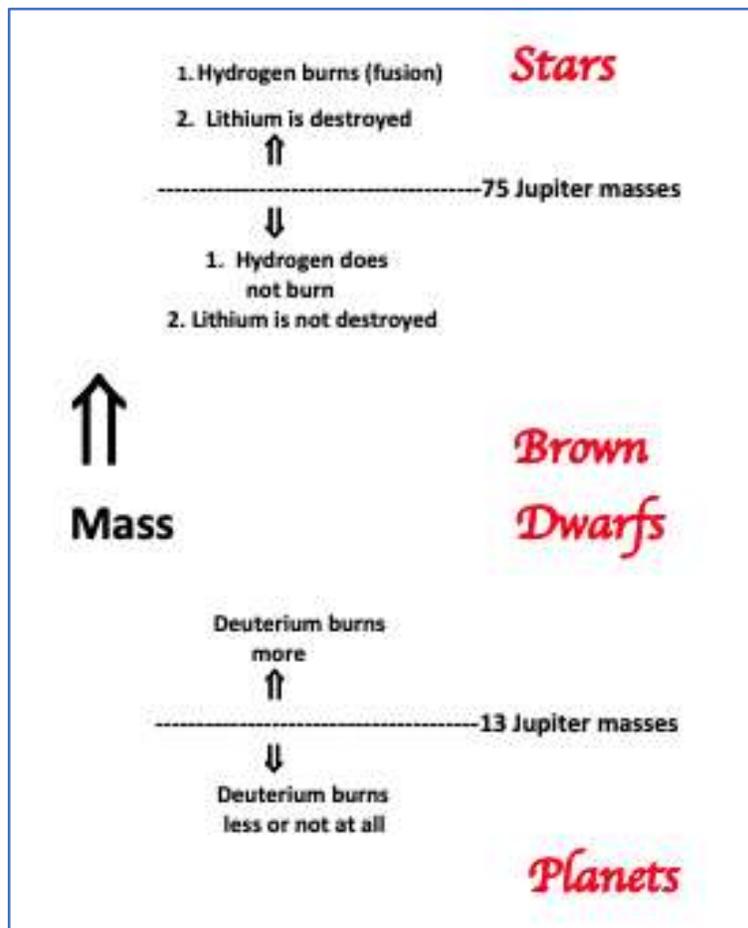


Figure 3: Mass limits of stars, brown dwarfs and planets (After Dr. Eric Nielsen)

It also turns out that brown dwarfs can [burn variable amounts of deuterium](#) which does not happen very much with bodies below 13 Jupiter masses. So, bodies less than 13 Jupiter masses are generally regarded as true planets. The occurrence of hydrogen fusion and lithium

destruction above 75 Jupiter masses and deuterium destruction above 13 Jupiter masses sets the approximate range of brown dwarf masses (Figure 3).

Brown dwarf upper atmosphere temperatures are also typically low, ranging from 2400 °C down to even below 0 °C.

Brown dwarfs are generally at their brightest when first formed and gradually cool down, contract, and get dimmer with time. But they are limited in their contraction by electron repulsion between atoms (Coulomb pressure) and electron degeneracy just like in the case of white dwarf stars. And so, brown dwarfs all have very similar radii despite an almost six-fold range in Jupiter masses.

### ***Origins of Brown Dwarfs and Planets***

In discussing the origins of brown dwarfs and planets, Dr. Nielsen began with molecular clouds of dust and gas (e.g. the Eagle Nebula) some parts of which become dense enough to collapse into new stars. Protoplanetary disks form around these new stars where new companion bodies may form. Dr. Nielsen offered two possible ways in which brown dwarfs and planets can form in these disks (Figure 4).

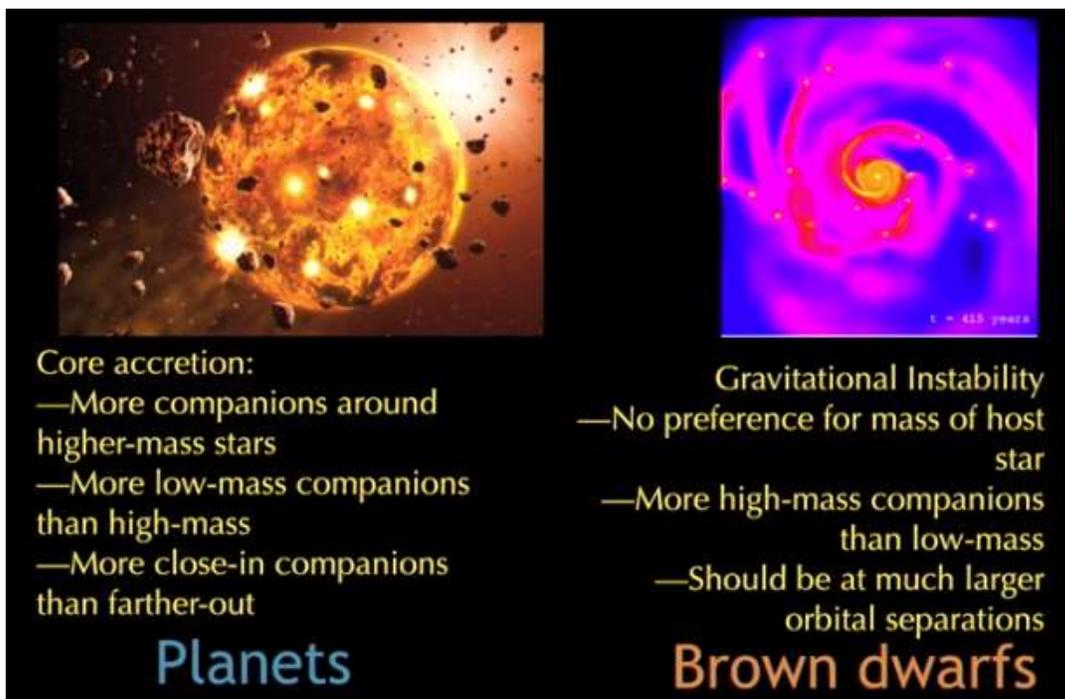


Figure 4: Predictions of Core Accretion vs. Gravitational Instability Models (Dr. Eric Nielsen)

1. **Core Accretion (Bottom Up):** Rocky and icy material in the protoplanetary disk coalesce into solid bodies of at least 10 Earth masses. These bodies then have enough gravitational attraction to pull at least an estimated 300 Earth masses of gas from the disk to form a body with a very deep atmosphere such as the gas giants we have in our Solar System. This process has a limited time to occur of around 5-10 million years before the solar wind and radiation of the star blows

the gas of the disk away. This mechanism predicts more numerous, smaller planetary bodies forming in closer orbits around higher mass stars.

**2. Gravitational Instability (Top Down):** Denser areas of the protoplanetary disk coalesce into planetary bodies very rapidly over just a few hundred years resulting in more high mass companions at larger distances from their host stars. This mechanism is also called **Cloud Collapse**.

By using the **GPIES (Gemini Planet Imager Exoplanet Survey)** camera with the **Gemini South telescope** in Chile, Dr. Nielsen and colleagues collected statistics on exoplanet characteristics to test which formation mechanism produced what types of planetary systems. What they found was that the **Core Accretion** mechanism favored the formation of true planets whereas the **Gravitational Instability** mechanism favored the formation of brown dwarfs.

However, brown dwarfs do occur in binary pairs, around white dwarfs, and around ordinary stars. Some also have planets orbiting around them. This suggests the specific mechanisms of brown dwarf formation have not yet been fully worked out to account for all of what has been observed. And the internal and atmospheric physics of brown dwarfs is still in progress while being informed by observations of the nearby gas giants in our Solar System.

### ***References:***

1. Basri, G. *The Discovery of Brown Dwarfs*, Scientific American, April 2000.
2. [Brown Dwarf](#), Wikipedia.
3. Nielsen, E., [Brown Dwarfs: Failed Stars or Overachieving Planets?](#), YouTube, July 2019.

## ***SMCAS Winter Holiday Party***

By Bill Lockman



*Figure 5: Photo from Bill Lockman*

Our annual **SMCAS Winter Holiday Party** was held in the Fireside Room at the Crystal Springs Methodist Church on Saturday, January 11, 2020. Unfortunately, several members were unable to attend due to illness or other scheduling conflicts. Despite this, approximately 20 people showed up for the potluck event. As usual, there was plenty of delicious food and soft drinks to go around, not to mention great camaraderie, and lots of enthusiastic, boisterous conversations took place. We all agreed it was a very enjoyable and successful event!

Stay tuned for our upcoming **SMCAS Spring Equinox Party**, now scheduled for **Saturday, March 14** at the same location beginning around 6:15 pm. Thanks to Mike Ryan for reserving the Fireside Room on that date. We are looking forward to seeing you there!



*Figure 6: Photo from Ed Ching*

# *My New Electronically Enhanced Telescope – The eVscope*

**By Ed Pieret**

I received my eVscope from Unistellar Optics on January 24<sup>th</sup> of this year. On the inside flap of the box when I opened it was the phrase “PREPARE TO BE AMAZED”. I took it out on the first clear night and was certainly amazed!

The telescope is a 114 mm (4.5 in) reflector with a focal length of 450 mm. Inside the instrument is a Sony IMX224 sensor (1280 x 960) astronomical camera and an OLED (Extremely high contrast ratio) screen behind the eyepiece. The only control on the telescope is an on/off switch, all other functions are controlled wirelessly from a smart phone app. The telescope and tripod weigh 20 pounds together. It is rated to <16 magnitude under medium skies.

Alignment consists of pointing the telescope somewhere in the sky and pressing the Align button in the app. Alignment is accomplished in about a minute and then you can choose from pre-selected objects or enter the designation of an object you are looking for. The telescope will slew to the object and the view can be improved by touching Enhance. The hardware takes a series of short photos and does real time stacking. As you view the image it keeps improving while continuing to be available in the eyepiece. The image is also shown in the smartphone app.

Everything is designed to be used in real time, the photons are used to build up the image as they arrive. You can see detail and color in objects that just isn't available in other amateur telescopes, even very large ones. I have managed to view a distant supernova, saw incredible color and detail in the Orion Nebula and detail in galaxies that I have never come close to before (see the pictures in Figure 7 which I viewed, then captured with my instrument).



*Figure 7: Type 1a Supernova 2020ue in NGC 4636 (left), M42 (middle) and M82 (right) as recorded in Ed Pieret's new eVscope.*

Another exciting capability the eVscope has is to enable participation in Citizen Science efforts led by the SETI Institute. Professional astronomers with beta versions of the telescope have proven it sensitive enough to imaging the transit of exoplanets and the occultation a star by a Trojan Asteroid. The concept is to use images taken by owners to accumulate information on

exoplanets, asteroids, comets and other faint or transitory events. This will provide capabilities that are not available to professional astronomers now.

I brought the eVscope to Jazz Under the Stars on February 1, 2020 and to the Star Party at Central Middle School on February 4, 2020. At both events the public attending were impressed but the astronomers were blown away. The ability to see fine detail and colors make viewing objects through the telescope a more interesting and informative experience.

If you would like to see the eVscope in action for yourself, come to a Crestview Star Party (information and schedule on the following pages).

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## ***Spring Equinox***

See the following article on the Spring Equinox:

<https://www.almanac.com/content/first-day-spring-vernal-equinox>

# Mohsen Janatpour's 33<sup>rd</sup> Presentation of Art and Science:

## When is a Painting Finished?



Photos from the 32<sup>nd</sup> Presentation of Art & Science at College of San Mateo, April 19, 2019.

Friday, April 10, 2020 • 7:30 pm • College of San Mateo Theatre

Associated Students, CSM METaS and the Math/Science Division of College of San Mateo present

### Professor Mohsen Janatpour's Lecture & Art Exhibition

on

### When is a Painting Finished?

Friday, April 10, 2020 • 7:30 pm • College of San Mateo Theatre  
Admission FREE, Reception following

#### 33<sup>rd</sup> Presentation of Art & Science

When is a painting finished? In any discipline where repeated editing and refinement are possible—including oil paints, writing music, and even scientific study—the artist or scientist without a deadline must decide for themselves when a work is complete and ready to be released to the world. In this 33<sup>rd</sup> Presentation of Art and Science, I will discuss the philosophy of determining a work's completion, with the specific case study of reworking my Symvisio XIII after first showing it last year.

We will complete the evening by setting up telescopes in front of the theatre, courtesy of the San Mateo County Astronomical Society, and CSM Astronomy department. With help from the experts, and weather permitting, you will be treated to the observation of the celestial beauties such as Pleiades and Orion Nebula.

Beethoven parking lots C, D, E  
are closest to the event  
See campus map at  
[collegeofsanmateo.edu/map](http://collegeofsanmateo.edu/map)

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## *Dim Delights in Cancer*

By David Prosper

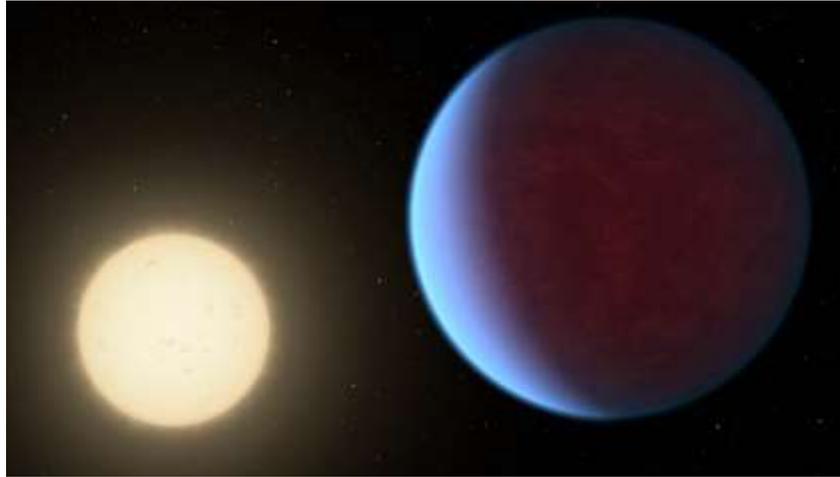
**Cancer the Crab** is a dim constellation, yet it contains one of the most beautiful and easy-to-spot star clusters in our sky, the **Beehive Cluster**. Cancer also possesses one of the most studied exoplanets: the superhot super-Earth, **55 Cancri e**.

Find **Cancer's** dim stars by looking in between the brighter neighboring constellations of Gemini and Leo. Don't get frustrated if you can't find it at first, since Cancer isn't easily visible from moderately light polluted areas. Once you find Cancer, look for its most famous deep-sky object, the **Beehive Cluster**! It's a large open cluster of young stars, three times larger than our Moon in the sky. The Beehive is visible to unaided eyes under good sky conditions as a faint cloudy patch, but is stunning when viewed through binoculars or a wide-field telescope. It was one of the earliest deep-sky objects noticed by ancient astronomers, and so the Beehive has many other names, including Praesepe, Nubilum, M44, the Ghost, and Jishi qi. Take a look at it on a clear night through binoculars. Do these stars look like a hive of buzzing bees? Or do you see something else? There's no wrong answer, since this large star cluster has intrigued imaginative observers for thousands of years.

55 Cancri is a nearby binary star system, about 41 light years from us and faintly visible under excellent dark sky conditions. The larger star is orbited by at least five planets including **55 Cancri e**, (a.k.a. Janssen, named after one of the first telescope makers). Janssen is a "super-earth," a large rocky world 8 times the mass of our Earth, and orbits its star every 18 hours, giving it one of the shortest years of all known planets! Janssen was the first exoplanet to have its atmosphere successfully analyzed. Both the Hubble and recently-retired Spitzer space telescopes confirmed that the hot world is enveloped by an atmosphere of helium and hydrogen with traces of hydrogen cyanide: not a likely place to find life, especially since the surface is probably scorching hot rock. The NASA Exoplanet Catalog has more details about this and many other exoplanets at [bit.ly/nasa55cancrie](https://bit.ly/nasa55cancrie).

How do astronomers find planets around other star systems? The Night Sky Network's "How We Find Planets" activity helps demonstrate both the transit and wobble methods of exoplanet detection: [bit.ly/findplanets](https://bit.ly/findplanets). Notably, 55 Cancri e was discovered via the wobble method in 2004, and then the transit method confirmed the planet's orbital period in 2011!

Want to learn more about exoplanets? Get the latest NASA news about worlds beyond our solar system at [nasa.gov](https://www.nasa.gov).



Artist concept of 55 Cancri e orbiting its nearby host star. Find details from the Spitzer Space Telescope's close study of its atmosphere at: [bit.ly/spitzer55cancrie](https://bit.ly/spitzer55cancrie) and the Hubble Space Telescope's observations at [bit.ly/hubble55cancrie](https://bit.ly/hubble55cancrie)  
Credit: NASA/JPL-Caltech



Look for Cancer in between the "Sickle" or "Question Mark" of Leo and the bright twin stars of Gemini. You can't see the planets around 55 Cancri, but if skies are dark enough you can see the star itself. Can you see the Beehive Cluster?

## Crestview Star Party

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, manufacturers 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](mailto:SMCASnews@groups.io)



Figure 8: Array of telescopes set up for public stargazing at Crestview Park.

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 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.



**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.

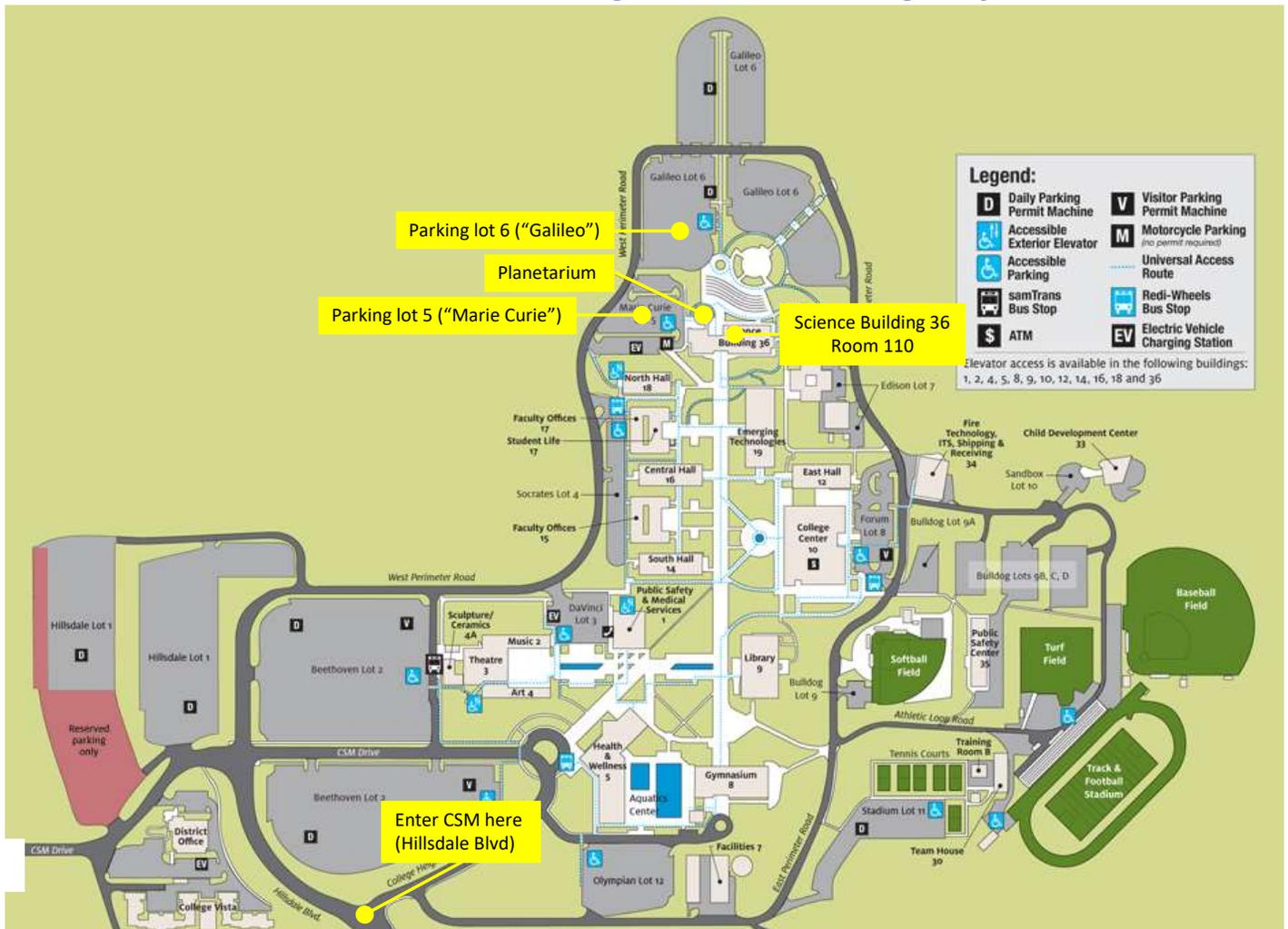
**From Hwy 101 or El Camino:** take Brittan Avenue in San Carlos, west (toward the hills). Follow Brittan 2.3 miles (from El Camino) to Crestview Drive. Turn right on Crestview. In half-a-block, you will see a small blue posted sign with an arrow, indicating the entry road into Crestview Park. It lies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

**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

rev 02272020

[SMCAS@live.com](mailto: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' 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 02272020

[SMCAS@live.com](mailto: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: \_\_\_\_\_