

The SAN MATEO COUNTY ASTRONOMICAL SOCIETY

March 2016 — 634th General Meeting Notice



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 info is found at www.smcasastro.com, where those who want can join via Paypal. Membership includes access to this monthly 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 us at (650) 678-2762.

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San Mateo County Astronomical Society

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WELCOME

The San Mateo County Astronomical Society is dedicated to bringing the wonders of space and astronomy to the residents of San Mateo County. We are glad you stopped by.

Please join us at one of our upcoming events (see [Announcements](#).)

All of our [meetings](#) and [star parties](#) are free and open to the public.

January/February 2016 Newsletter

San Mateo County Astronomical Society Activities

- Next Public star party at Crestview Park Saturday, February 27, 2016
- Next General meeting and presentation Friday, March 4, 2016

OUR NEW WEB SITE went live in February at its interim web address, www.smcasastro.com. The old URL (www.smcas.net) redirects to the new site so that it will continue to work. Read more about the new site and the members who contributed to it in the President's Corner column on page 2.

DATES TO SAVE

Mar 4: General Meeting, Pizza, and Presentation at the CSM Planetarium. Details on page 3.

Mar 19: Spring Equinox Spaghetti Feed/Potluck at Crystal Springs Methodist Church, San Mateo. Bring a dish to share. Details on page 6.

Apr 1: General Meeting, Pizza, and Presentation at the CSM Planetarium.

President's Corner

The detection of Gravity Waves and confirmation of Einstein's theory 100 years after he proposed it, amazing! We are truly going through one of the golden ages of scientific discovery and it is an exciting time to be living in the Bay Area where we have access to so many of the scientists that help make these discoveries!

Speaking of new discoveries, many of you may already have seen and heard that we have implemented a new SMCAS website. A team consisting of Andy Thanos, Ed Pieret, Ken Lum and myself guided this into fruition, with Ed Pieret doing most of the work (thanks Ed!). For now, the new website is found at www.smcasastro.com ("smcas" plus "astro", with "as" twice). You can access this site directly using that URL, or continue using the old URL, www.smcas.net, as it will redirect you automatically to the smcasastro URL. With time, we hope to move all the new content back under the smcas.net domain.

One of the big advantages of the new website is that it is easily edited by content providers using a fairly simple set of design tools, no programming skills needed. This will allow content providers to more easily keep the website up to date with announcements about star parties, events, socials and more. Our website is currently used primarily for publicizing information, letting SMCAS members and the general public find out more about us and our activities. We expect to continue to develop the web site, adding content and features. As time goes on, you may notice changes in the design or content as we gain experience with how to use the design tools, and get feedback on what should be on our website. If you have comments or suggestions about the website, please send them on to myself, Ed or other board members.

As noted previously, we are in our annual SMCAS membership renewal period. We appreciate the contributions our members make through their individual efforts and their membership fees. I want to thank you all! Membership in SMCAS benefits you individually, as well as the general community in San Mateo County. Members benefit from being part of an astronomy focused community - providing you with star party opportunities, social events, member tours to local science facilities, and learning opportunities with other experienced astronomers, a great lecture series, a quarterly glossy magazine *The Reflector*, and more.. The community benefits from getting free access to our great presentation by professional astronomers, our Crestview star parties for the general public, as well as our star parties provided to many schools in San Mateo County, and though our partnering with the College of San Mateo we have a role in helping develop and influencing the next generation of astronomers. Over the years SMCAS has been around, we have touched many tens of thousands of individuals of every age and background. Your membership in SMCAS is a valuable investment!

See you at the general meeting March 4th!

Marion Weiler

President, San Mateo County Astronomical Society

[SMCAS General Meeting and Presentation on March 4, 2016](#)

Dr. Eric Nielsen

Postdoctoral Researcher, SETI Institute; Stanford University

**The Gemini Planet Imager:
Discovering Young Jupiters Around Other Stars**

Friday, March 4, 2016 , [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.

The Gemini Planet Imager (GPI) is one of the most advanced astronomical imaging systems ever built, designed to detect and characterize exoplanets. While most planets beyond our solar system have been discovered by indirect methods, such as Doppler spectroscopy or transits, instruments like GPI allow imaging of planetary systems and study of planetary atmospheres and compositions. Imaging is a technical challenge. At best, planets are a million times fainter than their star and separated by just one arcsecond. Nonetheless, advances in adaptive optics, detector technology, and image processing have allowed astronomers to begin discovering planets by imaging them, and studying the light they emit.



From the Gemini South telescope in Chile the GPI Exoplanet Survey has searched around almost 200 young nearby stars, with 400 more yet to be observed. Eric will discuss the instrument, the survey, and what we've learned from imaging giant exoplanets. GPI discovered 51 Eridani b, a planet twice the mass of Jupiter that is very young by astronomical standards, born 40 million years after the last of the dinosaurs. Finally, he will look ahead to the future prospects of direct imaging, including the planned NASA WFIRST space telescope and its prospects for imaging lower mass planets around the closest stars to the Sun.

Dr. Eric Nielsen is a postdoctoral researcher at SETI and Stanford University. He was an undergraduate at UC Berkeley and obtained his PhD in Astronomy from the University of Arizona in 2011. He was a postdoctoral researcher at the University of Hawaii at Manoa until 2014. Eric has participated in several planet searches: the California and Carnegie Planet Search, the VLT and MMT Simultaneous Differential Imaging Survey, the Gemini/NICI Planet-Finding Campaign, and the GPI Exoplanet Survey. Research interests include measuring planetary orbits, determining the ages of stars, studying planetary and brown dwarf companions, and determining the prevalence and orbital distribution of long-period giant planets.



February Meeting Review

Are We Alone?

By Ken Lum

Since the launch of the Kepler mission by NASA in 2009, around 2000 extrasolar planets have been discovered. Many have been found to be in the range of Earth-size or nearly so. Thus far, around a dozen of these also have been found to be at or near the habitable zones of their host stars and are, thus potentially able to support some kind of life as we know it. Starting with that, Dr. Lynn Rothschild of NASA Ames and UC Santa Cruz, last month, began a discussion of how we could go about looking for definitive signs of life on these and other worlds.

The oldest fossil evidence of life on Earth dates back to at least 3.5 billion years (Gya). Some zircons found in Australia are known to be 4.1 Gya old from their uranium to lead ratios. They also have embedded graphite whose carbon atoms have a carbon-12/carbon-13 ratio high enough to suggest an origin in living matter. Unlike carbon-14, carbon-13 is not radioactive. But living matter concentrates carbon-12 more in the tissues than carbon-13 so a high carbon-12 to carbon-13 ratio indicates a possible origin of the graphite samples from living matter in zircon samples dated to 4.1 Gya by their uranium to lead isotope ratios. This suggests these rocks possibly have the earliest evidence of life on Earth. And this did not involve radiocarbon dating.

Since liquid water is necessary for life on Earth, one approach has been to "follow the water", e.g. look for water on other celestial bodies. And both Earth bound spectroscopy and space missions have found abundant water throughout the Solar System and some other places in the rest of the Universe.

But other factors are also important including temperature, pH (acidity/alkalinity), salinity, the chemical environment, pressure, radiation exposure, and the presence of free oxygen. In examining the other planets in the Solar System, Mars and some of the moons of the giant planets,



Marion Weiler, our fearless leader, with Dr. Lynn Rothschild of NASA Ames and UC Santa Cruz

most especially, could host some form of extremophile life. But other environments cannot be entirely ruled out. That includes asteroids and even Kuiper Belt objects, such as Pluto. Whatever the likelihood, abundant water, at least, has been found on most of these objects in the presence of levels of the other above factors that could still allow for life to exist.

In the search for life on extrasolar planets, advanced optics and spectroscopy are playing a crucial role. There are now attempts to directly image these objects separately from their host stars. If this can be done, spectroscopy can potentially be used to look for the chemical signatures of life such as evidence of complex organic molecules and free diatomic oxygen much like what is present on Earth.

Others are making attempts to use radio telescopes to search for radio signals being sent from advanced civilizations. Still others are trying to create life in the lab artificially. This could also give us a detailed look at what environmental conditions are necessary for the origin of life and may lead to the creation of synthetic life forms. Searching for places having these conditions could lead to the discovery of extraterrestrial life.

Event Update

Upcoming Holiday Party, Star Parties, and Monthly Meetings, for SCMAS this Year and Beyond!

We have many fun and interesting activities planned in the coming months. See the web site (www.smcasastro.com) or contact Marion Weiler (mgwe@pacbell.net) for more information or to volunteer at any of these events. Please contact Ed Pieret (epieret@comcast.net) if you are available to help out with Star Parties at Crestview Park and other locations.

Fri, Mar 4	7:00 pm	General Meeting, Pizza Social and Presentation
Sat, Mar 5	6:00 pm	Crestview Park Star Party
Fri, Mar 11	6:00 pm	Bayside School Star Party and STEM Fair
Sat, Mar 12	6:00 pm	Crestview Park Star Party
Sat, Mar 19	6:00 pm	Spring Equinox Social, Crystal Springs Methodist Church
Fri, Apr 1	7:00 pm	General Meeting, Pizza Social and Presentation
Sat, Apr 2	7:30 pm	Crestview Park Star Party
Fri, Apr 8	7:00 pm	Symvisio: A Visual Equivalent of Symphony, by Mohsen Janatpour, CSM Theater
Sat, Apr 9	7:30 pm	Crestview Park Star Party
Sat, Apr 30	8:00 pm	Crestview Park Star Party
Fri, May 6	7:00 pm	General Meeting, Pizza Social and Presentation
Sat, May 7	8:00 pm	Crestview Park Star Party
Sat, May 7	5:00 pm	KIPAC Open House + Star Party (contact Marion Weiler)
Sat, May 28	8:00 pm	Crestview Park Star Party
Sat, Jun 4	8:30 pm	Crestview Park Star Party

Annual Spring Equinox Members Spaghetti Social

Saturday, March 19 6:00-9:00 pm

Come celebrate the Sun's return to the Northern Hemisphere on the evening of March 19! Bring your appetite, your spouse, your family, friends and all the stories you wish to tell; there will be no truth meter present! Plus, Ken Lum will finish his series of presentations on the History of the Telescope as Travelogue by speaking about amateur telescope making.

This event is free for members and their families/friends. You are encouraged to bring your favorite appetizer, side dish or desert to share, but it is not required. We will supply the pasta and sauces!

The Fireside Room
Crystal Springs Methodist Church
2145 Bunker Hill Drive, San Mateo, CA
650-345-2381

If you have special diet needs regarding the spaghetti or sauce, please advise. For RSVP, special needs or questions, contact Marion at mgwe@pacbell.net

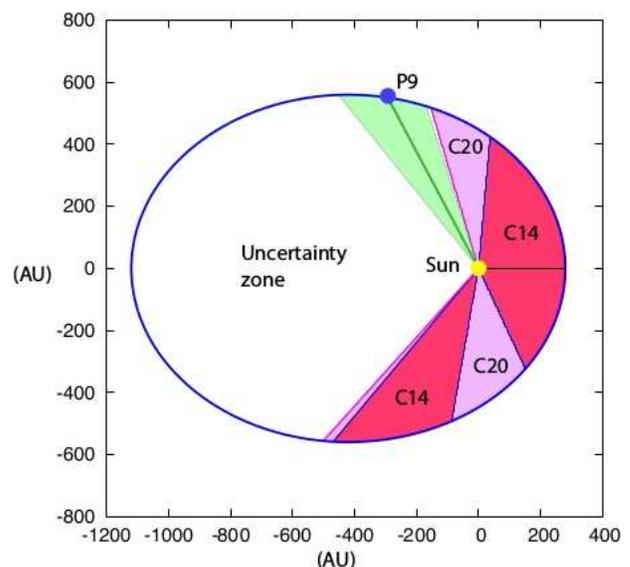
Planet 9 Developments

The recent suggestion [1] of a ninth planet ("P9") in the outer solar system has attracted a great deal of interest, both public and professional. P9 offers a possible explanation for coincidences in the orbits of several Kuiper Belt objects. In principle the proposal is a lot like LeVerrier's computation that led to the discovery of Neptune, working backward from observations to infer the nature of a gravitational influence that could account for them.

A very recent paper [2] has continued the computational search for P9. The results point to a small region in which there is reason to believe that P9 may be located, potentially shortening the observational search.

The new computation parallels LeVerrier's even more closely, working from perturbations in the orbit of Saturn combined with other data. High precision radio ranging measurements from the Cassini orbiter have provided Earth-Saturn distances since 2004.

The computation relies on the INPOP planetary ephemerides, a comprehensive model of the dynamics of the solar system, including all major solar system bodies and over 100 asteroids. Although it is quite precise, small disagreements are



found between INPOP's predictions and observations. The approach taken in the paper is to add P9 to INPOP at different hypothetical positions, and see whether each addition makes the predictions for known bodies better or worse.

Figure 6 from a preprint of the paper, reproduced here, summarizes the conclusions. Far from the Sun, P9's effect is too small to make a detectable difference. This is the "uncertainty zone". Near the Sun, adding P9 usually reduces accuracy. In the red

Continued on page 9

Associated Students and the Math/Science Division of College of San Mateo presents

Professor Mohsen Janatpour's Lecture & Art Exhibition

on

Symvisio: A Visual Equivalent of Symphony

Friday, April 8, 2016 • 7:30 pm • College of San Mateo Theatre

Admission FREE, Reception following

29th Presentation of Art & Science

Music is NOT painting, and painting is NOT music! One unfolds in time, and the other in space. Yet, they have so much in common: They both play on our emotions and touch our souls. They both appeal to our intuition and make our creative juices flow. And they both deal with vibrations to make us vibrant.

However, there are also important differences! While musicians manipulate the frequency of sound to convey their message, painters depend on the frequency of light to express themselves. But, musicians and painters can, and do, learn from each other's work. After all they both work with vibration, and hence follow the same laws of harmonics.

Symphonic composition extends the enjoyment of music in time. My creation symvisio is an attempt to extend the enjoyment of painting in space. An added bonus is that the extension in space also prolongs the aesthetic experience of the artwork! In this 29th presentation of Art & Science, I would like to invite you to the exhibition of Symvisio No. XI, where I tell you more about symvisio, and share the experience with you.

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, you will be treated to the spectacular view of celestial beauties. —MJ

Beethoven parking lots C, D, E are closest to the event

See campus map at collegeofsanmateo.edu/map

For more information, call (650) 574-6272

or visit Janatpour's web site at www.mohsensart.com.



March Rise and Set Chart

SMCAS 2016 (PST)		Mar 5 Rise	Mar 5 Set	Mar 12 Rise	Mar 12 Set
Sun	Equinox: 19th @ 8:30 P	6:32 AM	6:07 PM	6:22 AM	6:14 PM
Moon	Penumbral eclipse: 23rd	4:02 AM	2:43 PM	8:57 AM	10:47 PM
Mercury	Mostly in the sun's glare	6:06 AM	4:49 PM	6:09 AM	5:22 PM
Venus	Before sunrise	5:35 AM	4:07 PM	5:33 AM	4:22 PM
Mars	In the wee hours	12:04 AM	10:08 AM	11:46 PM	9:48 AM
Jupiter	Opposition on 8th	6:12 PM	6:55 AM	5:40 PM	6:26 AM
Jupiter's moons		i j e c		c i j g e	
8 PM, East on left		J=Jupiter, c=Callisto, e=Europa, g=Ganymede, i=Io			
Saturn	In the wee hours	1:20 AM	11:08 AM	12:54 AM	10:41 AM
Uranus	After sunset	7:59 AM	8:44 PM	7:33 AM	8:19 PM
Neptune	Mostly in the sun's glare	6:24 AM	5:35 PM	5:57 AM	5:08 PM
Pluto	In the wee hours	3:32 AM	1:21 PM	3:05 AM	12:54 PM

- Star Parties are at Crestview on the 5th and 12th.
- Jazz Under the Stars is at CSM on the 12th.
- Daylight Saving Time begins on the 13th.

– courtesy of Ron Cardinale

Fundraising for the Group: SMCAS Participates in AmazonSmile and Receives a Percentage of Your Purchase

SMCAS is now enrolled in AmazonSmile, a program that enables certified 501(c)(3) non-profit organizations to receive donations from eligible purchases at Amazon.



To enroll in the program, go to smile.amazon.com. On your first visit to this site, you can select a charitable organization – San Mateo County Astronomical Society (SMCAS) – that will receive 0.5% of the purchase price of eligible items on Amazon. How will you know if an item is eligible? Items are clearly and literally marked on the product detail pages with “Eligible for AmazonSmile donation.” For more information, go to smile.amazon.com/about.

San Mateo County Astronomical Society Event Calendar						
March 2016						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
28	29	1 	2	3	7:00 PM General Membership Meetin	4 6:15 PM Crestview Star Party Sunset: 6:09 PM
6	7	8	9 	10	11	6:15 PM Crestview Star Party Sunset: 6:16 PM
13	14	15 	16	17	18	6:00 PM Equinox Spaghetti Feed Sunset: 7:23 PM
20	21	22	23 	24	25	26 Sunset: 7:29 PM
27	28	29	30	31 	1	2

San Mateo County Astronomical Society Event Calendar from the Night Sky Network.

Calendar courtesy of Ed Pieret

Planet 9, continued from page 6

areas labeled C14 it is bad enough that P9 is very unlikely to be there ("14" refers to data through 2014, used in the creation of INPOP). The authors believe that extending Cassini's mission to 2020 would eliminate the pink areas labeled C20 as well.

The most intriguing part of the figure is the green region, in which P9 makes INPOP's predictions significantly more accurate, hinting that P9 may be found there.

The paper concludes by making a case for extending Cassini to 2020 to aid in the search for P9. No new spacecraft will reach Uranus or Neptune any time

soon. Although the Juno Jupiter orbiter will reach its destination later this year, and its data will be of some value in locating P9, Jupiter is simply less sensitive to perturbations from the outer solar system.

References

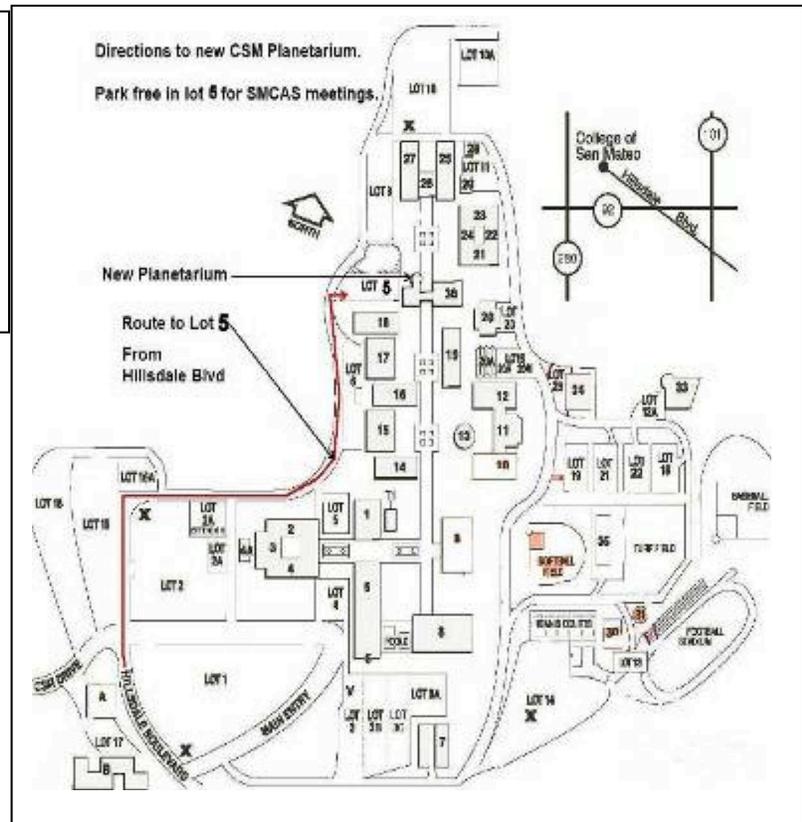
1. Batygin K and Brown M, 2015. Evidence for a distant giant planet in the solar system. *Astronomical Journal* 151:22 (Feb).
2. Fienga A, Laskar J, Manche H and Gastineau_M. 2016. Constraints on the location of a possible 9th planet derived from the Cassini data. *Astronomy & Astrophysics*, in press (Feb 2016).

Directions to SMCAS Meetings at CSM, and to Star Parties

Star Parties are Free to Members and Visitors and are Held Regularly, Weather Permitting

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". Science Bldg 36 and the planetarium lie straight ahead. Enter Bldg. 36 thru the door facing the lot, or walk around the dome to the courtyard entrance.



Crestview Park

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.

Directions to Crestview Park for Star Parties

From Hwy 101 or El Camino, take Brittan Avenue in San Carlos, west (to 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.

2nd Note: 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.

Membership Application and Society Information

To join the San Mateo County Astronomical Society or to renew membership, you can pay dues via Pay Pal on our website (www.smcasastro.com), at any monthly meeting, or send your check, payable to SMCAS, to: SMCAS, PO Box 974, Station A, San Mateo, CA, 94403.

Dues are currently \$30 for a new (family) membership and renewing member and \$15 for a student membership.

Please check one of the following boxes: () New member () Membership renewal () Student () Address or info change

NOTE TO RENEWING MEMBERS: Please complete the following form only if you have a change to your membership or contact info.

Name(s) _____

Address/City/Zip: _____

Phone(s) _____ Email _____

SMCAS – Society Information

Meetings of the San Mateo County Astronomical Society are held the **first Friday of the month (except in July and August)** in the Planetarium at the College of San Mateo, 1700 West Hillsdale Blvd. in San Mateo. Exit Hwy. 92 at West Hillsdale Blvd. and, proceed uphill through the second and third sets of traffic lights, to the first stop sign at the top of the hill. Continue straight, bearing right then, after the second stop sign, left up over a rise. After the third stop sign, enter the first parking lot on the right with a sign 'Lot 5, Marie Curie', identifying the top level plus those below.

Science Bldg. 36 adjoins the lot, with the geodesic planetarium dome to its left. Circle the planetarium, or enter Bldg 36 thru the door facing Lot 5. For the 4th floor observatory, use the elevator just inside on the right. The planetarium corridor is ahead on the left. Turn left at the restroom sign.

Officers: President: Marion Weiler; **Vice-President:** Ed Pieret; **Treasurer:** Karen Boyer; **Secretary:** Andy Thanos. **Board Directors-At-Large:** Bob Franklin, Ken Lum, Ed Ching, and Mike Ryan.

March Event Horizon Editor: Ted Jones. **NOTE:** Newsletter is posted by the beginning of each month (except for July and August). Submissions and photos are welcome by the 15th of the month before publication.

SMCAS Contact Information

Website: www.smcas.net

The CSM Astronomy Department schedule is at www.collegeofsanmateo.edu/astronomy/events.

Email: SMCAS@live.com

Society Yahoo group: <http://groups.yahoo.com/group/smcas>.

Yahoo Group Subscription: email smcas-subscribe@yahogroups.com to subscribe.

Event Horizon: To submit articles or photos, please contact Ed Pieret — epieret@comcast.net or 650.862.9602.