

# The SAN MATEO COUNTY ASTRONOMICAL SOCIETY

December 2015 — NO GENERAL MEETING THIS MONTH



## 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.smcas.net](http://www.smcas.net), 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](mailto:SMCAS@live.com), or call us at (650) 678-2762.



*AN UNEXPECTED SIGHT at the November 7 star party at Crestview Park was later confirmed to be a US Navy missile test performed without prior announcement. SMCAS member Bob Franklin captured the moment in a spectacular series of photographs. More on page 7.*

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### DATES TO SAVE

**Dec 4: NO GENERAL MEETING** in December. The CSM Planetarium will be closed for renovation.

**Dec 5:** Holiday Party at Crystal Springs Methodist Church, San Mateo. Bring a dish to share.

**Jan 1:** New Year's Day. **NO GENERAL MEETING** in January.

**Feb 5:** General Meeting, Pizza, and Presentation at the CSM Planetarium.

## President's Corner

A happy holiday season to you all, and a healthy prosperous New Year!

A reminder: we will be holding our annual Holiday Pot Luck Party on Saturday, December 5th at the Crystal Springs Methodist Church. Bring your family and friends for holiday cheer! Details elsewhere in this Event Horizon. As we will not be having a General Meeting in December, the Holiday Party will be our main event through year end!

Our meeting schedule the end of this year is a little unusual by our standards. We will not be holding a December general meeting due to renovations taking place in the Planetarium, which made it difficult to have a speaker. Combined with the the Holiday Party scheduled the next day anyway, the board made the decision to not hold the December general meeting and make the December 5th Holiday Party our main December get together. Then, as is somewhat normal, we will not be holding a January general meeting, as the first Friday is January 1, New Years Day! So our next general meeting will be on Friday, February 5th in the new upgraded Planetarium - new projectors and other electronics which will make an already great facility even better! Mark your calendars! Weather permitting, we will continue with our regularly scheduled Crestview Star Parties in December and January, and beyond!

I had the privilege of traveling to Paris the first week of November. The weather was nice, warm for this time of year, and it seemed most of the people in Paris were outdoors taking advantage of it. The streets and shops were busy, outdoor cafes in the parks filled, a city preparing for the holiday season. My wife and I enjoyed the museums, and just walking around outside in such a beautiful city with a long history in the arts and sciences, astronomy especially, although alas, the Paris Observatory was closed. It was very sad to see how the events unfolded there, days after our return. Our hearts go out to those in Paris and elsewhere likewise impacted.

End of an era after 43 years: for those who have purchased and appreciated the Guy Ottewell Astronomical Calendar over the years, the 2016 edition available this fall is to be the "The 43rd, finest, and final issue of this famous yearbook." SMCAS has been offering the Ottewell Calendar at a discount to our members for many years during our annual calendar sale, as it has been a very unique, beautiful and educational publication. We will miss it!

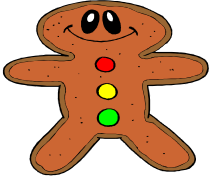
See you at the holiday party!

***Marion Weiler***

*President, San Mateo County Astronomical Society*

# Holiday Potluck Party

Our traditional Members' potluck will take place at The Fireside Room at the Crystal Springs Methodist Church, 2145 Bunker Hill Drive, San Mateo, California.



**Saturday, December 5<sup>th</sup> 2015**

**6:00PM to 9:00PM**



**Please bring your favorite holiday treat to share.**

**We always have a fun time and great food, so plan to bring the family!**

*Bring a side dish, salad or desert. Board members will bring entree items.*

*The club will provide non-alcoholic beverages, paper plates and utensils.*

**You may bring your own alcoholic beverages but please drink in moderation.**



## Directions

- From El Camino, take Hwy 92, exit at Ralston. Turn right (to the west), and Ralston becomes Polhemus.
- Or, if coming from Hwy 280, take Hwy 92, exit at Ralston, then turn right (yes, right!), toward Polhemus.
- Once on Polhemus go about a half-mile, pass Safeway on the right, then take the half-left onto Bunker Hill Drive. The Church will be just ahead on your left

See <http://www.smcas.net> for more details.

## November Meeting Review

### The Large Synoptic Survey Telescope

**By Ken Lum**

One of the newest big telescope projects now underway on Cerro Pachón mountain in the Chilean Andes is known as the Large Synoptic Survey Telescope (LSST, [www.lsst.org](http://www.lsst.org)). During our November meeting, Dr. Josh Meyers of the Kavli Institute for Particle Astrophysics and Cosmology (KIPAC) (Fig. 1) came to describe this revolutionary new telescope and what it is expected to do.

The purpose of the telescope is to take a series of high resolution wide field pictures of the entire sky visible from its location every few nights. Hence the term *synoptic* (from *synopsis*) referring to a general survey of the whole sky. In doing this, it is expected that many thousands of transient events will be captured by creating a high resolution movie of the entire sky over a period of at least ten years. This is equivalent to producing a Palomar Observatory Sky Survey every few days thereby providing a very detailed view of the way many astronomical objects change over time.

Some of these objects will include novae and supernovae which will help in mapping the distribution of dark energy over most of the entire sky. Mapping of weak gravitational lensing will also enable mapping of dark matter over the same fields of view. No such broad survey of these phenomena has ever before been done.

Other expected discoveries will come from an inventory of small objects in our Solar System such as asteroids, particularly Earth crossing Near Earth Objects (NEOs) that pose a threat of colliding with the Earth. Much further away, there may be new discoveries of Kuiper belt objects perhaps even reaching into the Oort cloud where the most distant comets originate.

There will also be a deep survey of our Milky Way



**Figure 1.** Dr. Josh Meyers of KIPAC with yours truly, Ken Lum

galaxy hopefully revealing the proper motions of many millions of stars and showing how stars in the Milky way circulate through it.

In the past, such wide field survey photography had been the role of Schmidt cameras such as the 48-inch at Palomar and its southern sky twin at Siding Spring in Australia. But around a 50-inch diameter is the practical limit for making Schmidt corrector lenses. In order to build a bigger wide angle camera, a Paul-Baker/Mersenne-Schmidt wide-angle telescope is being constructed. This is a squat design about as wide as it is tall. It uses big mirrors that are easier (and cheaper) to make than big lenses.

It is a three mirror configuration that corrects for spherical aberration, coma and astigmatism to yield a large flat, fully corrected (anastigmatic) focal plane (Fig. 2). The 8.4m primary disk for the main mirror has been spin cast at the University of Arizona's Stewart Observatory facility using a rotating oven to generate the initial deep concave curve. The disk has an outer 8.4m zone (M1)

**continued on p. 5**



## LSST, continued from p. 4

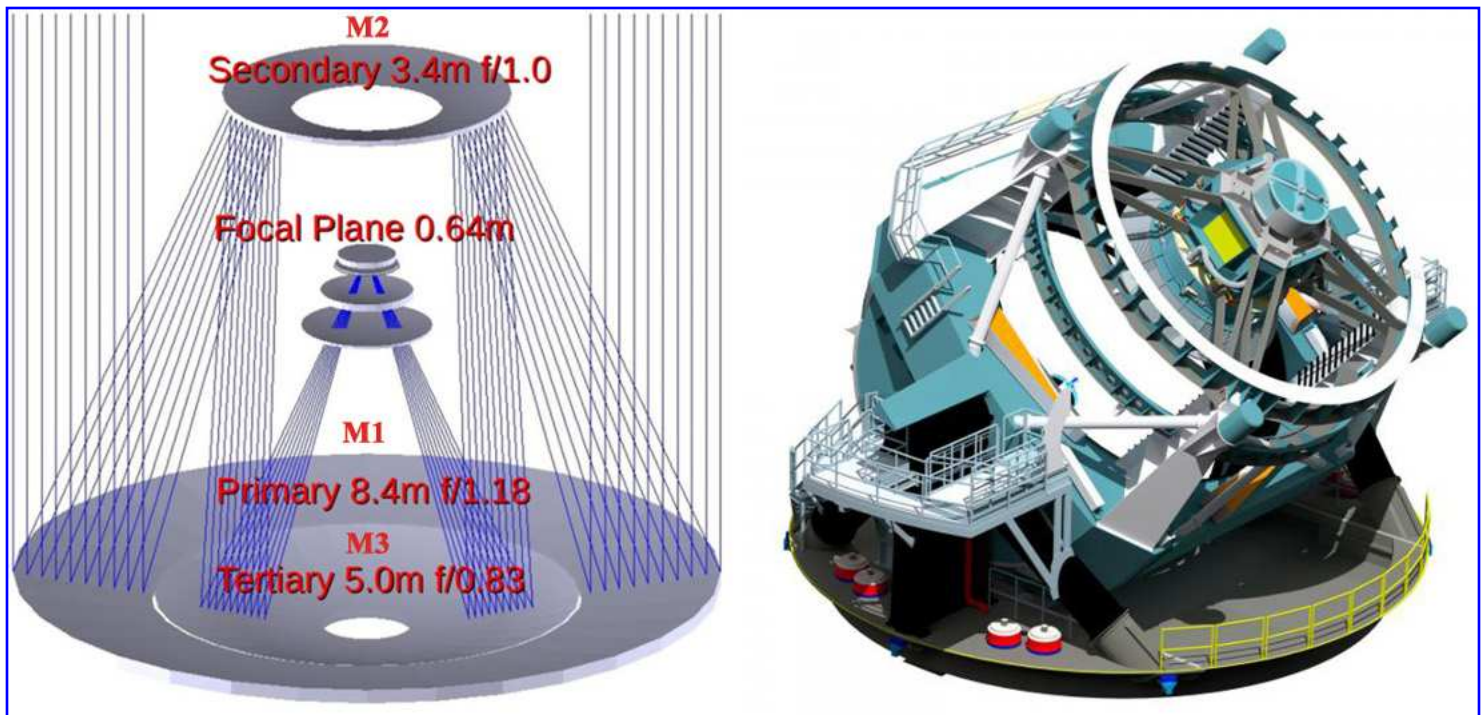
ground to a focal ratio of  $f/1.18$ . Unusually, the center 5m of the primary disk is also a tertiary mirror (M3) ground into the center with a focal ratio of  $f/0.83$  thereby incorporating two concentric mirrors of different focal lengths (M1 and M3) into the same 8.4m primary disk.

A convex secondary mirror (M2) of 3.4m diameter will be placed above the primary disk to intersect the outer primary zone's light cone and reflect the light down to the tertiary mirror (M3). The tertiary mirror (M3) will then further reflect the light up through two smaller corrector lenses to form a focal plane between the primary disk and the secondary mirror. The summated focal ratio at the focal plane will be  $f/1.23$  for a very fast photographic telescope.

This is where a very large 3.2 gigapixel camera

with a 25.2 inch diameter sensor array made of multiple CCD detectors mounted in a frame will be installed. The field of view at the camera will be 3.5 degrees or about 7 full Moons across. This camera is now being built at the KIPAC within the Stanford Linear Accelerator Center (SLAC). Many SMCAS members may recall the tour of SLAC we did on May 8 of this year, where we were able to enter the LSST assembly clean room, the last day it was open for public entry.

When in full operation, scheduled for 2022, it is expected that the telescope will produce over 200,000 pictures (1.28 petabytes uncompressed data) per year over its prime mission of 10 years. Processing such a staggering amount of data has been called this project's biggest technical challenge. But the prospects for new discoveries will be tremendous.



**Figure 2.** The optical configuration of the LSST and how it will appear when finished.

## [Members Forum](#)

### A Surprise Visitor to the Star Party of November 7

**By Bob Franklin**

Occasionally, star parties are met with surprising images. Such was the case on Saturday night, November 7, 2015 at Crestview Park when we were surprised to see an overly bright light arising in the South West. Luckily, I had purchased a new camera that morning and was seeking image

opportunities. Below are several images of this object that we later learned was a rocket launched from a submarine in San Diego.

I was able to gather many images as this rocket passed on to the west.



*Images taken by the author at Crestview Park in San Carlos on Saturday, November 7, 2015, at approximately 6:00pm. The interval between the first and last images was approximately three minutes.*

*On November 9 the US Navy identified the rocket as a test launch of an unarmed Trident 2 D5 submarine-launched ballistic missile.*

*The exhaust plume was made visible by reflected sunlight after the rocket had risen high enough to be illuminated by the Sun, at that time approximately 12 degrees below the horizon.*

*The gap at the base of the leading cone of exhaust was caused by a stage separation.*

## Geminid Edition

### Solar System this Month

**By Ted Jones**

This month will bring several noteworthy solar system events. Comet C/2013 US10 (Catalina) has already appeared in the morning sky at our latitude. This month it will cross from Virgo into Boötes, reaching Arcturus on January 1. Recent reports put it at magnitude 6.

#### **Lunar Occultation of Venus**

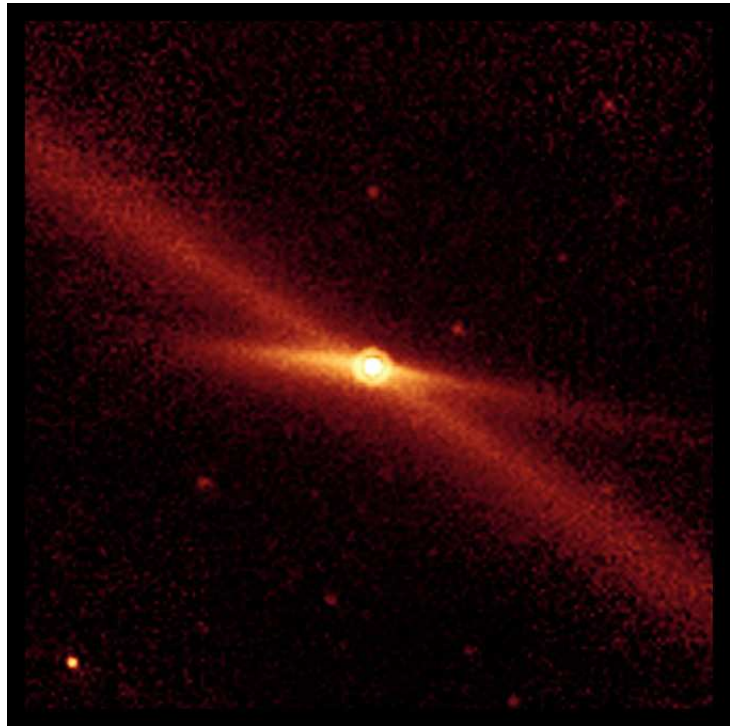
On the morning of December 7 the Moon will pass in front of Venus, hiding it for nearly two hours. *Sky and Telescope* predicts disappearance and reappearance for Berkeley, CA at 7:53 and 9:39 am. San Mateo times might differ slightly, but it is best to set up a little early anyway.

The disappearance and reappearance of Venus are best viewed with a telescope or suitable binoculars. However, if conditions are good (not hazy) the hours before or after the occultation will be an excellent time to show a friend Venus in the daytime by naked eye. Finding the thin crescent Moon may require some patience, but it is instantly recognizable even to inexperienced observers. Venus will be right beside it. The tiny white dot can hard to pick out against the bright sky. It may help to locate it initially with binoculars.

#### **The Geminid Meteor Shower**

The Geminids peak on the night of December 13–14, just past the new Moon. This shower is known for its reliability and frequency of bright fireballs. In general, meteor shower intensity peaks in the early morning hours. However, the early evening offers the possibility of “earthgrazers,” rare but impressive meteors that move relatively slowly parallel to the horizon.

Meteor showers are the result of the Earth moving through a stream of debris left behind by a small body, almost always a comet. The Geminids are



*NASA Spitzer Space Telescope infrared image of comet Enke in 2004. The long diagonal band belongs to the comet's dust trail. The shorter, more nearly horizontal band consists of two streams of material emanating from the head.*

exceptional in that the parent body is an asteroid 5 km in diameter, called 3200 Phaethon. Its orbit is eccentric and its distance from the Sun ranges from 0.14 to 2.4 AU. The numbers suggest that Phaethon's orbit might intersect Earth's. Fortunately, given the consequences of a collision, its orbit is considerably inclined from the ecliptic. When Phaethon's distance from the Sun matches ours, it is not in our orbital plane.

Phaethon and the parent bodies of other showers parent bodies shed dust and debris as they orbit the Sun. For comets, the familiar dust tail is visible evidence of this. The particles remain in orbit around the Sun but over time gravitational interactions and other forces disperse them into

**Continued on p. 10**



## **Event Update**

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

We have many fun and interesting activities planned through the end of the year and continuing into 2016. While the new website is under construction, please 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, Dec 4		<b>Planetarium closed — No general meeting</b>
Sat, Dec 5	6:00 pm	<b>Holiday Party, Crystal Springs Methodist Church, San Mateo</b>
Sat, Dec 12	5:00 pm	<b>Crestview Park Star Party</b>
Sat, Dec 13	Midnight+	<b>Geminids Meteor Shower peaks — King of meteor showers</b>
Fri, Jan 1		<b>New Year's Day — No general meeting</b>
Sat, Jan 2	5:00 pm	<b>Crestview Park Star Party</b>
Sat, Jan 9	5:00 pm	<b>Crestview Park Star Party</b>
Sat, Jan 30	5:30 pm	<b>Crestview Park Star Party</b>
Fri, Feb 5	7:00 pm	<b>General Membership Meeting, Pizza Social and Presentation</b>
Sat, Feb 6	5:30 pm	<b>Crestview Park Star Party</b>
Sat, Feb 27	6:00 pm	<b>Crestview Park Star Party</b>
Fri, Mar 4	7:00 pm	<b>General Meeting, Pizza Social and Presentation</b>
Sat, Mar 12	6:00 pm	<b>Crestview Park Star Party</b>
Fri, Apr 1	7:00 pm	<b>General Meeting, Pizza Social and Presentation</b>
Sat, Apr 2	7:30 pm	<b>Crestview Park Star Party</b>
Sat, Apr 9	7:30 pm	<b>Crestview Park Star Party</b>



## December Rise and Set Chart

<b>SMCAS 2015 (PST)</b>		<b><u>Dec 5 Rise</u></b>	<b><u>Dec 5 Set</u></b>	<b><u>Dec 12 Rise</u></b>	<b><u>Dec 12 Set</u></b>
Sun	Solstice: 21@ 8:48 PM	7:09 AM	4:50 PM	7:14 AM	4:51 PM
Moon		1:40 AM	1:45 PM	8:06 AM	6:30 PM
Mercury	Shortly after sunset	8:03 AM	5:22 PM	8:25 AM	5:41 PM
Venus	Before sunrise	3:36 AM	2:42 PM	3:49 AM	2:38 PM
Mars	In the wee hours	2:14 AM	1:55 PM	2:06 AM	1:37 PM
Jupiter	In the wee hours	12:28 AM	12:59 PM	12:00 AM	12:33 PM
Jupiter's moons		c g i e J		g e i J c	
3 AM next day, E on left		J=Jupiter, c=Callisto, e=Europa, g=Ganymede, i=Io			
Saturn	In the sun's glare	6:41 AM	4:36 PM	6:18 AM	4:11 PM
Uranus	Most of the evening	1:53 PM	2:37 AM	1:25 PM	2:09 AM
Neptune	In the evening	12:15 PM	11:19 PM	11:48 AM	10:52 PM
Pluto	After sunset	9:19 AM	7:06 PM	8:52 AM	6:39 PM

- Star parties are at Crestview on the 5th and 12th.
- Venus, Moon, Mars, and Jupiter lined-up on the 6th before sunrise.
- Saturn, Venus, Mars, Jupiter, and Moon lined-up last few days end of month, early January before sunrise.

– 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](https://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](https://smile.amazon.com/about).

<div> <div>&lt;</div> <div>December 2015</div> <div>&gt;</div> </div>						
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		1	2	3	4	5 6:00 PM Holiday Party
6	7	8	9	10	11	12 5:00 PM Crestview Star Party
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

• observing event
• club event
• community event

Calendar courtesy of Ed Pieret

### Geminids, continued from page 7

nearby orbits and they become unsynchronized from the parent body. This results in the formation of a dust trail (not to be confused with a dust *tail*), a distribution of particles in and around the entire length of the parent's orbit. Dust trails can be seen in infrared as in the Spitzer image on page 7.

Some of the particles in the dust trail have orbits that differ from the parent's so as to make collisions with Earth possible. When one of them does collide with the atmosphere, the result is a meteor.

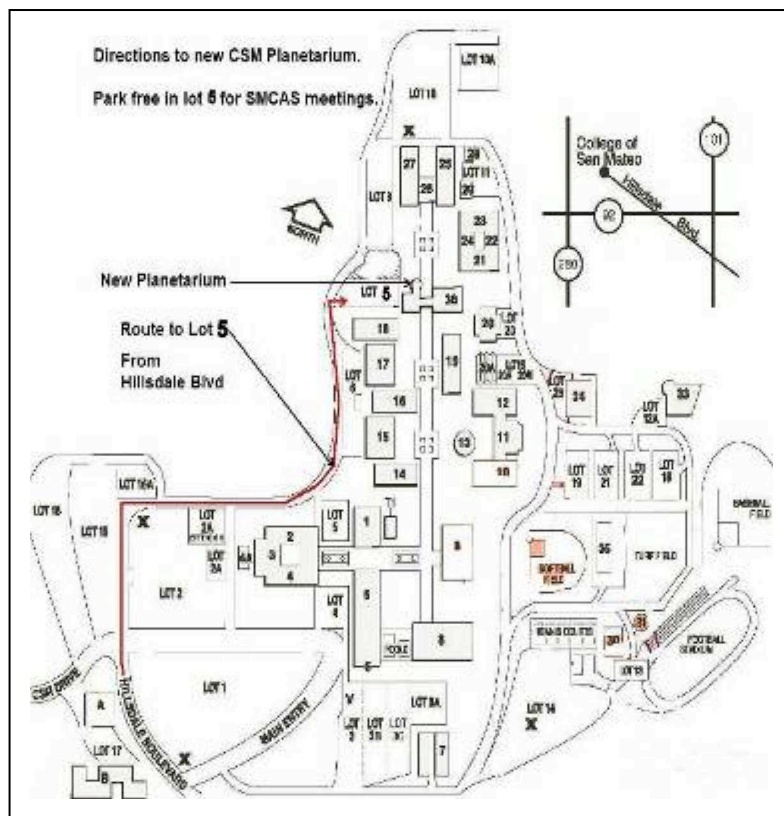
A comet loses particles as the Sun heats the ices in its head. The resulting gases carry away small particles that eventually join the comet's dust trail. For Phaethon, a different mechanism must have been at work. It is believed that one or more large fragments broke off several hundred years ago and eventually disintegrated. This would have produced more large particles than typical for a comet's dust trail, leading to the Geminids' reputation for fireballs.

## 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.smcas.net](http://www.smcas.net)), 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 4<sup>th</sup> 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:** Vacant. **Board Directors-At-Large:** Bob Franklin, Ken Lum, Ed Ching, Mike Ryan, and Andy Thanos.

**December 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](http://www.smcas.net)

The CSM Astronomy Department schedule is at [www.collegeofsanmateo.edu/astronomy/events](http://www.collegeofsanmateo.edu/astronomy/events).

**Email:** [SMCAS@live.com](mailto:SMCAS@live.com)

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

**Yahoo Group Subscription:** email [smcas-subscribe@yahogroups.com](mailto:smcas-subscribe@yahogroups.com) to subscribe.

**Event Horizon:** To submit articles or photos, please contact Ed Pieret — [epieret@comcast.net](mailto:epieret@comcast.net) or 650.862.9602.