

# The SAN MATEO COUNTY ASTRONOMICAL SOCIETY

May 2016 — 636th 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.smcastro.com](http://www.smcastro.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](mailto:SMCAS@live.com), or call us at (650) 678-2762.



*A STELLAR STREAM is seen at lower right in the halo of the dwarf starburst galaxy NGC 4449 in this image by R. Jay GaBany, the speaker at the April SMCAS meeting. The stream is believed to be the result of a merger with a satellite galaxy that is otherwise undetectable at present. Such an event could have triggered the intense star formation currently under way in NGC 4449. More on page 4.*

## Table of Contents

President's Corner.....	2
May Meeting.....	3
April Meeting Review.....	4
SMCAS Event Schedule.....	6
Rise and Set Chart.....	7
Calendar.....	8
Directions to CSM and Crestview.....	9
Membership form and club information.....	10

## DATES TO SAVE

**May 6:** General Meeting, Pizza, and Presentation at the CSM Planetarium. Details on page 3.

**May 9:** Transit of Mercury. Viewing event on the CSM Building 10 patio from 7:00–11:45 am.

**Jun 3:** General Meeting, Pizza, and Presentation at the CSM Planetarium.

More events on page 6.

## President's Corner

We are coming up on an important time of year for our Society: the annual election of officers. I wanted to take this opportunity to give you all a little information about the election process, and encourage you all to consider becoming more active participants in the management of SMCAS! Without our volunteer Board members, we can't run our Society and all the great programs we put on!

As called for in our By-Laws, our organization is run by a Board of Directors consisting of 9 elected members. We have five At-Large Board members, and four officers: President, Vice President, Secretary, and Treasurer. Our current Board can be seen at:

<http://www.smcasastro.com/board-of-directors.html>

The primary responsibilities of the Board are to conduct, manage, and control the affairs of SMCAS. Our Board meetings are generally held monthly, on a weeknight separate from our first Friday general membership meetings. The qualifications for Board membership are simple: you need to be an SMCAS member and at least age 18 by the beginning of your term.

At the May 6 general membership business meeting we will be opening up nominations for the 2016–17 term for our Board of Directors and Officers. Anyone can nominate themselves, or suggest others to be considered. Nominations can be passed on to any Board member between meetings, or publicly made at the June general membership business meeting, when the nominations process will be closed. Then, all the nominations, including a Board nominated slate, will be announced and a voice vote taken of the membership.

If you are interested on finding out more about Board participation, serving on the Board, or related questions, please contact me or any Board member

May will be a busy month for public star parties we support. After a wet, cloudy winter in the bay Area, I've lost count of the number of star parties we had to cancel. But I'm hopeful these upcoming star parties will actually occur! In addition to our normal Crestview Park star parties on May 7 and 28, we are also supporting star parties at the KIPAC Open House at SLAC National Laboratory on May 7, a Mercury Transit Viewing at CSM on May 9, a star party for the John Muir School in San Bruno on May 20, and a Girl Scout camp out at Levi Stadium on May 21. If you can help out at any of these events, please contact myself or Ed Pieret, we welcome your support of these events!

Lastly, we have a great speaker at the May meeting, Dr. Brad Tucker, an Astrophysicist-Cosmologist coming to us all the way from the Mt. Stromlo Observatory at the Australian National University. We are fortunate that his travels here coincided with our meeting!

***Marion Weiler***

*President, San Mateo County Astronomical Society*

## SMCAS General Meeting and Presentation on May 6, 2016

### **Dr Brad E Tucker**

Astrophysicist/Cosmologist

Mt Stromlo Observatory at the Australian National University

## **Exploding Stars, Dark Energy, and the End of the Universe**

Friday, May 6, 2016, [College of San Mateo, Building 36](#)

SMCAS General meeting at 7:00 pm, ISC Room, room 110

Presentation at 8:00 pm, [Planetarium](#)

Free and open to the public, free parking.

Most massive stars end their lives in brilliant explosions known as supernovae. These enormous bursts briefly outshine all the light from the galaxy wherein they occur. The past 15 years has been a “boom” period for supernovae with vast amounts of time and effort being invested in these objects. Not only are they important for understanding the life of stars, but they can be used as cosmological probes to study what the Universe is made of and how it is growing. This use has shown that the Universe is accelerating in its expansion, the subject of the 2011 Nobel Prize, and is being caused by dark energy which will cause the end of the Universe. Dr Tucker will show how our understanding of these objects has been revolutionized using new techniques including the Kepler Space Telescope and the Hubble Space Telescope, and what this means for the Universe.



Supernova exploding in galaxy (white dot above center)



Brad Tucker is an Astrophysicist/Cosmologist, and currently a Research Fellow at the Research School of Astronomy and Astrophysics, Mt Stromlo Observatory at the Australian National University.

Brad received Bachelor's degrees in Physics, Philosophy, and Theology from the University of Notre Dame. He then undertook a PhD at Mt Stromlo Observatory at the Australian National University, working with Nobel Laureate Brian Schmidt. He is currently working on projects trying to discover the true nature of Dark Energy, the mysterious substance causing the accelerating expansion of the Universe, which makes up 70% of the Universe. He is the lead of the Kepler Extra-Galactic Survey, which uses the Kepler Space Telescope to understand why and

how stars blow up. He is also leading a project to build a network of ultraviolet telescopes in the upper atmosphere.

In addition to his research, Brad frequently gives talks to school groups and the general public about Astronomy and has regular segments on various radio and TV stations talking about Astronomy news and events. Among other things, Brad has also developed a series of Astronomy coins in conjunction with the Royal Australian Mint, consulted on science fiction movies, advised on Astronomy-themed art projects, and has been featured in specials on the National Geographic Channel. He is currently in the process of writing his first popular book and producing a Massive Open Online Course.

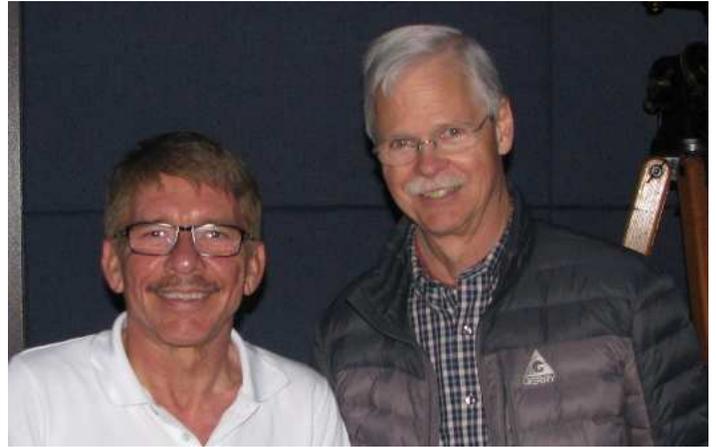
## [April Meeting Review](#)

### River of Stars: A Survey of Stellar Tidal Streams in Nearby Star Systems

**By Ken Lum**

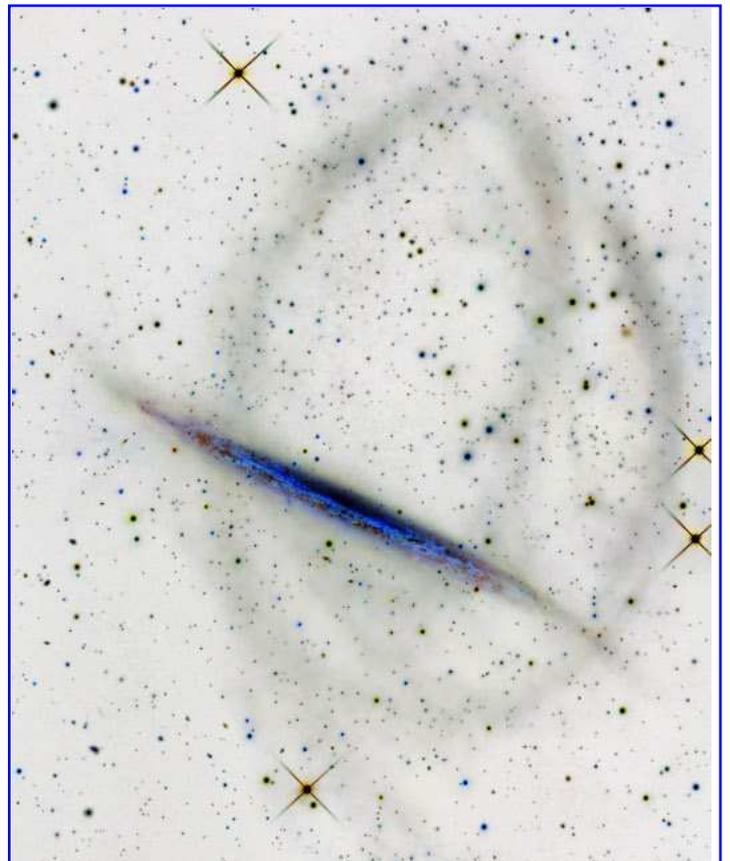
Last month, Bay Area astrophotographer R. Jay GaBany treated all of us to a parade of astronomical eye-candy with his stunning photos of faint stellar streams surrounding several galaxies that he has imaged over the years in collaboration with Dr. David Martinez-Delgado of the Max Planck Institute for Astronomy at the University of Heidelberg in Germany. Stellar streams are very faint star associations orbiting and/or merging with a host galaxy whose gravitational tidal effects have ripped apart a globular cluster or dwarf galaxy. Imaging these streams is an attempt to gather evidence concerning the current model of galaxy formation which argues that large galaxies form from the merger of smaller ones formed earlier in the history of the Universe.

Indeed, deep field studies with the Hubble Space Telescope show the early types of galaxies to be smaller and more irregularly structured than current galaxies making for a Universe that looked different from more recent epochs. Starting with work by Dr. Halton Arp in the 1960s using the 200" Palomar reflector [2], numerous galaxies have been found undergoing distorting interactions and mergers. It has been found that major mergers between large galaxies produce highly distorted galactic structures before settling down into more stable larger structures such as elliptical galaxies. Minor mergers involving the ingestion of smaller satellite dwarf galaxies by a larger galaxy leave behind faint stellar streams surrounding the merging structure. These have been imaged by Mr. GaBany using his 20" Ritchey-Chretien reflector and a modestly priced CCD camera now located in the Sierra foothills. Such a stream has even been discovered in the Milky Way, now



*Above: Mr. R. Jay GaBany with Marion Weiler, SMCAS President.*

*Below: NGC 5907 as imaged by R. Jay GaBany and inverted in Photoshop to better show the stellar stream left behind by a merger with a dwarf satellite galaxy.*

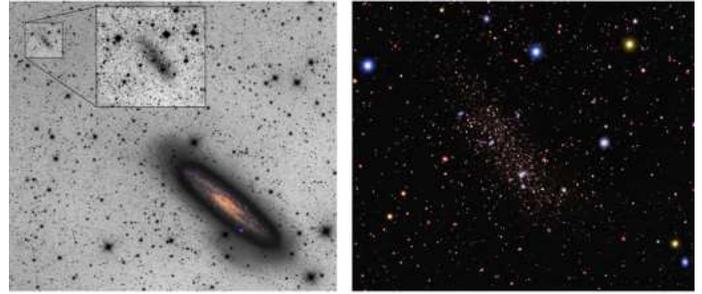


***Continued on page 5***

## **Stellar Streams, continued from page 4**

called the Sagittarius Star Stream, presumably arising from the merger of the Milky Way with the progenitor Sagittarius Dwarf Galaxy. Eventually, other dwarf galaxies around the Milky Way, such as the Large and Small Magellanic Clouds, will meet the same fate. Among the many galaxies with stellar streams arising from dwarf galaxy mergers imaged by Mr. GaBany and published in the peer-reviewed literature are NGC's 4013, 5907, 5055 (M63), 4631, 4651, and 4449.

Other faint features of galaxies imaged by Mr. GaBany include previously unknown dwarf galaxies around NGC's 4631 and 253. Images of these discoveries can be found by visiting Mr. GaBany's website [1] and searching by NGC catalog number. Included are several animated computer simulations by Dr. Martinez-Delgado of some of the mergers depicted. All are definitely worth looking at!



*Left: NGC 253 showing a previously unknown dwarf galaxy, NGC 253-dw2 by Ray GaBany. Right: close up image of NGC 253-dw2 using the 8.2m Subaru telescope on Mauna Kea by Miyazaki, et al. [3]*

## **References**

1. GaBany, R. J. [www.cosmotography.com](http://www.cosmotography.com)
2. Kanipe, J. and Webb, D., *The Arp Atlas of Peculiar Galaxies*, Willmann-Bell, 2006
3. Miyazaki, S., Komiyama, Y., Sekiguchi, M., et al. 2002, *Proc. of the Astronomical Soc. of Japan* 54:833

## **Hubble Shatters The Cosmic Record For Most Distant Galaxy**

**By Ethan Siegel**

The farther away you look in the distant universe, the harder it is to see what's out there. This isn't simply because more distant objects appear fainter, although that's true. It isn't because the universe is expanding, and so the light has farther to go before it reaches you, although that's true, too. The reality is that if you built the largest optical telescope you could imagine—even one that was the size of an entire planet—you still wouldn't see the new cosmic record-holder that Hubble just discovered: galaxy GN-z11, whose light traveled for 13.4 billion years, or 97% the age of the universe, before finally reaching our eyes.

There were two special coincidences that had to line up for Hubble to find this: one was a remarkable technical achievement, while the other was pure luck. By extending Hubble's vision away from the ultraviolet and optical and into the

infrared, past 800 nanometers all the way out to 1.6 microns, Hubble became sensitive to light that was severely stretched and redshifted by the expansion of the universe. The most energetic light that hot, young, newly forming stars produce is the Lyman- $\alpha$  line, which is produced at an ultraviolet wavelength of just 121.567 nanometers. But at high redshifts, that line passed not just into the visible but all the way through to the infrared, and for the newly discovered galaxy, GN-z11, its whopping redshift of 11.1 pushed that line all the way out to 1471 nanometers, more than double the limit of visible light!

Hubble itself did the follow-up spectroscopic observations to confirm the existence of this galaxy, but it also got lucky: the only reason this light was

**Continued on page 8**

## **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](http://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, May 6	7:00 pm	<b>General Meeting, Pizza Social and Presentation</b>
Fri, May 6		<b>Eta Aquarids Meteor Shower</b>
Sat, May 7	8:00 pm	<b>Crestview Park Star Party</b>
Sat, May 7	5:00 pm	<b>KIPAC Open House + Star Party (contact Marion Weiler)</b>
Mon, May 9	7:00 am	<b>Transit of Mercury Event, CSM Building 10 patio, 7:00–11:45AM</b>
Fri, May 20	8:00 pm	<b>Star Party at John Muir School, San Bruno. Contact: John Fiske</b>
Sat, May 21		<b>Girl Scout Camp Out Star Party at Levi Stadium</b>
Sat, May 28	8:00 pm	<b>Crestview Park Star Party</b>
Fri, Jun 3	7:00 pm	<b>General Meeting, Pizza Social and Presentation</b>
Sat, Jun 4	8:30 pm	<b>Crestview Park Star Party</b>
Fri, Jul 1		<b>There will be NO general meeting on this date</b>
Sat, Jul 16	6:00 pm	<b>Annual banquet and installation of officers</b>

## May Rise and Set Chart

SMCAS 2016 (PDT)	May 7		May 14		May 28	
	Rise	Set	Rise	Set	Rise	Set
Sun	6:05 AM	8:05 PM	5:59 AM	8:11 PM	5:50 AM	8:22 PM
Moon	7:07 AM	9:21 PM	1:49 PM	2:21 AM	12:59 AM	12:12 PM
Mercury	6:16 AM	8:16 PM	5:45 AM	7:24 PM	4:57 AM	6:23 PM
Venus	5:49 AM	7:22 PM	5:46 AM	7:37 PM	5:45 AM	8:08 PM
Mars	9:29 PM	7:15 AM	8:52 PM	6:39 AM	7:36 PM	5:24 AM
Jupiter	2:38 PM	3:34 AM	2:10 PM	3:06 AM	1:18 PM	2:12 AM
Jupiter's moons 10 PM, East on left	i j e g c		c i j e g		J i e g c	
	J=Jupiter, c=Callisto, e=Europa, g=Ganymede, i=Io					
Saturn	10:03 PM	7:57 AM	9:34 PM	7:27 AM	8:34 PM	6:28 AM
Uranus	5:01 AM	5:54 PM	4:34 AM	5:28 PM	3:41 AM	4:36 PM
Neptune	3:22 AM	2:36 PM	2:54 AM	2:09 PM	2:00 AM	1:15 PM
Pluto	12:26 AM	10:15 AM	11:55 PM	9:47 AM	10:59 PM	8:51 AM

- Star parties are at Crestview on the 7th and 28th.
- Jazz Under the Stars is at CSM on the 14th.

- 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](http://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](http://smile.amazon.com/about).

# San Mateo County Astronomical Society Event Calendar

< May 2016 >						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6 7:00 PM General Membership Meetin 	7 5:00 PM KIPAC Opne House 8:00 PM Crestview Star Party Sunset: 8:07 PM
8	7:00 AM Mercury Transit 9	10	11	12	13 	14 Sunset: 8:14 PM
15	16	17	18	19	20	21 8:30 PM Girl Scouts Levi  Sunset: 8:19 PM
22	23	24	25	26	27	28 8:00 PM Crestview Star Party Sunset: 8:24 PM
29 	Memorial Day 30	31	1	2	3	4

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

Calendar courtesy of Ed Pieret

## Hubble, continued from page 5

visible is because the region of space between this galaxy and our eyes is mostly ionized, which isn't true of most locations in the universe at this early time! A redshift of 11.1 corresponds to just 400 million years after the Big Bang, and the hot radiation from young stars doesn't ionize the majority of the universe until 550 million years have passed. In most directions, this galaxy would be invisible, as the neutral gas would block this light, the same way the light from the center of our galaxy is blocked by the dust lanes in the galactic plane. To see farther back, to the universe's first

true galaxies, it will take the James Webb Space Telescope. Webb's infrared eyes are much less sensitive to the light-extinction caused by neutral gas than instruments like Hubble. Webb may reach back to a redshift of 15 or even 20 or more, and discover the true answer to one of the universe's greatest mysteries: when the first galaxies came into existence!

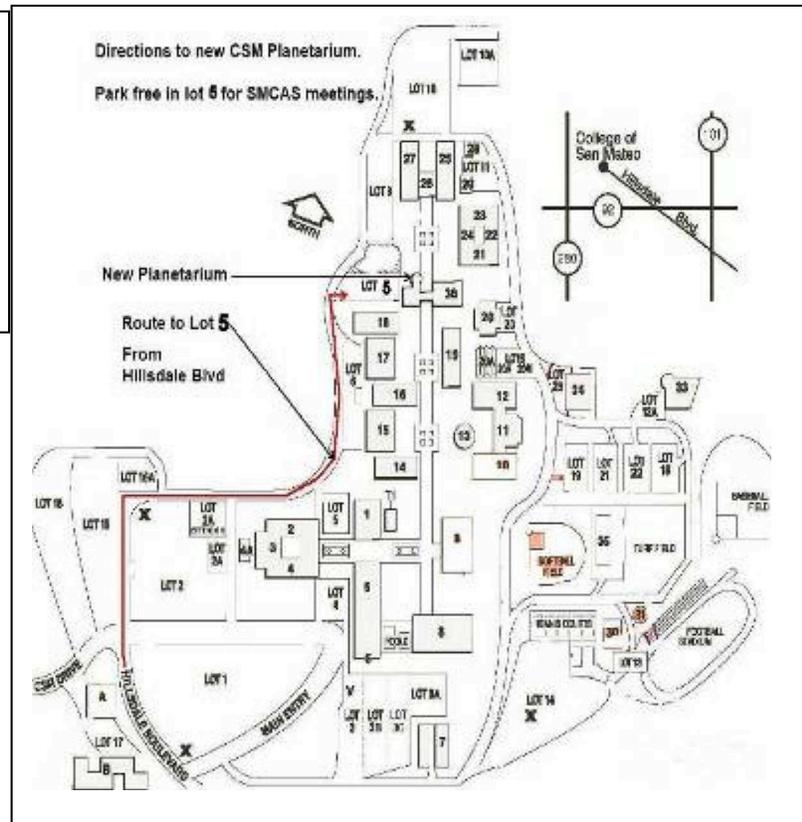
*This article is provided by NASA Space Place. With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology. Visit [spaceplace.nasa.gov](http://spaceplace.nasa.gov) to explore space and Earth science!*

## 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.

**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.

### Directions to Crestview Park for Star Parties

**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](http://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 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:** Andy Thanos. **Board Directors-At-Large:** Bob Franklin, Ken Lum, Ed Ching, and Mike Ryan.

**May 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.