

The SAN MATEO COUNTY ASTRONOMICAL SOCIETY

December 2016 — 640th 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.



THE MENLO PARK LIBRARY SCIENCE NIGHT featured SMCAS volunteers and their telescopes. This event was one of the most recent in a long list of accomplishments for the Society in 2016 reviewed by SMCAS President Marion Weiler in his column on page 2. Above, Ken Lum and Science Night attendees waiting for a look through his scope.

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DATES TO SAVE

Dec 2: General Meeting, Pizza, and Presentation at the CSM Planetarium. Details on page 4.

Dec 17: Holiday Party at Crystal Springs Methodist Church, San Mateo. Bring a dish to share. Details on page 8.

Jan 6: **NO GENERAL MEETING** in January.

More events on page 7.

President's Corner

2016 is drawing to a close and I hope you have had a great year! It's been a busy and eventful year for SMCAS. A brief summary of our activities so far in 2016 shows this. We have:

- Held many star parties at Crestview Park—perhaps 15+;
- Provided star parties to many elementary schools (or at least attempted to, as many were canceled due to weather!);
- Held a Transit of Mercury viewing event at CSM in early May;
- Provided telescope support for the KIPAC Open House in May and the SLAC Kid's Night in September;
- Made history by holding the first ever star party in Levi Stadium in May for the Girl Scouts of Northern California;
- Put on spring and fall Equinox Socials, a summer banquet, and a Holiday Party coming up;
- Held a member StarBQue and public star party with the AstroWizard at Hidden Villa in August;
- Co-sponsored the Family Science and Astronomy Festival at the College of San Mateo in October;
- Held 9 general meetings with presentations;
- Published 9 outstanding issues of the *Event Horizon*;
- Built a new SMCAS web site;
- Started a new SMCAS Facebook Group;
- And more!

I feel tired just thinking about everything that SMCAS accomplished in 2016! If you appreciate all that SMCAS does for its members and the community, please be sure to join us, or renew your membership by year end. All of us on the Board of Directors appreciate you, our members, whether you are able to help out at our events, or just provide support through your membership! Thank you for your support and involvement! I look forward to a great 2017 for SMCAS.

SMCAS participated in the Menlo Park Library Science Night on Thursday evening, November 17. Many thanks to Ed Pieret for organizing our participation, and also thanks to the SMCAS members who showed up with telescopes to inform and delight the roughly 200 attendees who showed up: Edwin Ching, John Fiske, Ken Lum, and Mike Ryan.

We have been lucky to have three Supermoons in 2016 and December 14 will be the final one of 2016. Early native American tribes referred to Supermoons at this time of year as the Full Cold Moon, as this is the time of year when the nights are long and dark, and the cold winter air



John Fiske and Ed Ching at the Menlo Park Library Science Night

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President's Corner, continued from p. 2

becomes the norm. This last Supermoon, while impressive, has a downside in that the Geminid meteor shower, the king of meteor showers, is also on December 13–14! The bright light of the Supermoon will wash out the fainter meteors by a factor of 5–10 fold, and you may expect to see only around a dozen meteors per hour at the peak. That being said, the Geminids are known for their bright meteors, so the ones that will be seen should be spectacular. Viewing will be best at about 2am, when the constellation is at its zenith.

For those of you who purchased the Ottewell Astronomical Calendar in previous years during our SMCAS annual calendar sale, you may be aware that last year was the final year of publication and there is not a 2017 issue. However, the author, Guy Ottewell from Universal Workshop, is continuing some of his traditional content for 2017 in an online format on his website, check it out:

universalworkshop.com/guysblog/astronomical-calendar-2017

Don't forget we have our annual holiday party coming up December 17th, look for details elsewhere in this *Event Horizon* or on our website.

See you Dec 2 at the general meeting, we have a great speaker!

Marion Weiler

President, San Mateo County Astronomical Society

Update on Holiday Publication Orders

By Ed Ching

The holiday orders of the Astronomy Calendars for 2017 have arrived, and are ready to be picked up. For those who have already paid, please be sure to come to one of

- the general meeting on Friday, December 2;
- the SMCAS holiday party on Saturday, December 17; or
- the Board meeting on Tuesday, December 20

to receive them before the end of the year.

If you have not paid, please be prepared to pay in exact change on one of those dates.

The RASC Observer's Guides (whose price had increased from \$27 to \$31) are not yet in my hands, but are expected to arrive over the Thanksgiving weekend. Likewise, please come to collect them on one of those dates, and if they had not been paid for, please be ready to pay for them in exact change. If you do not pick them up before the end of the year, we may need to arrange for delivery sometime next year.

SMCAS General Meeting and Presentation on Friday December 2, 2016

Brian Day

NASA AMES Research Center

Mars Trek: Powerful Online Tools for Exploring Mars

Friday, December 2, 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. in the CSM Planetarium
Free and open to the public, free parking.

NASA's Mars Trek web portal provides a powerful new way to visualize and analyze data returned from Mars by a range of instruments aboard a number of spacecraft. Mars Trek's wealth of data, advanced capabilities, and easy to use interface make it useful for the general public and students, as well as for mission planners and planetary scientists. In this presentation, we will focus on how to use Mars Trek to explore the spectacular landforms of Mars, examine current and past sites of robotic exploration, and look ahead to proposed sites for human missions to Mars now being planned. The audience will learn to use Mars Trek's tools, including generating custom 3D prints of the Martian surface.



Brian Day works at NASA's Solar System Exploration Research Virtual Institute where he serves in lead positions for lunar and planetary mapping and modeling, citizen science, and outreach. He is a member of the site selection & analysis teams for the Resource Prospector and Lunar Mission One missions to the Moon, and is supporting analysis of potential human landing sites on Mars. Brian was the EPO Lead for NASA's LCROSS and LADEE lunar missions. Brian has participated in a number of NASA Mars Analog Field Studies working in extreme environments here on Earth that share some characteristics with Mars. In 2007, he flew on the Aurigid-MAC mission to record fragments of comet Kiess entering Earth's upper atmosphere.

November Meeting Review

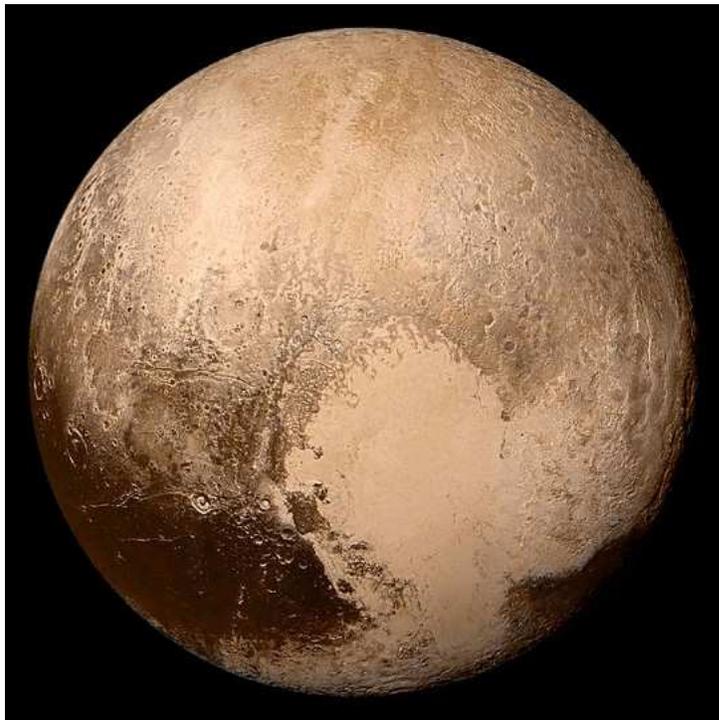
Exploration of the Pluto System: Updates from the New Horizons Mission

By Ken Lum

At November's SMCAS general meeting, we were treated to an update by Dr. Ross Beyer of the SETI Institute on the latest results from the New Horizons spacecraft mission to Pluto now fully downloaded from its July, 2015 flyby. Pluto was the first—and nearest—of what we now call the Kuiper Belt objects of the outer Solar System to be discovered. It was discovered by Clyde Tombaugh at the Lowell Observatory in Flagstaff, AZ in 1930, and has a 248 year orbit around the Sun that is highly eccentric with an aphelion (7.38 billion km) being nearly twice as far as its perihelion (4.44 billion km).

With the New Horizons mission, we now finally have very closeup photos and spectroscopy of this hitherto mysterious object. Pluto is a 2370 km diameter body consisting mostly of various frozen ices of nitrogen, methane, carbon monoxide and water forming a mantel surrounding a rocky core that also has radioactive elements generating heat driving a surprisingly active geology. The largest surface feature seen is a very brightly reflective, mostly smooth, heart-shaped area named Tombaugh Regio consisting mostly of upwelling frozen nitrogen in a subregion named Sputnik Planitia. This is occurring in a large 1000 km diameter depression that likely originated from a large impact. Floating in this smooth sea of semisolid nitrogen are mountains made of large masses of water ice. These appear to be wandering around as the frozen nitrogen ocean wells up from the interior.

Other unusual features include cryovolcanoes, such as Wright Mons and Piccard Mons which are oozing frozen water mixed with ammonia up under pressure. It is too early yet to explain all the fascinatingly unusual features that have been found. But all the indications are that Pluto is a



Composite image of Pluto from 450,000 km by New Horizons' Long Range Reconnaissance Imager. North is at the top. Tombaugh Regio is the bright heart-shaped region extending from the center to lower right. Sputnik Planitia is its brighter western lobe.

geologically active body with a young surface, relatively lacking in old impact craters, that is continually covering itself over with new material being pushed up from the interior.

It has also been known since 1988 that Pluto has an extremely rarefied atmosphere of only 10–11 pico bars at the surface—just 0.001% the sea level pressure of Earth's atmosphere. This atmosphere consists mostly of nitrogen with some methane and carbon monoxide. Initially, scientists were worried that this atmosphere might freeze entirely to the ground as Pluto moved away from its 1989 perihelion making it unexaminable by any spacecraft by remote sensing. Hence, New

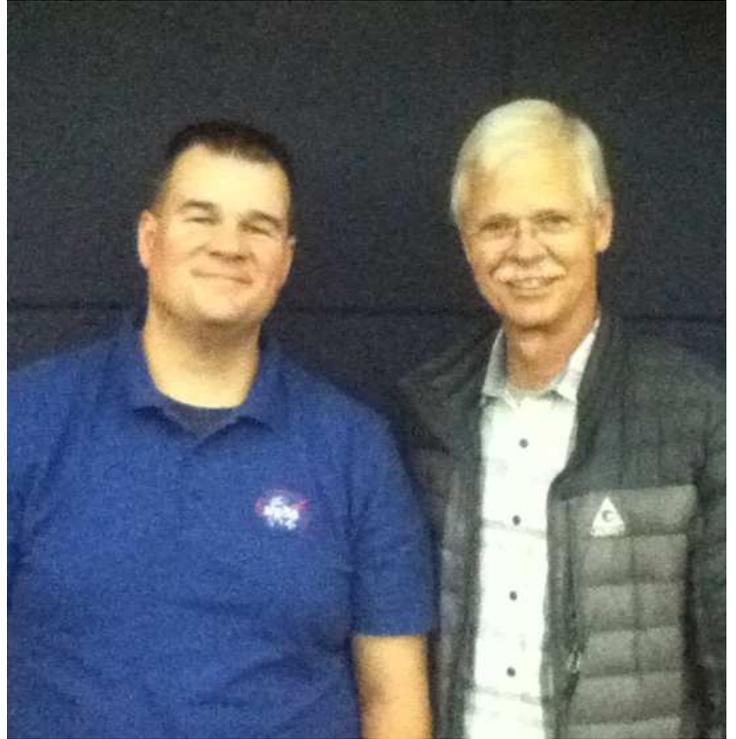
Continued on p. 6

November Meeting, continued from p. 5

Horizons was launched in 2006 ahead of this possibility. However, ground based observations showed Pluto's atmosphere was actually becoming denser partly due to its unusual orbital mechanics causing increased sublimation from its surface reservoirs of frozen nitrogen and other ices. Also, Pluto's atmosphere is held closer to the surface than anticipated due to colder than expected temperatures meaning there is little escape of atmospheric molecules into space expected from Pluto's low gravity. So the balance between sublimation and escape into space has resulted in a denser than anticipated atmosphere.

Finally, Pluto has an unusual retinue of five moons all arising probably from an impact early in its history-perhaps the one causing the Tombaugh Regio. The largest, Charon, was discovered in 1978. At 1208 km diameter, it is very large relative to its 2370 km diameter parent body. It consists mostly of water ice mixed with ammonia. It has a very large 1600 km long canyon likely arising from stretching of Charon's crust from the freezing of its water leading to a surface rupture. Charon's northern pole is also covered with a reddish material probably derived from weak reaction of solar UV with methane derived from Pluto's outer atmosphere. This led to the formation of long-chain hydrocarbons called tholins on Charon's surface. Four other much smaller moons have also been found in 2005 and 2012 while the spacecraft was well on its way. They have been named Nix, Hydra, Kerberos and Styx. All were imaged by New Horizons although the smaller moons could not be examined in much detail.

With the completion of its primary mission, new Horizons is now headed into the Kuiper belt where it will have a close encounter with the newly discovered Kuiper belt object 2014 MU69 on



November speaker Dr Ross Beyer with SMCAS President Marion Weiler.

January 1, 2019. Pluto itself only had one hemisphere fully illuminated for this flyby, but the other side will be facing the Sun in a little over 100 years. Perhaps we will send another probe to it at that time, hopefully to orbit Pluto and maybe even carry a lander. Something to be anticipated for future generations!

References

- J. Kelly Beatty, Pluto's Amazing Story, *Sky and Telescope* Oct. 2016.
- J. Kelly Beatty, Pluto's Perplexing Atmosphere, *Sky and Telescope* Nov. 2016.
- J. Kelly Beatty, Charon & Company, *Sky and Telescope* Dec. 2016.

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, Dec 2	7:00 pm	General Meeting, Pizza Social and Presentation
Sat, Dec 3	5:00 pm	Crestview Park Star Party
Tue, Dec 13	Midnight+	Geminids Meteor Shower Peaks — King of meteor showers (unfortunately also full moon this year)
Sat, Dec 17	6:00 pm	Holiday Party, Crystal Springs Methodist Church, San Mateo
Fri, Jan 6		No General Meeting in January
Sat, Jan 21	5:00 pm	Crestview Park Star Party
Sat, Jan 28	5:30 pm	Crestview Park Star Party
Fri, Feb 3	7:00 pm	General Meeting, Pizza Social and Presentation
Sat, Feb 18	5:45 pm	Crestview Park Star Party
Sat, Feb 25	5:45 pm	Crestview Park Star Party
Fri, Mar 3	7:00 pm	General Meeting, Pizza Social and Presentation
Sat, Mar 18	7:00 pm	Crestview Park Star Party
Sat, Mar 25	7:15 pm	Crestview Park Star Party

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 17th 2016

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!

Plus special presentation by Ken Lum on the Lowell Observatory.

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.

Free to a Good Home

Large older equatorial mount with dual axis drives and setting circles. I don't know the manufacturer or the history of this mount. I have owned it for about 15 years and I am guessing the mount was originally manufactured in the 70s or 80s. All of the electronics and drives work but the mount will require some repair work to function properly. The RA and Dec gears appear to be about 6" in diameter and made of bronze. The mount has many upgrades probably from previous owner(s) and it must have been a state of the art mount back in its day. The mount is very heavy, guessing close to 100 lbs. Call me for more information or come by and check it out for your self.

James Totoritis
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jamietot@earthlink.net



Dimming stars, erupting plasma, and beautiful nebulae

By Marcus Woo

Boasting intricate patterns and translucent colors, planetary nebulae are among the most beautiful sights in the universe. How they got their shapes is complicated, but astronomers think they've solved part of the mystery—with giant blobs of plasma shooting through space at half a million miles per hour.

Planetary nebulae are shells of gas and dust blown off from a dying, giant star. Most nebulae aren't spherical, but can have multiple lobes extending from opposite sides—possibly generated by powerful jets erupting from the star.

Using the Hubble Space Telescope, astronomers discovered blobs of plasma that could form some of these lobes. “We're quite excited about this,” says Raghendra Sahai, an astronomer at NASA's Jet Propulsion Laboratory. “Nobody has really been able to come up with a good argument for why we have

multipolar nebulae.”

Sahai and his team discovered blobs launching from a red giant star 1,200 light years away, called V Hydrae. The plasma is 17,000 degrees Fahrenheit and spans 40 astronomical units—roughly the distance between the sun and Pluto. The blobs don't erupt continuously, but once every 8.5 years.

The launching pad of these blobs, the researchers propose, is a smaller, unseen star orbiting V Hydrae. The highly elliptical orbit brings the companion star through the outer layers of the red giant at closest approach. The companion's gravity pulls plasma from the red giant. The material settles into a disk as it spirals into the companion star, whose magnetic field channels the plasma out from its poles, hurling it

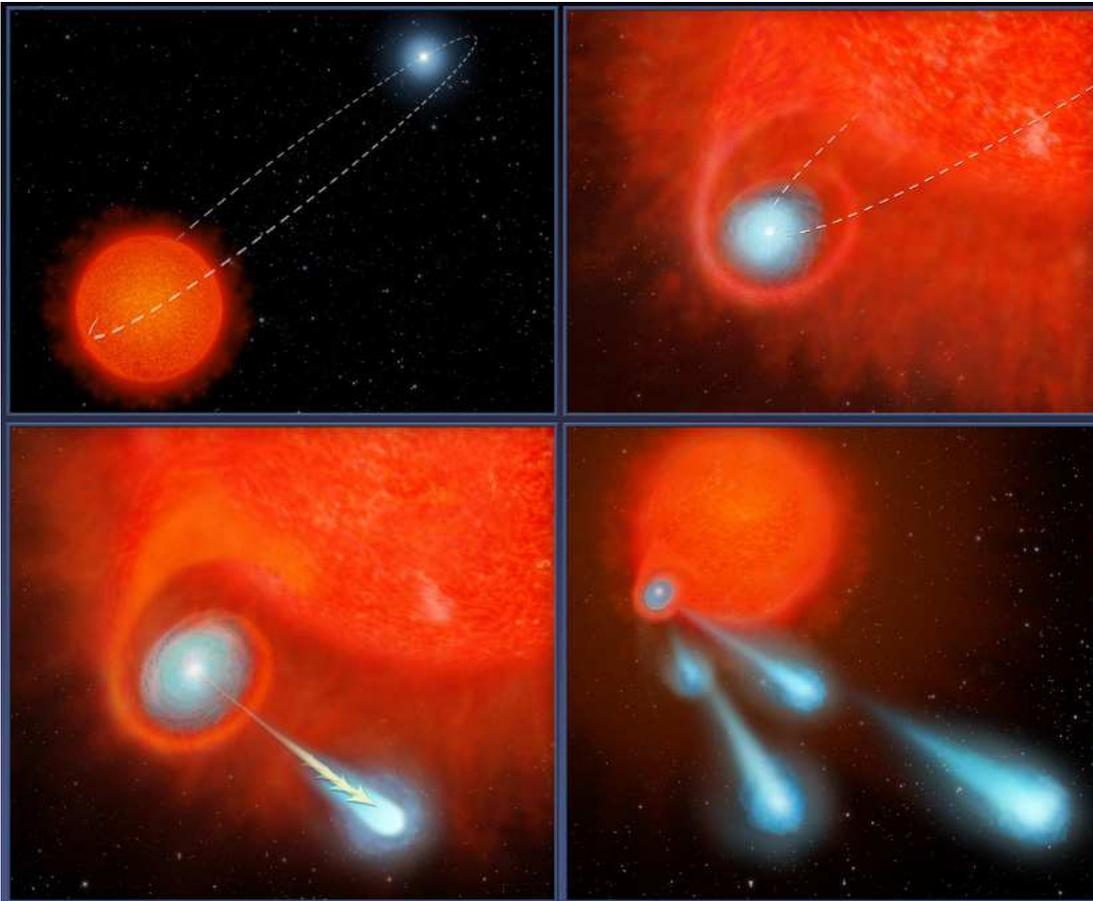


into space. This happens once per orbit—every 8.5 years—at closest approach.

When the red giant exhausts its fuel, it will shrink and get very hot, producing ultraviolet radiation that will excite the shell of gas blown off from it in the past. This shell, with cavities

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This four-panel graphic illustrates how the binary-star system V Hydrae is launching balls of plasma into space. Image credit: NASA/ESA/STScI



December Rise and Set Chart

SMCAS 2016 (PST)		Dec 3 Rise	Dec 3 Set	Dec 10 Rise	Dec 10 Set
Sun	Solstice on 21st	7:08 AM	4:50 PM	7:13 AM	4:51 PM
Moon	FQ:7,FM:13,LQ:20,NM:28	10:15 AM	8:48 PM	2:41 PM	3:07 AM
Mercury	After sunset	8:46 AM	5:59 PM	8:54 AM	6:12 PM
Venus	After sunset	10:23 AM	7:55 PM	10:23 AM	8:09 PM
Mars	In the evening	11:31 AM	9:51 PM	11:18 AM	9:50 PM
Jupiter	In the wee hours	2:38 AM	2:07 PM	2:16 AM	1:43 PM
Jupiter's moons		ci Jg e		c i J ge	
5 AM, East on left		J=Jupiter, c=Callisto, e=Europa, g=Ganymede, i=Io			
Saturn	In the sun's glare	7:34 AM	5:17 PM	7:10 AM	4:53 PM
Uranus	Most of the night	2:08 PM	3:02 AM	1:40 PM	2:34 AM
Neptune	In the evening	12:26 PM	11:35 PM	11:59 AM	11:08 PM
Pluto	After sunset	9:33 AM	7:18 PM	9:06 AM	6:51 PM

- Star Party at Crestview on the 3rd.
- Jazz Under the Stars at CSM on the 10th.

- 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						
< December 2016 >						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
27	28	29	30	1	7:00 PM General Membership Meetin	2 4:51 PM Crestview Star Party Sunset: 4:52 PM
4	5	6	7 	8	9	10 Sunset: 4:53 PM
11	12	13	14 	15	16	17 6:00 PM Holiday Party Sunset: 4:55 PM
18	19	20	21 	22	23	24 Sunset: 4:58 PM
Christmas Day 25	26	27	28	29 	30	31 Sunset: 5:03 PM

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

Calendar courtesy of Ed Pieret

V Hydrae, continued from p. 10

carved in it by the cannon-balls that continue to be launched every 8.5 years, will thus become visible as a beautiful bipolar or multipolar planetary nebula.

The astronomers also discovered that the companion's disk appears to wobble, flinging the cannonballs in one direction during one orbit, and a slightly different one in the next. As a result, every other orbit, the flying blobs block starlight from the red giant, which explains why V Hydrae dims every 17 years. For decades, amateur astronomers have been monitoring this variability, making V Hydrae one of the most well-studied stars.

Because the star fires plasma in the same few directions repeatedly, the blobs would create multiple lobes in the nebula—and a pretty sight for future astronomers.

If you'd like to teach kids about how our sun compares to other stars, please visit the NASA Space Place: spaceplace.nasa.gov/sun-compare/en/

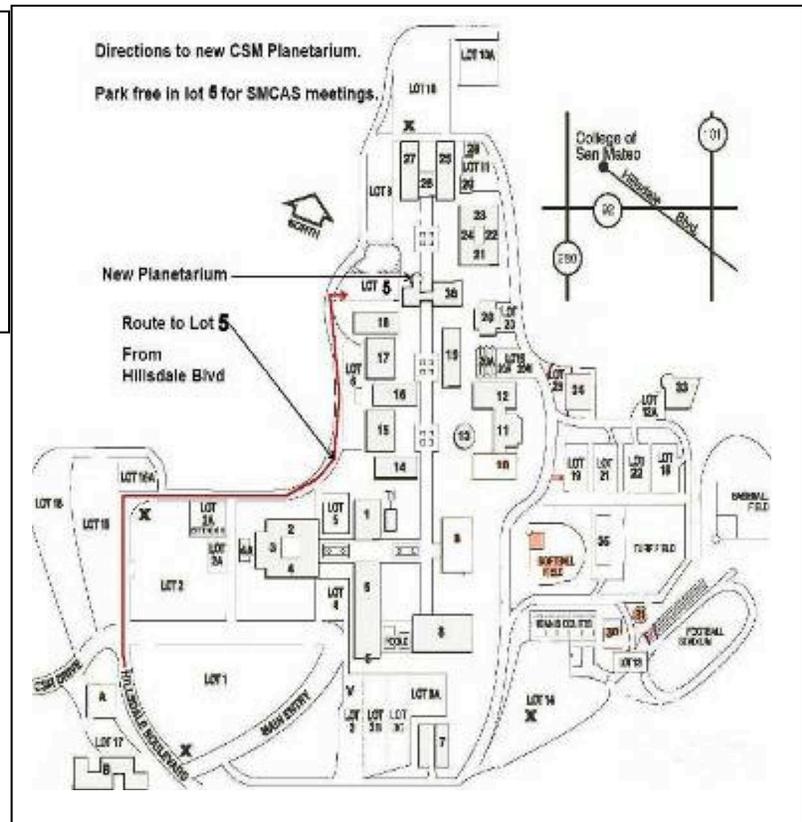
This article is provided by NASA Space Place. With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology. Visit spaceplace.nasa.gov to explore space and Earth science!

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.

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:** Vacant.
Board Directors-At-Large: Ed Ching, Bob Franklin, Ken Lum, Mary Ann McKay, Mike Ryan, and Frank Seminario.

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@yahoogroups.com to subscribe.

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