# ABOVE THE FOG

• BULLETIN OF THE SAN FRANCISCO AMATEUR ASTRONOMERS •

**Vol. 62, No. 7 - JuLY 2014**


## GENERAL MEETING – JULY 16, 2014

***Randall Museum . 199 Museum Way . San Francisco***
***7:00 pm Doors Open . 7:30 pm Announcements . 8:00 pm Speaker***
***SFAA's General Meetings occur on the 3rd Wednesday of each month (except January)***

## *TOM GREENE*

**Astrophysicist, NASA Ames Research Center**

## *THE JAMES WEBB SPACE TELESCOPE: SCIENCE POTENTIAL AND PROJECT STATUS*

The unprecedented sensitivity and resolution of the James Webb Space Telescope (JWST) will significantly advance a broad variety of astrophysics soon after it is launched in 2018. Its large (6.5-m diameter) primary mirror and infrared instruments will allow it to see some of the very first luminous objects that formed in the Universe after the Big Bang. Other major science themes of JWST encompass studying the assembly of galaxies, the birth of stars and planetary systems, planetary systems and the origins of life. JWST will be the premier astrophysics space observatory for NASA and ESA over its 5 - 10 year mission lifetime, supplanting the Hubble Space Telescope (which primarily works at visible and ultraviolet light wavelengths). In addition to the topics covered in this talk, many scientists will use JWST to make discoveries that we have not yet imagined.

JWST employs many unique technologies, and the mission has been in development for over 10 years. Many major hardware components - all large optics and all science instruments - have been completed, and integration of major components has begun. In this talk I will illustrate the mission's science potential and highlight the status of this development effort.

# *President's Message*

Hey SFAA,

I just finished reading the book "An Astronauts Guide to Life on Earth" by Commander Chris Hadfield. You may remember him as a commander of the International Space Station, or probably better yet, as the astronaut who released the Space Oddity cover he released. (If you haven't seen it, you should take the time to check it out.) While his book has great advice and is a good read for anyone, it's especially exciting for someone who loves space. The reason I bring this up is not to promote the book (despite thinking it's a great read) but that it is a great example of how amazing we can be if we really take the time and initiative to work for and achieve our dreams. Everyone is always saying you should shoot for the stars, and Cmdr Hadfield did just that. If you have a dream, don't give up and maybe one day you'll be there. I'll be here cheering you on!

As for club activities. We have Yosemite coming up soon. Spots are all full, but the waiting list is open for anyone still hoping to join us. Also, we have had a pretty low turnout for our city star parties. Without your help, we won't be able to continue to offer this great resource for members of the city who can't make it up to Mount Tam. If you can, please look at our calendar and consider coming out to the next star party to help out. The city loves it and we appreciate your time.

And finally, I just returned from a trip to the Big Island in Hawaii. I was able to get to the Mauna Kea Observatories and really enjoyed my trip. One thing that struck me was how the entire big island of Hawaii got involved with the Astronomy program. Instead of the white lights we have lining our streets, all of the lights on the island are amber and specially guarded to point down. While we don't have an observatory pushing this, it still goes to show that given the right motivation, there are things we can do to make the skies more space friendly. There has been some talk about creating a local chapter of the International Dark-Sky Foundation. The Dark-Sky Foundation is a political group that works with lawmakers and the cities to attempt to keep our skies dark while still staying safe outside. If we can get enough support, it might happen. If interested, feel free to contact the board and we'll get you in touch with the right people.

And with that, I wish you dark skies and amazing space formations! Keep looking up!

**Matt Jones**

**President**

**San Francisco Amateur Astronomers**

**2014**

# *SAN FRANCISCO*

# *AMATEUR ASTRONOMERS*

# *JULY EVENTS*

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| **July 12**<br><br>**Public Star Party** | **San Francisco City Star Party @ Randall Museum**<br>**Jul 12 @ 5:30 pm – 10:00 pm**<br><br>**Come join us at the Randall Museum in San Francisco for a night under the stars. SFAA members provide telescopes for your viewing pleasure. See our City Star Parties page for directions on how to get to the site.** |
| **July 16**<br><br>**Open to The Public** | **Astronomy Lecture @ Randall Museum**<br>**Jul 16 @ 7:00 pm – 9:00 pm**<br>**Once monthly, the SFAA hosts distinguished guest speakers who are leaders in the fields of astronomy, physics and related disciplines and they present to SFAA Members the latest developments from cutting-edge scientific programs. Held in the Randall Museum on the 3rd Wednesday of every month, join us in the Auditorium foyer for coffee and light snacks at 7:00 PM followed, in the Auditorium, by the General Meeting at 7.30 PM and lecture kick off at 8:00 PM.**<br><br>**Information will be posted as available at Randall Museum Lecture page as it is available.** |
| **July 26**<br><br>**Members Only** | **Mt. Tam Members Night @ Rock Springs Parking Lot - Mt Tam**<br>**Jul 26 @ 5:00 pm – 2:00 am**<br>**The SFAA hosts monthly public and members-only star parties at the Rock Springs parking lot in Mt Tamalpais State Park. The parking lot is above the Pan Toll ranger station, near the Mountain Theater.** |

# SAN FRANCISCO AMATEUR ASTRONOMERS
# UPCOMING LECTURES

**September 17, 2014**

## ROGER ROMANI, Professor of Physics, Stanford University

## BLACK WIDOW PULSARS: VENGEFUL STAR CORPSES

NASA's Fermi Gamma-ray Space Telescope has revealed a violent high-energy universe full of stellar explosions, black hole jets, and pulsing stars. These cosmic objects are often faint when observed with visible light, but glow bright with gamma rays. Dr. Romani will describe the quest to discover the true nature of the most puzzling of these gamma-ray sources. Several turn out to be a kind of star corpse called a 'black widow' pulsar. When a massive star dies, it leaves a collapsed remnant called a neutron star. When such a star corpse has a companion star, it can be reanimated by material from the companion. Ironically, the revived corpse then begins to vaporize its mate. Dr. Romani will discuss his group's discovery that these black widows may be the heaviest neutron stars known, on the edge of final collapse to black holes.

Roger Romani is professor of physics and member of the Kavli Institute at Stanford University. His research focuses on neutron stars and black holes. He enjoys finding new, strange phenomena in the sky and then building theoretical models to explain them. Past recognition for his work include Sloan Foundation and Cottrell Scholars fellowships and the Rossi Prize of the American Astronomical Society.

**October 15, 2014**

## KAREL SCHRIJVER, PH.D., Senior Fellow, Lockheed Martin STAR Labs, Palo Alto

## STORMS FROM THE SUN

The weather patterns of the Sun are powerful, ever changing, and mesmerizingly beautiful. They drive explosions of literally astronomical proportions that can escape the Sun's gravity to affect all of the planets from nearby Mercury to distant Uranus, including Earth. Space storms involve a force that we generally ignore in our daily lives: magnetism. This force can heat gases to millions of degrees, can speed up atoms to be as dangerous as radioactivity, and can force electromagnetic storms into the the electrical power grid. But although the terminology may be unfamiliar, space weather follows the laws of physics: storm paths can be forecast and storms lead to predictable consequences around Earth. We are rapidly increasing our understanding of how solar storms become space weather, but the Sun is a big object and the space between it and Earth is vast. We combine the sparse observational coverage of all that space with computer models to help us view the activity of the Sun-Earth system. Thus, we increasingly grasp how three apparently distinct types of space weather originate from explosive lightning storms on the star next door that affect satellites, radio signals, and high-voltage power lines.

Karel Schrijver is a senior fellow at the Lockheed Martin STAR Labs in Palo Alto, California. He received his doctorate in 1986 at the University of Utrecht on the topic of solar and stellar magnetic activity. His current research focuses on the magnetic activity of the Sun, the coupling of the Sun's magnetic field into the heliosphere, the manifestations of magnetic activity of other Sun-like stars, and the impact of solar variability on society.

In addition to scientific research, he is actively involved in developing and operating space instrumentation: he was the science lead and later the Principal Investigator for the Transition Region and Coronal Explorer (TRACE) and for the Atmospheric Imaging Assembly (AIA) of the Solar Dynamics Observatory (SDO), and co-investigator on the Helioseismic and Magnetic Imager (HMI) on SDO and on the Interface Region Imaging Spectrograph (IRIS) Small Explorer project.

# Southern Delta Aquarids

http://earthsky.org/astronomy-essentials/everything-you-need-to-know-delta-aquarid-meteor-shower

A Delta Aquarid meteor. Credit: Jimmy Westlake

**2014 Delta Aquarids Forecast**
This year the Delta Aquarids will peak 28-29 July. This year's peak occurs during a new moon, which means dark skies for optimal viewing. Begin looking for these faint meteors after midnight.

**Fast Facts**

- Comet of Origin: Unknown, 96P Machholz (suspected)
- Radiant: Constellation Aquarius
- Active: 12 July - 23 Aug. 2014
- Peak Activity: 28-29 July 2014
- Peak Activity Meteor Count: Approximately 20 meteors per hour
- Meteor Velocity: 41 km (25 miles) per second

**About the Meteor Shower**
The Delta Aquarids are active beginning in mid-July and are visible until late-August. These faint meteors are difficult to spot, and if there is a moon you will not be able to view them. If the moon has set, your best chance to see the Delta Aquarids is when meteor rates rise during the shower's peak at the end of July.

If you are unable to view the Delta Aquarids during their peak, look for them again during the Perseids in August: You will know that you have spotted a Delta Aquarid if the meteor is coming from the direction of the constellation Aquarius -- its radiant will be in the southern part of the sky. The Perseid radiant is in the northern part of the sky.

**Viewing Tips**
The Delta Aquarids are best viewed in the Southern Hemisphere and southern latitudes of the Northern Hemisphere. Find an area well away from city or street lights. Come prepared with a sleeping bag, blanket or lawn chair. Lie flat on your back and look up, taking in as much of the sky as possible. However, looking halfway between the horizon and the zenith, and 45 degrees from the constellation of Aquarius will improve your chances of viewing the Delta Aquarids. In less than 30 minutes in the dark, your eyes will adapt and you will begin to see meteors. Be patient -- the show will last until dawn, so you have plenty of time to catch a glimpse.

**Where Do Meteors Come From?**
Meteors come from leftover comet particles and bits from broken asteroids. When comets come around the sun, the dust they emit gradually spreads into a dusty trail around their orbits. Every year the Earth passes through these debris trails, which allows the bits to collide with our atmosphere where they disintegrate to create fiery and colorful streaks in the sky.

**The Comet**
The pieces of space debris that interact with our atmosphere to create the Delta Aquarids are suspected to originate from comet 96P/Machholz. This short period comet orbits the sun about once every five years.

Comet Machholz was discovered by Donald Machholz in 1986. Comet Machholz's nucleus is 6.4 km ( about 4 miles) across (this is a little more than half the size of the object hypothesized to have led the demise of the dinosaurs).

**The Radiant**
Their radiant -- the point in the sky from which the Delta Aquarids appear to come from -- is the constellation Aquarius. The third brightest star within this constellation is called Delta. This star and the constellation is also where we get the name for the shower: Delta Aquarids.

**Note:** The constellation for which a meteor shower is named only serves to aid viewers in determining which shower they are viewing on a given night. The constellation is not the source of the meteors. The name of a star (Delta) is part of this shower's name in order to help distinguish it from another meteor shower, the Eta Aquarids, which peak in May.

**Determine Meteor Shower Activity for Where You Live**
http://leonid.arc.nasa.gov/estimator.html

# August 2-3, 2014 – Yosemite Star Party at Glacier Point

**To sign up, just e-mail Dave Frey at** yofiestasemite@yahoo.com..
**Be sure to put "Yosemite Sign Up" in the subject line to reserve your campsite.**
**Sign up soon – It's filling up fast! Remember, the trip is available to MEMBERS ONLY.**

Since this is a Public Viewing Event that the SFAA attends as guests of the National Parks, all campers are expected to bring a telescope and be willing to host public viewing. The club aims to bring one telescope for every two SFAA members attending.

**About the Trip**

The SFAA is provided with FREE admission to Yosemite National Park as well as FREE reserved, shared campgrounds at Bridalveil Group Campground.

The campsite is 8.5 miles away from Glacier Point.

We will host two public star parties at Glacier Point, on Friday and Saturday night. We have the public (about 200 – 300 people) from twilight for a few hours, and then the rest of the night (and all day) to ourselves; this is a mighty good deal, considering how some folks come 12,000 miles to see these rocks. The National Park Service limits astronomy clubs to a maximum of 30 SFAA campers. Please do not ask if your friends can come …unless they are SFAA members and have telescopes.

**Observing site at Glacier Point**

The observing area is mostly open, with incredible views from about NNW to the east, around to due south. The horizon from south around to the west is partly blocked by tall trees. Still, there is a lot of open sky, and typically, the seeing and transparency are excellent. It has warm temperatures of 70 to 90 during the day, and cool to chilly 40's at night, due to the elevation of 7200 feet.

**Star Party**

One of the rangers does a sunset talk, and then delivers the crowd to us. Following that, a member of the club will give an evening talk, (want to volunteer?) The public will have white flashlights, and we need to be tolerant of that. We will have 3 club members with red brake light tape to politely cover the offending flashlights. Expect many questions from the public.

**The Reward**

By around 9:30 or so, we will have the place to ourselves, and can stay until dawn if you so choose. Scopes must be removed when we quit, then set up again on Saturday. Some of us may set up sun scopes during the afternoon, show Half Dome festooned with rock climbers, and invite people to come back again after sunset.

**Gastronomic Astronomic**

Early Saturday eve is the traditional potluck meal and is always tons of fun. Please provide enough food for ~ say 3 or 4 people. Salads, main courses, pu pu's, and desserts are all welcome. The question is: Who will have the best astronomical gastronomical theme of incredible edibles this year? Remember the Brown Dwarfs? Prizes will be awarded!

Please remember this repast takes time. It's better to start our own gastronomic party early so that there's no need to rush for set up Saturday evening on Glacier Point.

Check the National Weather Service for up-to-date weather info on Yosemite Park current weather and conditions.

**See you at the campsite.**
**Ken & Dave**

# 2014 ASTRONOMY PROGRAMS
# Mt. Tamalpais State Park
# Explore the Wonders of the Universe

**Free and open to all (no signup). Directions**

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| ***June 28***<br>8:30 p.m. | **Dr. Wil van Breugel, UC Merced**<br>**"Masks of the Cosmos"**<br>Humans have always wondered about the Cosmos and their own place in it. Different cultures have believed that they have discovered its true nature, but might these ideas just be anthropological 'masks' projected on the universe? |
| ***August 2***<br>8:30 p.m. | **Dr. Beate Heinemann , Lawrence Berkeley Lab**<br>.physics.berkeley.edu/research/faculty/heinemann.html<br>**"How We Found the Higgs Boson"**<br>How does the Large Hadron Collider near Geneva in Switzerland work and how did its use lead to the discovery in 2012 of the Higgs boson. What is hoped to be learned in the future at this collider. |
| ***August 30***<br>8:00 p.m. | **Dr. Lloyd Knox , UC Davis** virgo.physics.ucdavis.edu/~knox/<br>**"The Big Bang in Context"**<br>Follow the history of the "big bang" picture of our origins of the universe, clarified by observational successes. What remaining questions drive scientists toward deeper exploration. |
| ***September 27***<br>7:30 p.m. | **Dr. Lynn Cominsky , Sonoma SU universe.sonoma.edu/~lynnc**<br>**"NuSTAR's Sharper View of the Universe"**<br>Launched in June 2012, NuSTAR is bringing the high-energy Universe into focus. Exploding stars, hidden black holes and other exotic objects are all being studied in an entirely new light. |
| ***October 25***<br>7:00 p.m. | **Andrew Fraknoi, Foothill College** foothill.edu/ast<br>**" The Top Tourist Sights of the Solar System"**<br>Where will Bill Gates' Great-Granddaughter go on her honeymoon? Using spectacular space photos we will explore the most intriguing future "tourist destinations" among the planets and moons in our cosmic neighborhood<br>**Co-produced with Wonderfest-part of Bay Area Science Festival** |

# July 2014 - THE EVENING SKY

May Sky Map: http://skymaps.com/skymaps/tesmn1407.pdf

May Sky Calendar: http://skymaps.com/articles/n1407.html

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# BAY AREA ASTRONOMY EVENTS

**Kenneth Lum**

http://tech.groups.yahoo.com/group/bayastro/?v=1&t=directory&ch=web&pub=groups&sec=dir&slk=94

## BAY AREA REGULARLY SCHEDULED EVENTS

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| **EVERY FRIDAY NIGHT**<br>**7:00 PM – 10:00 PM**<br>**excluding major holidays**<br><br>**The Telescope Makers' Workshop**<br><br>**CHABOT SPACE AND SCIENCE CENTER**<br>**10000 Skyline Boulevard**<br>**Oakland, CA 94619-2450** | **THE TELESCOPE MAKERS' WORKSHOP** is held every Friday night from 7pm - 10pm, excluding major holidays (e.g. Christmas Day and New Year's Day) that fall on Fridays. The Workshop is always closed on Memorial Day Weekend. Attendance every Friday night is not mandatory, and members work at their own pace. The Workshop meets at Chabot Space & Science Center, 10000 Skyline Blvd., Oakland. Contact us for more specific details:<br><br>Contact: E-mail Richard Ozer (rozer@pacbell.net) or (510) 406-1914 |
| **EVERY FRIDAY & SATURDAY EVENING, weather permitting**<br>**7:30 PM – 10:30 PM**<br><br>**CHABOT SPACE AND SCIENCE CENTER**<br>**10000 Skyline Boulevard**<br>**Oakland CA 94619-2450**<br>**(510) 336-7300** | **EXPLORE THE NIGHT SKIES AT THE CHABOT OBSERVATORIES**<br>For more information: http://www.chabotspace.org/<br><br>**Free Telescope Viewing**<br>Regular hours are every Friday & Saturday evening, weather permitting: 7:30pm -10:30pm Come for spectacular night sky viewing the best kept secret in the Bay Area and see the magnificence of our telescopes in action!<br><br>**Daytime Telescope Viewing** On Saturday and Sunday afternoons come view the sun, moon, or Venus through Chabot's telescopes. Free with General Admission. (weather permitting)<br><br>12pm - 5pm: Observatories Open |
| **Sunset – 5:11 PM**<br>**(TWICE MONTHLY)**<br><br>**Inclement weather (clouds, excessive wind and showers) will cause the event to be canceled without notice.**<br><br>**SAN MATEO COUNTY ASTRONOMICAL SOCIETY STAR PARTY** | **STAR PARTIES AT CRESTVIEW PARK, SAN CARLOS**<br><br>Come out and bring the kids for a mind expanding look at the universe<br><br>The City of San Carlos Parks and Recreation Department and the San Mateo County Astronomical Society has open Star Parties twice a month. These events are held in Crestview Park, San Carlos California. Note that inclement weather (clouds, excessive wind and showers) will cause the event to be canceled without notice.<br>For more information call Bob Black, **(650)592-2166**, or send an email to SMCAS@live.com or call Ed Pieret at **(650)862-9602.** |

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| | **Reasons to Attend**<br>If you have kids interested in space or planets bring them here for a real life view of planets, nebula, star clusters and galaxies.<br>If you are thinking of buying a telescope or want help using a telescope you own, come here to talk with experienced users. If you think you might have an interest in astronomy come and talk to experienced amateur astronomers.<br>Cautions<br>Dress warmly and wear a hat.<br>Visitors should park on the street and walk into the park so your headlights don't affect the observer's dark adaptation.<br>Only park in the parking lot if you are arriving before dark and plan to stay until the end of the event.<br>You shouldn't need lights but if you feel you do, only bring a small flashlight with the lens covered using red cellophane or red balloon.<br>Please respect the telescopes and ask permission from the owner if you wish to touch.<br>Parents, please watch your children.<br>The park is residential, and adjacent to homes and backyards, please keep noise to a minimum.<br>Schedule Time<br>Astronomers arrive to set up at around sunset. Observing starts at about one hour after sunset and continues for two to three hours. |
| **EVERY CLEAR SATURDAY MORNING OBSERVATORY**<br>**10:00 AM – 12:00 PM**<br><br>**FOOTHILL COMMUNITY COLLEGE**<br>**12345 Moody Road**<br>**Los Altos Hills**<br><br>**Cost: Free** | Solar observing with a Hydrogen alpha solar telescope every clear Saturday morning. This allows spectacular views of solar prominences and unusual surface features on the Sun not otherwise visible with regular white light telescopes.<br>Admission is free.<br><br>Foothill Observatory is located on the campus of Foothill College in Los Altos Hills, CA. Take Highway 280 to the El Monte Rd. exit. The observatory is next to parking lot 4. Parking at the college requires visitor parking permits that are available from the machines in the parking lots for $ 3.00. |
| **EVERY CLEAR FRIDAY EVENING**<br>**9:00 PM – 11:00 PM**<br><br>**FOOTHILL COMMUNITY COLLEGE OBSERVATORY**<br>**12345 Moody Road**<br>**Los Altos Hills**<br><br>**Cost: Free** | Foothill Observatory is open for public viewing every clear Friday evening from 9:00 p.m. until 11:00 p.m. Visitors can view the wonders of the universe through the observatory's computer-controlled 16-inch Schmidt-Cassegrain telescope. Views of objects in our solar system may include craters and mountains on the moon, the moons and cloud-bands of Jupiter, the rings of Saturn, etc. Deep space objects including star clusters, nebulae, and distant galaxies also provide dramatic demonstrations of the vastness of the cosmos. The choice of targets for<br>Any evening's viewing depends on the season and what objects are currently in the sky.<br><br>The public viewing programs at Foothill are free of charge and are open to guests of all ages. Please note that the observatory is closed when the weather is cloudy. Also note that visitor parking permits are available from the machines in the parking lots for $3.00.<br><br>Come to Foothill Observatory and join us in the exploration of our Universe!<br><br>Foothill Observatory is located on the campus of Foothill College in Los Altos Hills, CA. Take Highway 280 to the El Monte Rd exit. The observatory is next to parking lot 4. Parking at the college requires visitor parking permits that are available from the machines in the parking lots for $3.00. |

**BAY AREA EVENTS – JULY 2014**
**http://groups.yahoo.com/neo/groups/bayastro/conversations/topics/49**

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| **Tuesday, July 15**<br>**12 Noon**<br><br>**SETI INSTITUTE**<br>**COLLOQUIUM SERIES**<br>**189 Bernardo Avenue**<br>**Mountain View 94043** | **WATER VAPOR AT EUROPA'S SOUTH POLE – OBSERVATIONS BY THE HUBBLE SPACE TELESCOPE**<br>**LORENZ ROTH**<br>**SOUTHWEST RESEARCH INSTITUTE**<br><br>https://plus.google.com/events/c17d03inhhiu4us0v73fn7a9tic<br>With its subsurface water ocean and relatively young icy surface Europa is among the top candidates in the search for habitable environments in our solar system.<br>Existence of water vapor plumes on Europa has long been speculated and could possibly provide accessibility of subsurface liquid reservoirs.<br>Images of auroral emissions obtained in December 2012 by the Hubble Space Telescope (HST) revealed coincident signals from hydrogen and oxygen pointing to the existence of transient water vapor near the moon's south pole. The aurora is excited by impinging charged particles from Jupiter's huge magnetosphere, which interacts with Europa's atmosphere and interior water ocean.<br>Dr. Roth will provide an overview of the complex interaction between Europa and Jupiter's magnetosphere, the generation of the plume aurora signals and our HST detection method, and the important implications of the plume discovery for the future exploration of Europa and its hidden water ocean. |
| **Friday, July 18**<br>**12:30 PM – 2:00 PM**<br><br>**STANFORD LINEAR ACCELERATOR CENTER**<br>**2575 Sand Hill Road**<br>**Madrone Conference Room**<br>**Menlo Park CA 94025** | **STEFANO PROFUMO, UC SANTA CRUZ**<br>**NEW PHYSICS WITH GAMMA-RAY ASTRONOMY?**<br><br>Cost: Free |
| **Friday, June 20**<br>**8:30 PM**<br><br>**Lick Observatory**<br>**7299 Mt. Hamilton Rd**<br>**Mt. Hamilton, CA 95140** | **LICK OBSERVATORY SUMMER VISITOR'S PROGRAM**<br><br>**THE LUMINOUS SEARCH FOR DARK MATTER**<br>**SPEAKER: AARON ROMANOWSKY, SAN JOSE STATE**<br>Part of the Lick Summer Visitor's series. Tickets on sale 4/15 at Noon.<br>Website: http://www.ucolick.org/public/sumvispro.html<br>Cost: $9.50 |
| **Friday, July 18**<br>**9:30 PM – 11:30 PM**<br><br>**Houge Park, San Jose** | **SAN JOSE ASTRONOMICAL ASSOCIATION STAR PARTY**<br><br>Interested in learning about the night sky?<br>Come out and look through our members scopes and ask us questions. It's free and educational.<br>Sunset 8:26 pm, 49% moon rises 12:37 am. |

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| Saturday, July 19<br>7:30 PM - 8:15 PM<br><br>Chabot Space and Science Center<br>10000 Skyline Blvd<br>Oakland, CA 94619<br><br>**Cost: Free with Admission** | FARIDE KHALAF<br>STAYING ALIVE - THE SOKOL SPACESUIT<br><br>Learn the history of spacesuits from the earliest pressure suits worn by aviators in the 1930s to the more recent state of the art suits used for work on International Space Station. View an actual Russian Sokol Spacesuit, with a demonstration of its features and its use. Worn by all who fly on the Soyuz spacecraft, it is known as a rescue suit not suitable for spacewalks. Explore what makes this suit so special. |
| **Saturday, July 19**<br>**8:30 PM**<br><br>Lick Observatory<br>7299 Mt. Hamilton Rd<br>Mt. Hamilton, CA 95140<br><br>**Cost: $40** | **GEOFF MARCY - UNIVERSITY OF CALIFORNIA AT BERKELEY**<br>**"ONE SMALL STEP: OTHER EARTHS AND INTELLIGENT LIFE IN THE UNIVERSE"**<br><br>**MUSIC OF THE SPHERES CONCERT #2: ANCIENT FUTURE**<br><br>Ancient Future is the first and longest running organization dedicated exclusively to creating world fusion music. The term was coined by bandleader Matthew Montfort in 1978 to describe Ancient Future's unusual blend of musical traditions from around the world. Billboard calls the group "trendsetters" for their early contributions to world fusion.<br><br>Web site: http://www.ucolick.org/public/music.html |
| **Tuesday, July 22**<br>**12:00 PM**<br><br>**SETI Institute Colloquium Series**<br>**189 Bernardo Ave**<br>**Mountain View, CA 94043** | **THE DIVERSITY OF HABITABLE ZONES AND THE PLANETS**<br>**STEPHEN KANE, SAN FRANCISCO STATE UNIVERSITY**<br><br>The field of exoplanets has rapidly expanded from the exclusivity of exoplanet detection to include exoplanet characterization. A key step towards this characterization is the determination of which planets occupy the Habitable Zone (HZ) of their host stars. As the Kepler data continues to be processed, the orbital period sensitivity is increasing and there are now numerous exoplanets known to occupy the HZ of their host stars. In this talk Dr. Kane will describe the properties of the HZ, the dependence on the spectral type properties, and the current state of exoplanet detections in the HZ. Along the way Dr. Kane will attempt to dispel some common misconceptions regarding the Habitable Zone. Dr. Kane will relate HZ results to the calculation of eta_Earth and eta_Venus. Finally, Dr. Kane will present several case studies of HZ Kepler planets, including circumbinary planets for which the HZ is a time-dependent function. |
| **Friday, July 25 and Saturday, July 26**<br>**9:00 AM - 4:30 PM**<br><br>**COLLEGE OF SAN MATEO**<br>**Building 36**<br>**1700 W Hillsdale Rd**<br>**San Mateo, CA 94402**<br><br>**Cost: Free** | **BAY AREA PROJECT ASTRO INTRODUCTORY WORKSHOP (DAY 1)**<br>**SHOW A CHILD THE UNIVERSE AND INSPIRE THE NEXT GENERATION OF SCIENCE LEADERS!**<br><br>**ASP'S PROJECT ASTRO PARTNERS TEACHERS WITH ASTRONOMERS IN BAY AREA SCHOOLS & COMMUNITY ORGANIZATIONS**<br><br>Project ASTRO is looking for 3rd–9th grade teachers to work with volunteer astronomers who have a keen interest in sharing the wonders of astronomy with students. Together, teachers and their astronomer partner attend a free 2-day summer workshop to learn hands-on, inquiry-based astronomy activities designed to involve students in the excitement of scientific discovery.<br><br>This is a 2 day workshop, and attendance is required at both days. |

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| | Target Audience: Teachers in grades 3 – 9; volunteer astronomers with a passion for sharing their love of astronomy To apply go to: http://astrosociety.org/education/k12-educators/sf-bay-area-project-astro/<br><br>Contact: Brian Kruse Email: bkruse@astrosociety.org<br>Phone: 415-715-1426<br>Website: http://www.astrosociety.org/education/k12-educators/sf-bay-area-project-astro/ |

# NASA SCIENCE NEWS

## Three Supermoons in a Row

**July 10, 2014:** In June of last year, a full Moon made headlines. The news media called it a "supermoon" because it was 14% bigger and 30% brighter than other full Moons of 2013. Around the world, people went outside to marvel at its luminosity.

If you thought one supermoon was bright, how about three….? The full Moons of summer 2014—July 12th, August 10th, and Sept. 9th--will all be supermoons.

A new ScienceCast video counts the supermoons of summer 2014. Play it

The scientific term for the phenomenon is "perigee moon." Full Moons vary in size because of the oval shape of the Moon's orbit. The Moon follows an elliptical path around Earth with one side ("perigee") about 50,000 km closer than the other ("apogee"). Full Moons that occur on the perigee side of the Moon's orbit seem extra big and bright.

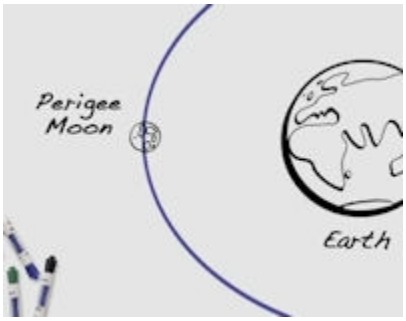
This coincidence happens three times in 2014. On July 12th and Sept 9th the Moon becomes full on the same day as perigee. On August 10th it becomes full during the same hour as perigee—arguably making it an extra-super Moon."

It might seem that such a sequence must be rare. Not so, says Geoff Chester of the US Naval Observatory.

"Generally speaking, full Moons occur near perigee every 13 months and 18 days, so it's not all that unusual," he says. "In fact, just last year there were three perigee Moons in a row, but only one was widely reported."

In practice, it's not always easy to tell the difference between a supermoon and an ordinary full Moon. A 30% difference in brightness can easily be masked by clouds and haze. Also, there are no rulers floating in the sky to measure lunar diameters. Hanging high overhead with no reference points to provide a sense of scale, one full Moon looks about the same size as any other.

Chester expects most reports of giant Moons this summer to be … illusory.




Perigee is the point in the Moon's elliptical orbit closest to Earth. **Diagrams:**#1, #2

"The 'Moon Illusion' is probably what will make people remember this coming set of Full Moons, more than the actual view of the Moon itself," he says.

The illusion occurs when the Moon is near the horizon. For reasons not fully understood by astronomers or psychologists, low-hanging Moons look unnaturally large when they beam through trees, buildings and other foreground objects. When the Moon illusion amplifies a perigee Moon, the swollen orb rising in the east at sunset can seem super indeed.

"I guarantee that some folks will think it's the biggest Moon they've ever seen if they catch it rising over a distant horizon, because the media will have told them to pay attention to this particular one," says Chester.

"There's a part of me that wishes that this 'super-Moon' moniker would just dry up and blow away, like the 'Blood-Moon' that accompanied the most recent lunar eclipse, because it tends to promulgate a lot of mis-information," admits Chester. "However, if it gets people out and looking at the night sky and maybe hooks them into astronomy, then it's a good thing."

Indeed it is.

Mark your calendar--July 12th, August 10th, and Sept. 9th –and enjoy the super-moonlight.

**Credits:** Author: Dr. Tony Phillips | Production editor: Dr. Tony Phillips | Credit: Science@NASA

Close-up of comet 67P/C-G on 30 April 2014. *Credit: ESA/ Rosetta/ MPS for OSIRIS Team MPS/ UPD / LAM/ IAA/ SSO/ INTA/ UPM/ DASP/ IDA*

"A flyby is just a tantalizing glimpse of a comet at one stage in its evolution," points out Alexander. "Rosetta is different. It will orbit 67P for 17 months. We'll see this comet evolve right before our eyes as we accompany it toward the sun and back out again."

The most exciting moment of the mission will likely come in November when a European-built lander descends from the spacecraft and touches down on the comet's surface. The lander's name is "Philae" after an island in the Nile, the site of an obelisk that helped decipher—you guessed it—the Rosetta Stone.

Because a comet has little gravity, the lander will anchor itself with harpoons. "The feet may drill into something crunchy like permafrost, or maybe into something rock solid," Alexander speculates.

Once it is fastened, the lander will commence an unprecedented first-hand study of a comet's nucleus while Rosetta continues to monitor developments overhead.

Although Rosetta is a European mission, NASA has contributed some important instruments to the spacecraft, and US scientists are just as eager as their European counterparts for Rosetta to arrive. The recent photos have helped mission controllers pinpoint 67P and start a series of maneuvers that will slowly bring the spacecraft in line with the comet in time for an August rendezvous.

"Our target is ahead," says Alexander, "and Rosetta is chasing it down!"

**Credits:**
Author: Dr. Tony Phillips | Production editor: Dr. Tony Phillips | Credit: Science@NASA
**Web Links:** Rosetta -- ESA mission home page Rosetta's Target Comet is Becoming Act

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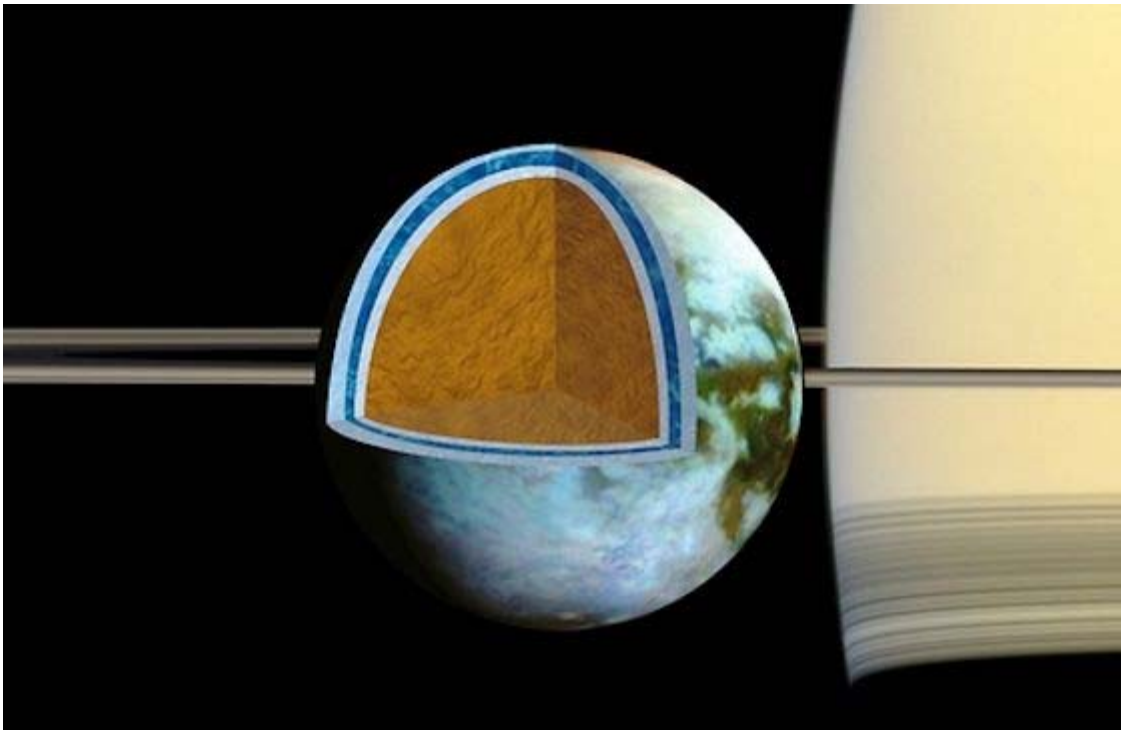
## Saturn's Moon Titan Has a Very Salty Ocean

**July 2, 2014:** Scientists analyzing data from NASA's Cassini mission have firm evidence of an ocean inside Saturn's largest moon, Titan, which might be as salty as the Earth's Dead Sea. The findings are published in this week's edition of the journal Icarus.

"This is an extremely salty ocean by Earth standards," said the paper's lead author, Giuseppe Mitri of the University of Nantes in France. "Knowing this may change the way we view this ocean as a possible abode for present-day life, but conditions might have been very different there in the past."



Researchers found that Titan's ice shell, which overlies a very salty ocean, varies in thickness around the moon, suggesting the crust is in the process of becoming rigid. Image Credit: NASA/JPL/SSI/Univ. of Arizona/G. Mitri/University of Nantes

The new results come from a study of gravity and topography data collected during Cassini's repeated flybys of Titan during the past 10 years. Researchers found that a relatively high density was required for Titan's subsurface ocean in order to explain the gravity data. This indicates the ocean is probably an extremely salty brine of water mixed with dissolved salts likely composed of sulfur, sodium and potassium. The density indicated for this brine would give the ocean a salt content roughly equal to the saltiest bodies of water on Earth.

Their findings also support the idea that the moon's icy shell is rigid and in the process of freezing solid.

The thickness of Titan's ice crust appears to vary slightly from place to place. The researchers said this can best be explained if the moon's outer shell is stiff, as would be the case if the ocean were slowly crystalizing, and turning to ice. Otherwise, the moon's shape would tend to even itself out over time, like warm candle wax. This freezing process would have important implications for the habitability of Titan's ocean, as it would limit the ability of materials to exchange between the surface and the ocean.

The data also touch on a major mystery: The presence of methane in Titan's atmosphere. Scientists have long known that Titan's atmosphere contains methane, ethane, acetylene and many other hydrocarbon compounds. But sunlight irreversibly destroys methane after tens of millions of years, so something has replenished methane in Titan's thick air during the moon's 4.5 billion-year history.

The rigid ice shell model published in Icarus suggests that any outgassing of methane into Titan's atmosphere must happen at scattered "hot spots" (like the hot spot on Earth that gave rise to the Hawaiian Island chain), not from a broader process such as convection or plate tectonics.

"Titan continues to prove itself as an endlessly fascinating world," said Linda Spilker, Cassini project scientist at NASA's Jet Propulsion Laboratory (JPL) in Pasadena, California, who was not involved in the study. "With our long-lived Cassini spacecraft, we're unlocking new mysteries as fast as we solve old ones."

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. JPL manages the mission for NASA's Science Mission Directorate in Washington.

For more information about Cassini, visit http://www.nasa.gov/cassini

**Credits:** Production editor: Dr. Tony Phillips | Credit: Science@NASA

San Francisco Amateur Astronomers
PO Box 15097
San Francisco, CA 94115

**San Francisco Amateur Astronomers**
**Application for New or Renewing Membership**

1. Memberships, with dues payment, are for one year running from standard renewal dates of 1 July to 30 June and 1 January to 31 December.

2. Submitting appropriate dues in April, May, June, July, August, September, membership will run to 30 June of the next year.

3. Submitting appropriate dues in October, November, December, membership will run to 31 December of the next year; submitting appropriate dues in January, February or March, membership will run to 31 December of the same year.

4. Renewals are maintained at the original membership date unless the renewal is made later than the original cutoff date (e.g. September or March as described in 3). In such cases the membership date is shifted to the next renewal date 30 June or 31 December.

5. New or renewal memberships sent in via USPS mail will have membership start date based on postmark date.

**This application is for:**

□ New

□ Renewing

Name:_____

Address:_____

_____

Email:_____

Home Telephone (optional):_____

Cell Phone (optional):_____

**Membership Type**: □ Individual $25.00 / □ Family $30.00 / □ Student $10.00 / □ Supporting $75.00

## □ Please mail to me a Mt. Tamalpais Parking Permit

**To complete the membership process:**
A. Print and fill out this form
B. Make check or money order payable to San Francisco Amateur Astronomers
C. Mail this form and payment to:

**Treasurer, SFAA**
**PO Box 15097**
**San Francisco, CA 94115**

New members will be entered onto the SFAA roster on the Night Sky Network (NSN) and will receive a verifying email from the NSN with username and password for the NSN. Renewing members will have their information updated but will not receive an email from the NSN. Both new and renewing members will receive a verifying email from the SFAA Treasurer upon completion of the membership process.

## 2013 Club Officers & Contacts

| | | |
|---|---|---|
| President | **MATTHEW JONES** | president@sfaa-astronomy.org |
| Vice President | **Douglas Smith** | vice-president@sfaa-astronomy.org |
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| Secretary | **Ryan Binford** | secretary@sfaa-astronomy.org |
| Speaker Chair | **Linda Mahan** | |
| Newsletter Editor | **Annette Gabrielli** | editor@sfaa-astronomy.org |
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| | **Suzanne Huang** | Suzanne.Huang@sfaa-astronomy.org |

## Club Telescopes

The SFAA owns eight very fine, easy to use, loaner telescopes well-suited for deep sky, planets, and star parties. All scopes are available to any SFAA member. The loaner custodians for the majority of our fleet are Pete & Sarah Goldie. Please contact them at telescopes@sfaa-astronomy.org for details if you are interested in borrowing a scope or if you have items you can donate for the loaner program (eyepieces, star maps/books, red flashlights, collimator, etc.). Please contact the appropriate member indicated below if you are interested in borrowing one of the telescopes.

1) 6" f/10.3 Dobsonian/Ken Frank ken@sfaa-astronomy.org
2) 8" f/7 Dobsonian/Pete Goldie
3) 8.5" f/6 Dobsonian/Pete Goldie
4) 10" f/8 Dobsonian/Pete Goldie
5) 114mm f/4 Newtonian StarBlast/Pete Goldie
6) 8" f/10 Celestron SCT/ Ken Frank ken@sfaa-astronomy.org
7) 8" f/10 Meade SCT/Stefanie Ulrey/treasurer@sfaa-astronomy.org
8) 9.5" f/5.6 Celestron Newtonian/Ken Frank/ ken@sfaa-astronomy.org

## Club Astronomy Videos

The SFAA owns a series of astronomy videotapes featuring Alex Filippenko, a world-renowned professor of astronomy at UC Berkeley. The videotapes provide an introduction to astronomy and cover topics such as the Solar System, the lifecycles of stars, the nature of galaxies, and the birth of the Universe. The SFAA loans the tapes free to all members. If you are interested in viewing these tapes, you may check them out at any of the SFAA General Meetings. These tapes were kindly donated to the SFAA by Bert Katzung. For information on the course tapes themselves:

**http://www.teach12.com/ttc/assets/coursedescriptions/180.asp**

## Membership Dues

Membership is billed for each upcoming year on June 30. Members may receive no more than one bulletin after the expiration of membership.

## SFAA Website and Online Services

The SFAA web site at sfaa-astronomy.org is provided to our members and the general public for the sharing of club information and services. The web site contains links for club star parties, events, newsletters, lectures and meetings. If you wish to interact with other people who are interested in astronomy, the SFAA web site offers public and members only bulletin board forums. If you wish to remain up-to-date on club activities, then we encourage you to subscribe to one or both of our public mailing lists, which will allow you to receive our newsletter and/or club announcements via email. Other useful and interesting information and services are available on the site such as observing location reviews, member astronomy photos, and members only telescope loans. Information about SFAA's membership, organization and by-laws are available at the club's online public document archive. If you need to contact a representative of the SFAA, then please visit our contacts page to help in finding the right person to answer your questions.

***Above the Fog*** *is the official bulletin of the San Francisco Amateur Astronomers. It is the forum in which club members may share their experiences, ideas, and observations. We encourage you to participate by submitting your articles, announcements, letters, photos and drawings. We would also like to hear from our new members. Tell us about yourself – what you have done in the past and what other clubs you have joined.* ***The deadline for the next issue is the 25th day of the month****. Send your articles to* ***Editor@sfaa-astronomy.org***

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***Sharing the Wonders of the Universe***

**Has your membership expired?** Your mailing label includes the month and year through which your membership is paid. If it is past, your membership has expired and this may be your last issue.