

★ ABOVE THE FOG

• BULLETIN OF THE SAN FRANCISCO AMATEUR ASTRONOMERS •

Vol. 62, No. 2 - April 2014

GENERAL MEETING - APRIL 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)

GLOBULAR CLUSTERS OF THE MILKY WAY

GRAEME SMITH

Professor of Astronomy, University of California



Globular clusters are ancient stellar systems that formed at very early times in the history of the Milky Way galaxy. The talk will cover topics such as how globular clusters are distributed within the Milky Way, their ages, chemical compositions, and the types of stars found within them. Such basic properties of globular clusters will be described with a particular emphasis on how these systems of stars can serve as an astronomical fossil record.

Graeme Smith is a Professor of Astronomy at the University of California. Much of his research centers around properties of red giant stars within the Milky Way galaxy: their physical evolution, their chromospheric activity

and mass loss, and what they can tell us about the chemical enrichment history of the Galaxy.

The main area of Smith's research has been the properties of the oldest populations of stars within our Galaxy, with regard to both their physical evolution and what they can tell us about the chemical enrichment history of the Milky Way. Much of his work has been directed towards the study of abundance differences among stars within globular clusters. These clusters are amongst the oldest stellar systems within the Galaxy, having formed at a time when the process of galactic chemical enrichment was just commencing. Striking differences in the abundances of the elements carbon, nitrogen, oxygen, sodium, magnesium, and aluminum typically exist among stars within the same globular cluster. Understanding the origin of these differences can potentially provide information about the early environment in the halo of our Galaxy, within which the globular clusters formed, as well as about processes, such as mixing, occurring within the interiors of their stars.

Another area of interest is that of chromospheric activity among evolved red giants, particularly those of Population II. Spectroscopic studies have been carried out of chromospheric emission lines among old red giants in the Galactic halo. By determining how the chromospheric lines behave as a function of stellar luminosity and evolutionary state it is hoped that some insight may be gained into the processes responsible for chromospheric heating and mass loss among these stars.

Other areas of interest to Smith include the spectroscopy of comets in our Solar System and the chemical composition of red giants in Galactic open clusters.

PRESIDENT'S MESSAGE

As I promised, 2014 will be the month of social engagements. The plans are under way and we hope to have an awesome event coming up centered around the Lunar Eclipse happening on April 14-15. The night plans to start with a private social gathering for members, followed by a public viewing and gathering. Special thanks to Paul Salazar for heading this event and working hard to make this an awesome way to begin the year. Detail and sign-ups can be found here:

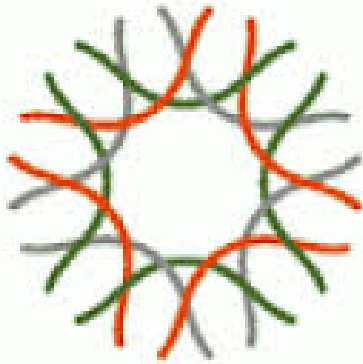
<http://www.eventbrite.com/e/sfaa-member-social-and-lunar-eclipse-watching-party-tickets-6733025661>

We also had our remembrance for John Dobson. While he is gone, his spirit continues to live on and we should continue follow his examples. John Dobson might be most well known for bringing larger telescopes more within the reach of the amateur astronomer, but he also did lots of work on outreach and public education. We shouldn't forget that we can each take on that mantle and help show the public this world that so many believe is far beyond their grasp. You don't have to setup a scope in the middle of a public place, as John commonly did to spread the word. Simply talking to others, letting them see your passion and love for the stars can be enough to give them a new experience they'll never forget.

And remember, you're a member of this amazing club. We are here for everyone and it is our passion to let others see the wonder that we hold dear. Our public nights will be beginning once again on April 5th. Invite members to come see Dr. Chat Hull speak on how we can watch stars form using radio telescopes, followed by a night looking at the stars through the scopes. How can anyone not love that?

Thanks for being the best astronomy club in the world! And if I haven't met you yet, please come say hi! You're what makes the club so awesome!

MATTHEW JONES
President
San Francisco Amateur Astronomers
2014



CALIFORNIA
ACADEMY OF
SCIENCES

**MAY 10, 2014
ASTRONOMY DAY**

**ACADEMY OF SCIENCES
GOLDEN GATE PARK
SAN FRANCISCO**

THE ACADEMY OF SCIENCES IS
ASKING FOR OUR HELP ON
ASTRONOMY DAY

The California Academy of Sciences will be hosting their annual Astronomy Day on Saturday May 10, 2014, and SFAA has once again been invited to participate. The Academy will be open 9:30 am until 5:00 pm. This will be an opportunity to educate Academy visitors about amateur astronomy and citizen science in the Bay Area and show them ways they can get involved. In addition to their usual planetarium programs, Academy staff will present a kid-friendly inflatable planetarium and astronomy-themed craft activities, and they're asking for informational displays from local organizations, especially SFAA. What we do is largely up to what you want to do.

Do you have a solar telescope?

Would you like to set it up on the Academy's living roof and share views of the Sun with visitors?

Are you an astrophotographer?

Would you like to show off your images, explain how they were created, and describe the objects pictured?

Are you more of a visual observer?

Would you like to teach basic naked-eye skywatching skills, explain how to get the most from binoculars and small telescopes, and answer questions?

Have you contributed to Galaxy Zoo or another citizen science project?
Could you show visitors how it works and how they could join the project?

Would you be interested in telling people about SFAA activities and how they can get involved?

You can come for all or part of the day, and you'll get free admission to the Academy. Once we know how many SFAA members are planning to participate and what we want to do, we can figure out a schedule and let the Academy staff know how many tables and what other stuff we may need.

If you're interested, please email **Anthony Barreiro**, anthonybarreiro@yahoo.com, and let me know what you want to do, what time you would be available, and your email and phone.

Please share this invitation with other SFAA members.

Thanks!

SAN FRANCISCO AMATEUR ASTRONOMERS UPCOMING LECTURES

MAY 21, 2014

FARIDE KHALAF

Amateur Astronomer/Private Pilot, Chabot Space & Science Telescope Operator

THE DUSTY DOZEN

Join Faride Khalaf, amateur astronomer, private pilot, and certified telescope operator at Chabot Space and Science Center, for a talk on ***The Dusty Dozen***, about the twelve American astronauts that have walked on the Earth's moon.

Mr. Khalaf will introduce the "Dusty Dozen," the twelve American astronauts that served as the first ambassadors to visit our companion world, Luna. Learn about the six Apollo lunar missions and these rare and adventurous men who risked so much for the reward of skipping along the surface the Moon.

June 18, 2014

BRAD TUCKER

Astrophysicist/Cosmologist, University of California at Berkeley

EXPLODING STARS, DARK ENERGY & THE END OF THE UNIVERSE

Join Astrophysicist/Cosmologist Brad Tucker, one of the top researchers on Dark Energy, for an intriguing talk.

Tucker will discuss the brilliant explosions at the end of stars lives, known as supernova. 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. In this talk, Tucker will show how our understanding of these objects has been revolutionized and what this means for the Universe

July 16, 2014

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.

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



**To sign up, just email 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 gastronomic 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

April 14, 2014

SFAA Member Social and Lunar Eclipse Watching Party

Member Social

7:00 – 9:00 p.m. Park Chalet Garden Restaurant
1000 Great Highway, Golden Gate Park, San Francisco

Public Eclipse Viewing

9:00 p.m. – 1:00 a.m. Park Chalet Gardens



On Monday, April 14, the full Moon will travel through the Earth's shadow and we will enjoy a total lunar eclipse from 12:06 a.m. PT to 1:25 a.m. PT. To celebrate, the San Francisco Amateur Astronomers (SFAA) is hosting a public eclipse viewing from 9:00 p.m. - 1:00 a.m. at Park Chalet Gardens near Ocean Beach after our member social which runs from 7:00 p.m. - 9:00 p.m.

Earlier that night, the SFAA will host a club social event from 7:00 p.m. - 9:00 p.m. at Park Chalet for our members to get together and socialize over drinks and appetizers.

Agenda for Monday, April 14

7:00 p.m. – 9:00 p.m. – SFAA Member Social with appetizers/drinks
9:00 p.m. – 1:00 a.m. – Public Eclipse Viewing (general public is welcome)

Location

Park Chalet Garden in Golden Gate Park by Ocean Beach

Sign up here: <http://www.eventbrite.com/e/sfaa-member-social-and-lunar-eclipse-watching-party-tickets-6733025661>

Written by [Paul Salazar](#)

FIGURE 1

Total Lunar Eclipse of 2014 Apr 15

Ecliptic Conjunction = 07:43:24.8 TD (= 07:42:17.6 UT)
 Greatest Eclipse = 07:46:47.0 TD (= 07:45:39.8 UT)

Penumbral Magnitude = 2.3183 P. Radius = 1.2267° Gamma = -0.3017
 Umbral Magnitude = 1.2907 U. Radius = 0.6952° Axis = 0.2863°

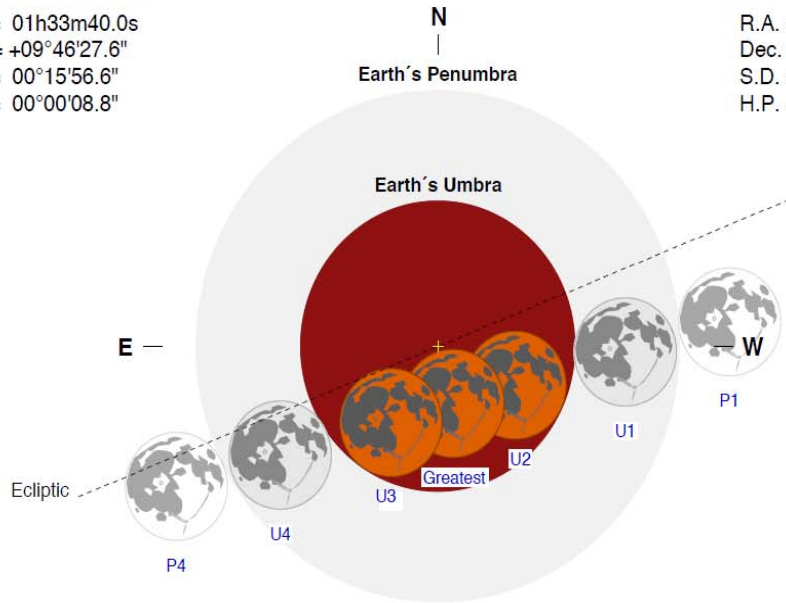
Saros Series = 122 Member = 56 of 75

Sun at Greatest Eclipse
 (Geocentric Coordinates)

R.A. = 01h33m40.0s
 Dec. = +09°46'27.6"
 S.D. = 00°15'56.6"
 H.P. = 00°00'08.8"

Moon at Greatest Eclipse
 (Geocentric Coordinates)

R.A. = 13h33m21.1s
 Dec. = -10°02'59.8"
 S.D. = 00°15'30.9"
 H.P. = 00°56'56.4"



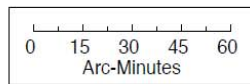
Eclipse Durations

Penumbral = 05h44m00s
 Umbral = 03h34m44s
 Total = 01h17m48s

$\Delta T = 67 \text{ s}$

Rule = CdT (Danjon)

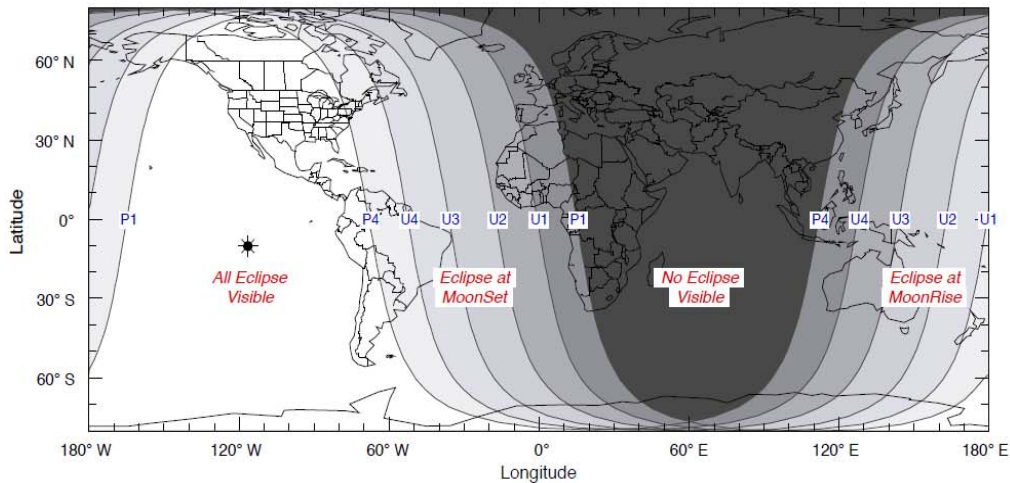
Eph. = VSOP87/ELP2000-85

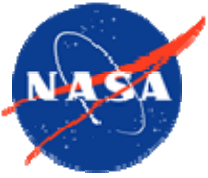


F. Espenak, NASA's GSFC
eclipse.gsfc.nasa.gov/eclipse.html

Eclipse Contacts

P1 = 04:53:37 UT
 U1 = 05:58:19 UT
 U2 = 07:06:47 UT
 U3 = 08:24:35 UT
 U4 = 09:33:04 UT
 P4 = 10:37:37 UT





What's Up for April 2014

Jane Houston Jones

What's Up for April? Mars at opposition, a lunar eclipse and April's Lyrid meteor shower.

Hello and welcome. I'm Jane Houston Jones from NASA's Jet Propulsion Laboratory in Pasadena, California.

On April 8 Mars reaches opposition, in its nearly 2-year orbit, when it's directly opposite the sun in our sky. This year Mars will be closer to Earth than it has been since 2007. Mars rises in the East in the early evening and is visible all night long. The viewing will be best a little after midnight, when the red planet reaches its highest elevation. Some of the famous dark markings--and possibly the polar cap--will be visible, even in a small telescope. The next Mars oppositions happen in 2016 and 2018, when Mars will be even closer to the Earth and will appear even more impressive in the telescope.

Mars spacecraft launches always happen roughly 2 years apart, a few months before opposition. Because both Earth and Mars are moving in space, we don't aim our spacecraft at where Mars is at launch. Instead, our spacecraft's elliptical orbit takes it to where Mars will be at the end of the 7- or 8-month journey.

InSight, NASA's next Mars mission, launches in 2016 to study the deep interior of Mars and help understand the processes that shaped the rocky planets of the inner solar system more than 4 billion years ago--including Earth. By using sophisticated geophysical instruments, InSight will measure the planet's 'vital signs'--its 'pulse,' 'temperature' and 'reflexes.'

The Dawn mission's two targets, the protoplanet Vesta and the dwarf planet Ceres, both reach opposition this month, too. Use a telescope to see them in the constellation Virgo, not too far from Mars.

A lunar eclipse will be visible to everyone in North and South America and the Pacific on April 14 and 15. On the East Coast the eclipse begins at 12:53 a.m. and ends at 6:38 a.m. If you just want to catch the total eclipse, set your alarm clock for 3 a.m. on the East Coast and midnight on the West Coast. The total eclipse will last an hour and a half from beginning to end.

Look for the familiar constellation Lyra, rising in the Northeast at 10 p.m. It'll be high overhead by 4 a.m. This month's Lyrid meteor shower peaks on the night of April 22 and the morning of April 23. But you'll spot some Lyrids any night between the 16th and the 25th. The peak rate is expected to be 15 to 20 meteors per hour. The third quarter moon rises an hour past midnight, brightening the sky. But the moon will only obscure the fainter meteors. Luckily, the Lyrids are known to produce bright meteors, many with persistent trains.

If you're under a dark sky, you can't miss the beautiful river of stars near Lyra--a spiral arm of our Milky Way galaxy.

You can learn about NASA's Mars exploration missions and all of NASA's missions at: www.nasa.gov

That's all for this month.

April Meteor Showers

LYRIDS

Active: April 16-25, 2014

Peak Activity: April 21-22, 2014

Comet of Origin: C/1861 GI Thatcher

Radiant: constellation Lyra

Peak Activity Meteor Count: 20 meteors per hour

Meteor Velocity: 30 miles (49 kilometers) per second

Note: Light from the gibbous moon will be very problematic, as there are few bright meteors in this stream. Try watching this meteor shower during the early morning of April 23. Lyrid meteors often produce luminous dust trains observable for several seconds.

Whether you're watching from a downtown area or the dark countryside, here are some tips to help you enjoy these celestial shows of shooting stars. Those streaks of light are really caused by tiny specks of comet-stuff hitting Earth's atmosphere at very high speed and disintegrating in flashes of light.

First a word about the moon - it is not the meteor watcher's friend. Light reflecting off a bright moon can be just as detrimental to good meteor viewing as those bright lights of the big city. There is nothing you can do except howl at the moon, so you'll have to put up with it or wait until the next favorable shower.

The best thing you can do to maximize the number of meteors you'll see is to get as far away from urban light pollution as possible and find a location with a clear, unclouded view of the night sky. If you enjoy camping, try planning a trip that coincides with dates of one of the meteor showers listed below. Once you get to your viewing location, search for the darkest patch of sky you can find, as meteors can appear anywhere overhead.

The meteors will always travel in a path away from the constellation for which the shower is named. This apparent point of origin is called the "radiant." For example, meteors during a Leonid meteor shower will appear to originate from the constellation Leo. (Note: the constellation only serves as a helpful guide in the night's sky. The constellation is not the actual source of the meteors. For an overview of what causes meteor showers click here: [Meteor Showers: Shooting for Shooting Stars](#))

Whether viewing from your front porch or a mountaintop, be sure to dress for success. This means clothing appropriate for cold overnight temperatures, which might include mittens or gloves, and blankets. This will enable you to settle in without having to abandon the meteor-watching because your fingers are starting to turn blue.

Next, bring something comfortable on which to sit or lie down. While Mother Nature can put on a magnificent celestial display, meteor showers rarely approach anything on the scale of a July 4th fireworks show. Plan to be patient and watch for at least half an hour. A reclining chair or ground pad will make it far more comfortable to keep your gaze on the night sky.

Lastly, put away the telescope or binoculars. Using either reduces the amount of sky you can see at one time, lowering the odds that you'll see anything but darkness. Instead, let your eyes hang loose and don't look in any one specific spot. Relaxed eyes will quickly zone in on any movement up above, and you'll be able to spot more meteors. Avoid looking at your cell phone or any other light. Both destroy night vision. If you have to look at something on Earth, use a red light. Some flashlights have handy interchangeable filters. If you don't have one of those, you can always paint the clear filter with red fingernail polish

2014 ASTRONOMY PROGRAMS
Mt. Tamalpais State Park
Explore the Wonders of the Universe
 Free and open to all (no signup). [Directions](#)

<p>May 3</p>	<p>Dr. Chris McCarthy, San Francisco State University “Searching for Planets in Ophiuchus” <i>Searchers for extrasolar planets are using two techniques, radial velocity and a new strategy for finding a new category of planets that do not orbit any star, the co-called “free-floating” planets.</i></p>
<p>May 31 8:30 p.m.</p>	<p>Dr. Kevin Zahnle NASA-Ames Research Center “When Worlds Collide” Planet Earth is constantly being struck by interplanetary debris, from fine dust to rocks or boulders big enough to outshine the Sun when they die, to asteroids or comets or even small stray planets. Co-produced with Wonderfest</p>
<p>June 28 8:30 p.m.</p>	<p>Dr. Wil van Breugel, UC Merced “Masks of the Cosmos” 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?</p>
<p>August 2 8:30 p.m.</p>	<p>Dr. Beate Heinemann , Lawrence Berkeley Lab .physics.berkeley.edu/research/faculty/heinemann.html “How We Found the Higgs Boson” 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.</p>
<p>August 30 8:00 p.m.</p>	<p>Dr. Lloyd Knox , UC Davis virgo.physics.ucdavis.edu/~knox/ “The Big Bang in Context” 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.</p>
<p>September 27 7:30 p.m.</p>	<p>Dr. Lynn Cominsky , Sonoma SU universe.sonoma.edu/~lynnc “NuSTAR's Sharper View of the Universe” 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.</p>
<p>October 25 7:00 p.m.</p>	<p>Andrew Fraknoi, Foothill College foothill.edu/ast " The Top Tourist Sights of the Solar System” 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 Co-produced with Wonderfest-part of Bay Area Science Festival</p>

April 2014 - THE EVENING SKY
April Sky Map: <http://skymaps.com/skymaps/tesmnl404.pdf>
April Sky Calendar: <http://skymaps.com/articles/nl404.html>

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

<p>EVERY FRIDAY NIGHT 7:00 PM – 10:00 PM excluding major holidays</p> <p>The Telescope Makers' Workshop</p> <p>CHABOT SPACE AND SCIENCE CENTER 10000 Skyline Boulevard Oakland, CA 94619-2450</p>	<p>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:</p> <p>Contact: E-mail Richard Ozer (rozer@pacbell.net) or (510) 406-1914</p>
<p>EVERY FRIDAY & SATURDAY EVENING, weather permitting 7:30 PM – 10:30 PM</p> <p>CHABOT SPACE AND SCIENCE CENTER 10000 Skyline Boulevard Oakland CA 94619-2450 (510) 336-7300</p>	<p>EXPLORE THE NIGHT SKIES AT THE CHABOT OBSERVATORIES For more information: http://www.chabot.space.org/</p> <p>Free Telescope Viewing 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!</p> <p>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)</p> <p>12pm - 5pm: Observatories Open</p>
<p>Sunset – 5:11 PM (TWICE MONTHLY)</p> <p>Inclement weather (clouds, excessive wind and showers) will cause the event to be canceled without notice.</p> <p>SAN MATEO COUNTY ASTRONOMICAL SOCIETY STAR PARTY</p>	<p>STAR PARTIES AT CRESTVIEW PARK, SAN CARLOS</p> <p>Come out and bring the kids for a mind expanding look at the universe</p> <p>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.</p> <p>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.</p> <p>Reasons to Attend If you have kids interested in space or planets bring them here for a real life view of planets, nebula, star clusters and galaxies. If you are thinking of buying a telescope or want help using a telescope you own, come here to talk</p>

	<p>with experienced users. If you think you might have an interest in astronomy come and talk to experienced amateur astronomers.</p> <p>Cautions Dress warmly and wear a hat. Visitors should park on the street and walk into the park so your headlights don't affect the observer's dark adaptation. Only park in the parking lot if you are arriving before dark and plan to stay until the end of the event. 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. Please respect the telescopes and ask permission from the owner if you wish to touch. Parents, please watch your children. The park is residential, and adjacent to homes and backyards, please keep noise to a minimum.</p> <p>Schedule Time Astronomers arrive to set up at around sunset. Observing starts at about one hour after sunset and continues for two to three hours.</p>
<p>EVERY CLEAR SATURDAY MORNING OBSERVATORY 10:00 AM – 12:00 PM</p> <p>FOOTHILL COMMUNITY COLLEGE 12345 Moody Road Los Altos Hills</p> <p>Cost: Free</p>	<p>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. Admission is free.</p> <p>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.</p>
<p>EVERY CLEAR FRIDAY EVENING 9:00 PM – 11:00 PM</p> <p>FOOTHILL COMMUNITY COLLEGE OBSERVATORY 12345 Moody Road Los Altos Hills</p> <p>Cost: Free</p>	<p>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 Any evening's viewing depends on the season and what objects are currently in the sky.</p> <p>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.</p> <p>Come to Foothill Observatory and join us in the exploration of our Universe!</p> <p>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.</p>

BAY AREA EVENTS – APRIL 2014

<http://groups.yahoo.com/neo/groups/bayastro/conversations/topics/49>

<p>Friday April 11, 2014 7:30 pm</p> <p>FOOTHILL COLLEGE Room 5015 12345 El Monte Rd Los Altos Hills, CA</p> <p>Next to Parking Lot 5 Bring \$3 for a parking permit</p>	<p>DR. ZARIJA LUKIC, LAWRENCE BERKELEY LAB THE DYNAMICAL UNIVERSE: EVOLUTION OF THE COSMIC STRUCTURE</p> <p>"Recent decades have brought significant insights about the Universe we live in. Now we know to a great accuracy what is the geometry of the universe and its content. Yet, this knowledge has opened some of the biggest mysteries in today's physical sciences: what is dark matter, what is dark energy, and why is the expansion of the universe accelerating? Why did the universe come to be this way? The standard model of particle physics appears as a great success, the standard cosmological model as well, but the two seem to be at odds. In this talk I will review the current state of cosmology, and then turn to the large-scale structure of the Universe, and what it can tell us in the future with new sky surveys coming online. Modeling this cosmic structure is exciting research, done on the largest supercomputers, and confronting those models against observations is the key in understanding what is dark energy as well as assessing our understanding of gravity."</p> <p>Zarija Lukić has been a postdoc in the Computational Cosmology Center since 2011. He received his Ph.D. in 2008 at the University of Illinois at Urbana-Champaign, and was a Postdoctoral Research Associate in the Theoretical Division at Los Alamos National Laboratory 2008-2011. The main focus of his research is in the large-scale structure of the Universe, and accurate determination of cosmological parameters with particular emphasis on theoretical predictions for Lyman-alpha forest using the Nyx code - research relevant to current and future DOE-HEP experiments.</p> <p>Besides cosmology, his research also includes aspects of nuclear physics, and he has published research on the practical usage of cosmic rays to obtain material identification of scanned cargos, as well as to remotely diagnose the state of damaged cores at the Fukushima reactors.</p>
<p>Saturday, 04/12/14 04:00 PM - 10:00 PM</p> <p>CHABOT SPACE AND SCIENCE CENTER 10000 Skyline Blvd Oakland, CA 94619</p> <p>Cost: \$12 + General Admission</p>	<p>YURI'S NIGHT CELEBRATION</p> <p>Yuri's Night has become a global celebration with parties and events held around the world every April to commemorate the day of cosmonaut Yuri Gagarin's first manned spaceflight in 1961. Join us for space games and activities, recall the great space race and how we managed to send a human into space, interact with a real astronaut suit and explore the cutting edge technology that helps us explore the cosmos today.</p> <p>Website: http://www.chabotspace.org/events.htm</p>
<p>Wed. 4/16/2014 7PM</p> <p>SMITHWICK THEATER FOOTHILL COLLEGE 12345 El Monte Rd Los Altos Hills, CA</p>	<p>SILICON VALLEY ASTRONOMY LECTURE SERIES</p> <p>DR. MICHAEL BICAY (OF NASA'S AMES RESEARCH CENTER) Free, illustrated, non-technical talk LIFTING THE COSMIC VEIL: HIGHLIGHTS FROM A DECADE OF THE SPITZER SPACE TELESCOPE</p> <p>As the infrared cousin to Hubble, the Spitzer Space Telescope was launched in 2003 to study the cool universe with waves that are invisible to the human eye. It was designed to probe the birth and youth of stars and planetary disks, and to observe some of the most distant objects in the Universe. However, Spitzer's ultimate legacy may be in an area completely unanticipated when the mission was originally envisioned — the study of planets orbiting other stars. Dr. Bicay will describe the long and winding road leading to Spitzer's launch, and present highlights from the mission's remarkable first decade of discovery.</p>

Dr. Michael Bica is the Director of Science at NASA's Ames Research Center, leading more than 400 scientists and technical staff conducting research in space, earth and biological science. His PhD from Stanford University is in Applied Physics and his research interests include the properties and contents of galaxies and galaxy clusters, as well as the large-scale structure in the universe. Before coming to Ames, he was on the scientific staff of Caltech's Infrared Processing and Analysis Center and was a Program Scientist at NASA Headquarters. While in Washington, he also served as an astrophysics consultant to the Smithsonian's National Air and Space Museum. After returning to Pasadena in 1996, he was a member of the science staff and scientific community liaison for the Spitzer Space Telescope.

Foothill College is just off the El Monte Road exit from Freeway 280 in Los Altos. For directions and parking information, see: <http://www.foothill.edu/news/transportation.php>
 For a campus map, see: <http://www.foothill.edu/news/maps.php>

The lecture is co-sponsored by:

- * NASA Ames Research Center
- * The Foothill College Astronomy Program
- * The SETI Institute
- * The Astronomical Society of the Pacific.

We expect large crowds, so we ask people to try to arrive a little bit early to find parking. The lecture is free, but there is a charge of \$3 for parking on campus and exact change is appreciated.

Past lectures can be viewed on our YouTube channel at:
<http://www.youtube.com/SVastronomylectures>

Friday, 04/18/14
06:00 PM - 07:30 PM

CHABOT SPACE AND SCIENCE CENTER
10000 Skyline Boulevard
Oakland, CA 94619-2450

Cost:
\$23 + service

FUTURE FRIDAYS: BUILDING A MINI SUN TO SAVE THE EARTH

Scientists are continuously discovering new ways to harness the energy of the Sun and stars to meet Earth's energy needs. Dr. Edward Moses is leading efforts to explore ways to commercialize the power of lasers to provide environmentally friendly energy for our future. Using Laser Ignition Fusion Energy, LIFE, Moses is exploring this new type of laser fusion power plant that would produce no greenhouse gas emissions, operate continuously to meet demand, and produce shorter-lived and less hazardous radioactive byproducts than current power plants. Mr. Moses has been a leader of this technology at the National Ignition Facility, harnessing the world's most energetic laser system, and is responsible for laser technologies for homeland security, economic competitiveness, and laser fusion energy.

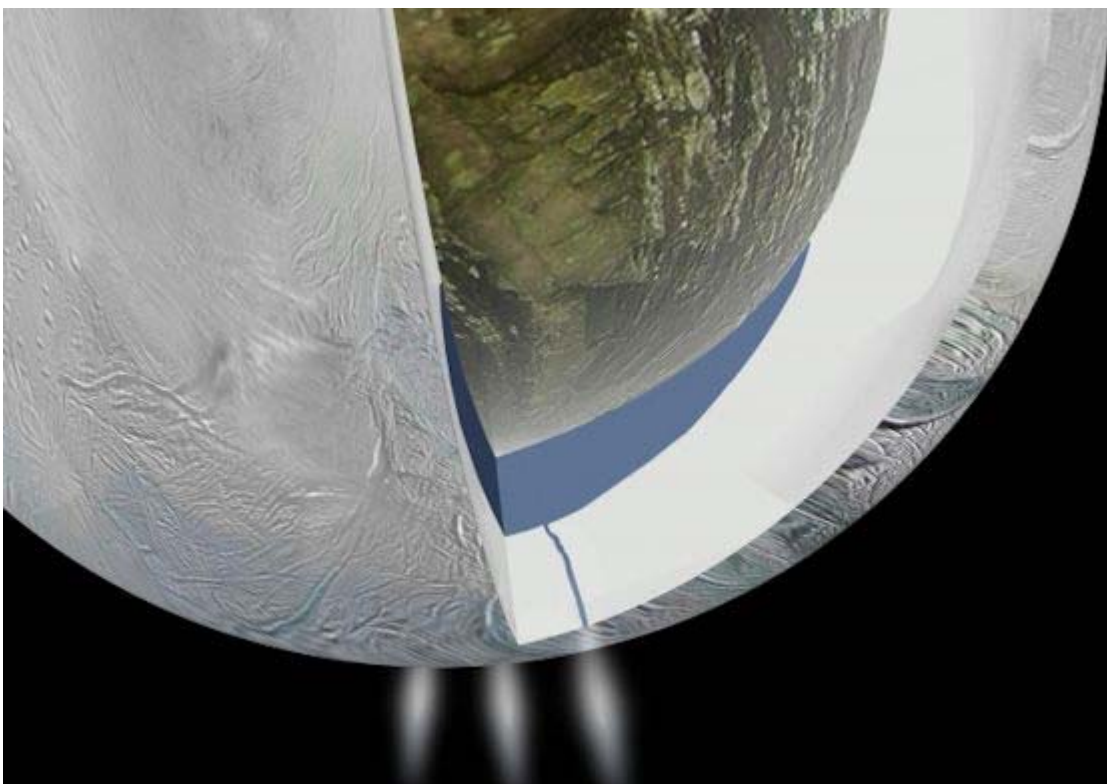
Website: <http://www.chabot.space.org/future-fridays.htm>

Deep Ocean Detected Inside Saturn's Moon

April 3, 2014: NASA's Cassini spacecraft and Deep Space Network have uncovered evidence that Saturn's moon Enceladus harbors a large underground ocean, furthering scientific interest in the moon as a potential home to extraterrestrial microbes.

Researchers theorized the presence of an interior reservoir of liquid water in 2005 when Cassini discovered water vapor and ice spewing from vents near the moon's south pole. New data on the moon's gravity field reported in the April 4, 2014, edition of the journal *Science* strengthen the case for an ocean hidden inside Enceladus.

The gravity measurements suggest a large, possibly regional, ocean about 6 miles (10 kilometers) deep, beneath an ice shell about 19 to 25 miles (30 to 40 kilometers) thick. The subsurface ocean evidence supports the inclusion of Enceladus among the most likely places in our solar system to host microbial life. Before Cassini reached Saturn in July 2004, no version of that short list included this icy moon, barely 300 miles (500 kilometers) in diameter.



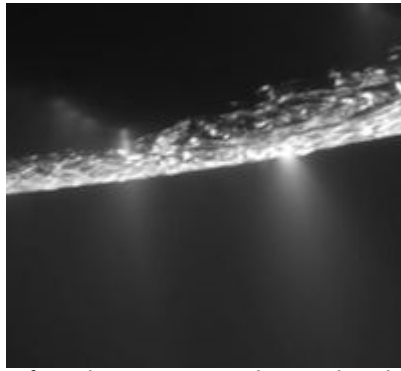
This diagram illustrates the possible interior of Saturn's moon Enceladus based on a gravity investigation by NASA's Cassini spacecraft and NASA's Deep Space Network, reported in April 2014. [More](#)

"The way we deduce gravity variations is a concept in physics called the Doppler Effect, the same principle used with a speed-measuring radar gun," says Sami Asmar of NASA's Jet Propulsion Laboratory (JPL) in Pasadena, Calif., a coauthor of the paper. "As the spacecraft flies by Enceladus, its velocity is perturbed by an amount that depends on variations in the gravity field that we're trying to measure. We see the change in velocity as a change in radio frequency, received at our ground stations here all the way across the solar system."

"This provides one possible story to explain why water is gushing out of these fractures we see at the south pole," adds David Stevenson of the California Institute of Technology, Pasadena, one of the paper's co-authors.

Cassini has flown near Enceladus 19 times. Three flybys, from 2010 to 2012, yielded precise trajectory measurements. The gravitational tug of a planetary body, such as Enceladus, alters a spacecraft's flight path. Variations in the gravity field, such as those caused by mountains on the surface or differences in underground composition, can be detected as changes in the spacecraft's velocity, measured from Earth.

The technique of analyzing a radio signal between Cassini and the Deep Space Network can detect changes in velocity as small as less than one foot per hour (90 microns per second). With this precision, the flyby data yielded evidence of a zone inside the southern end of the moon with higher density than other portions of the interior.



Watery jets erupting from locations near the south pole of Enceladus. [More](#)

The south pole area has a surface depression that causes a dip in the local tug of gravity. However, the magnitude of the dip is less than expected given the size of the depression, leading researchers to conclude the depression's effect is partially offset by a high-density feature in the region, beneath the surface.

"The Cassini gravity measurements show a negative gravity anomaly at the south pole that however is not as large as expected from the deep depression detected by the onboard camera," says the paper's lead author, Luciano Iess of Sapienza University of Rome. "Hence the conclusion that there must be a denser material at depth that compensates the missing mass: very likely liquid water, which is seven percent denser than ice. The magnitude of the anomaly gave us the size of the water reservoir."

There is no certainty the subsurface ocean supplies the water plume spraying out of surface fractures near the south pole of Enceladus, however, scientists reason it is a real possibility. The fractures may lead down to a part of the moon that is tidally heated by the moon's repeated flexing, as it follows an eccentric orbit around Saturn.

Much of the excitement about the Cassini mission's discovery of the Enceladus water plume stems from the possibility that it originates from a wet environment that could be a favorable environment for microbial life.

"Material from Enceladus' south polar jets contains salty water and organic molecules, the basic chemical ingredients for life," says Linda Spilker, Cassini's project scientist at JPL. "Their discovery expanded our view of the 'habitable zone' within our solar system and in planetary systems of other stars. This new validation that an ocean of water underlies the jets furthers understanding about this intriguing environment."

Credits:

Production editor: [Dr. Tony Phillips](#) | Credit: [Science@NASA](#)

More information:

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>



**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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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

San Francisco Amateur Astronomers
P.O. Box 15097
San Francisco, CA 94115



Information Hotline: (415) 289-6636

Web Page: www.sfaa-astronomy.org

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.