

★ ABOVE THE FOG

• BULLETIN OF THE SAN FRANCISCO AMATEUR ASTRONOMERS •

Vol. 63, No. 1 – January 2015

GENERAL MEETING

Randall Museum . 199 Museum Way . San Francisco

7:00 pm Doors Open . 7:30 pm Announcements . 8:00 pm Speaker

Effective February 17, 2015: SFAA's General Meetings occur on the 3rd Tuesday of each month (except January)



A NEW HOME
FOR
SAN FRANCISCO AMATEUR ASTRONOMERS

NEW MEETING LOCATION



***Effective February 17, 2015:
SFAA's General Meetings occur on
the 3rd Tuesday of each month
(except January)***

!!! TUESDAY !!!

FEBRUARY 17, 2015 – 7:30 pm

THE PRESIDIO
OBSERVATION POST - BUILDING 211

Additional Information Links

Observation Post/Building 211 layout

<http://www.presidio.gov/venues/Documents/Bldg%20211%20Floor%20Plan.pdf>

Driving Directions

<http://www.presidio.gov/venues/Pages/observation-post-at-the-presidio-driving-directions.aspx>

Public transportation information link

<http://www.presidio.gov/transportation/Pages/default.aspx>

***** NEW MEETING LOCATION *****
The Observation Post at The Presidio
211 Lincoln Boulevard, San Francisco

!!!!!! TUESDAY !!!!!

FEBRUARY 17, 2015

FRANCK MARCHIS, PH.D., SETI Institute & UC Berkeley

Breaking the Seeing Barriers for Planetary Astronomy

Once monthly, the San Francisco Amateur Astronomers hosts distinguished guest speakers who are leaders in the fields of astronomy, physics, and related disciplines, to present the latest developments from cutting-edge scientific programs.

Dr. Franck Marchis, currently a Principal Investigator at the Carl Sagan Center of the SETI Institute, opens the 2015 Monthly Lecture Series with a presentation on ***Breaking the Seeing Barriers for Planetary Astronomy***.

In the past four centuries planetary astronomy, the study of our solar system bodies using telescopes, has increased our knowledge of the environment of Earth, the evolution of planets, the origin of comets and asteroids, and the formation of our solar system. In this presentation, Dr. Marchis will discuss the contributions of telescopic observation over the past 50 years, highlighting the most recent discoveries and looking into the future of space-based astronomy, particularly for the search and study of planets around other stars in our galaxy.

About the Speaker:

Franck Marchis is a Principal Investigator at the SETI Institute, and also an Assistant Research Astronomer at UC Berkeley. He received his Ph.D. in 2000 from University of Toulouse, France in planetary science, then moved to California shortly after through a postdoctoral position at UC Berkeley. In 2007, he was appointed as a Planetary Scientist at the Carl Sagan Center of the SETI Institute where he expanded his research on multiple asteroids using space-telescope facilities. In June 2011, he took a full-time position at the Carl Sagan Center to lead the development of space mission concepts and new high-resolution & high contrast instruments for ground-based telescopes. He is an associate astronomer at Observatoire de Paris since June 2003.

Ages: Geared for adults; All ages welcome

Cost: FREE - Donations encouraged

Info: www.sfaa-astronomy.org

2015 STAR PARTY DATES

Anthony Barreiro

Here's the current schedule for SFAA star parties during 2015. Please mark your calendar and plan to attend! Thanks to Paul Salazar and Michael Patrick of SFAA, Tinka Ross of the Friends of Mount Tamalpais, and Supervising Ranger Roberto Walton of Mt. Tam State Park for helping to plan and schedule these events.

Mount Tamalpais members nights are subject to final approval of our State Park permit application to use the Rock Springs parking area. Members nights are scheduled for the Saturday nearest the new Moon, and give us a chance to observe deep sky objects in a relatively dark sky. Make sure your membership is up to date and you have a current SFAA parking pass. (You can renew your membership at www.sfaa-astronomy.org/membership/. If you need a parking pass, please pick one up at a meeting or send an email to treasurer@sfaa-astronomy.org with your mailing address.) March 21 will be our annual Messier marathon, an opportunity to try to observe all 109 Messier objects in one night.

From April through October SFAA presents monthly public astronomy programs in collaboration with the Friends of Mount Tamalpais. Friends of Mt. Tam presents a lecture by a professional astronomer in the Mountain Theater, followed by telescope viewing in the Rock Springs parking area. Public nights are generally on the Saturday nearest the waxing quarter Moon, so the Moon, planets, and brighter deep sky objects like double stars and star clusters are good things to share with the visitors. After the visitors leave we get a few hours of observing time to ourselves. You need a parking pass to stay after the visitors leave.

During 2014 SFAA held our monthly City Star Parties at Point Lobos / Lands End, the Embarcadero outside the Exploratorium, and the Presidio Parade Ground. Locations for 2015 City Star Parties will be announced month by month. With urban light pollution and a bright Moon, the Moon, planets, and the very brightest deep sky objects work well for City Star Parties.

Each star party give us a chance to hang out with one another, check out other members' equipment, and learn more about the sky and the cosmos. The Mount Tam public nights and City Star Parties are excellent opportunities to share our love of astronomy and the night sky with the public and to let people know about SFAA and our other programs. If you're able to bring a telescope to a star party that's great, but even without a telescope you can still enjoy the sky and share your knowledge with others. It's best to arrive before sunset, so you'll have light to set up your equipment and so you won't be shining your headlights into other people's dark-adapted eyes.

If you've been to a few star parties and you're willing to serve as a contact person for an upcoming event, please let me know -- email anthonybarreiro@yahoo.com.

January 17 Mt. Tam members night

January 31 City star party

February 14 Mt. Tam members night

February 21 City star party

March 21 Mt. Tam members night -- Messier marathon

March 28 City star party

April 18 Mt. Tam members night

April 25 Mt. Tam public night

May 2 City star party

May 16 Mt. Tam members night

May 23 Mt. Tam public night

May 30 City star party

June 13 Mt. Tam members night
June 20 Mt. Tam public night
June 27 City star party

July 18 Mt. Tam members night
July 25 Mt. Tam public night

August 1 City star party
August 15 Mt. Tam members night
August 22 Mt. Tam public night
August 29 City star party

September 12 Mt. Tam members night
September 19 Mt. Tam public night
September 26 City star party

October 10 Mt. Tam members night
October 17 Mt. Tam public night
October 24 City star party

November 14 Mt. Tam members night
November 21 City star party

December 12 Mt. Tam members night
December 19 City star party

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

**EVERY FRIDAY NIGHT
7:00 PM – 10:00 PM
excluding major holidays**

**The Telescope Makers'
Workshop**

**CHABOT SPACE AND
SCIENCE CENTER
10000 Skyline Boulevard
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.

Chabot's TMW is one of only a handful of regularly scheduled telescope making workshops in the U.S., and probably the world; it meets every Friday evening throughout the year, except Memorial Day weekend. It has been in operation since December of 1930, founded by Franklin B. Wright, and is currently run by Eastbay Astronomical Society member Rich Ozer, with help from other EAS members, Dave Barosso, Barry Leska, and others. The price of admission is FREE. All you have to do is show up, buy a mirror blank and a "tool" (typically around \$100 - \$200 depending on the size of the mirror) and start "pushin' glass!" We supply you with instruction, the various grits you'll need to first grind, and then polish and figure your mirror, and all the testing equipment needed. With a small bit of luck, you could wind up with a telescope that costs 1/3 or 1/4 the cost of a store-bought telescope, that is yet optically superior! It does take time - depending on how much time you put in on it, and other factors, it could take a few months or several months. But, it's a fun project, great for kids, and at the end you get a great telescope!

For more information call or email Richard Ozer at rozer@pacbell.net or phone (510) 406-1914.

**EVERY FRIDAY &
SATURDAY EVENING,
weather permitting
7:30 PM – 10:30 PM**

**CHABOT SPACE AND
SCIENCE CENTER
10000 Skyline Boulevard
Oakland CA 94619-2450
(510) 336-7300**

EXPLORE THE NIGHT SKIES AT THE CHABOT OBSERVATORIES

For more information: <http://www.chabot.space.org/>

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!

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)

12pm - 5pm: Observatories Open

<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</p> <p>If you have kids interested in space or planets bring them here for a real life view of planets, nebula, star clusters and galaxies.</p> <p>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.</p> <p>Cautions</p> <p>Dress warmly and wear a hat.</p> <p>Visitors should park on the street and walk into the park so your headlights don't affect the observer's dark adaptation.</p> <p>Only park in the parking lot if you are arriving before dark and plan to stay until the end of the event.</p> <p>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.</p> <p>Please respect the telescopes and ask permission from the owner if you wish to touch.</p> <p>Parents, please watch your children.</p> <p>The park is residential, and adjacent to homes and backyards, please keep noise to a minimum.</p> <p>Schedule Time</p> <p>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.</p> <p>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</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</p>

<p>12345 Moody Road Los Altos Hills</p> <p>Cost: Free</p>	<p>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>
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NASA SCIENCE NEWS

Hubble: Pillars of Creation are also Pillars of Destruction



Jan. 7, 2015: Although NASA's Hubble Space Telescope has taken many breathtaking images of the universe, one snapshot stands out from the rest: the iconic view of the so-called "Pillars of Creation." The jaw-dropping photo, taken in 1995, revealed never-before-seen details of three giant columns of cold gas bathed in the scorching ultraviolet light from a cluster of young, massive stars in a small region of the Eagle Nebula, or M16.

In celebration of its upcoming 25th anniversary in April, Hubble has revisited the famous pillars, providing astronomers with a sharper and wider view. Although the original image was dubbed the Pillars of Creation, the new image hints that they are also "pillars of destruction."

Astronomers using NASA's Hubble Space Telescope have assembled a bigger and sharper photograph of the iconic Eagle Nebula's "Pillars of Creation". Credit: NASA/ESA/Hubble Heritage Team (STScI/AURA)/J. Hester, P. Scowen (Arizona State U.)

"I'm impressed by how transitory these structures are," explains Paul Scowen of Arizona State University in Tempe. "They are actively being ablated away before our very eyes. The ghostly bluish haze around the dense

edges of the pillars is material getting heated up and evaporating away into space. We have caught these pillars at a very unique and short-lived moment in their evolution.” Scowen and astronomer Jeff Hester, formerly of Arizona State University, led the original Hubble observations of the Eagle Nebula.

The original 1995 images were taken in visible light. The new image includes near-infrared light as well. The infrared view transforms the pillars into eerie, wispy silhouettes seen against a background of myriad stars. That’s because the infrared light penetrates much of the gas and dust, except for the densest regions of the pillars. Newborn stars can be seen hidden away inside the pillars.

The infrared image shows that the very ends of the pillars are dense knots of dust and gas. They shadow the gas below them, keeping the gas cool and creating the long, column-like structures. The material in between the pillars has long since been evaporated away by the ionizing radiation from the central star cluster located above the pillars.

At the top edge of the left-hand pillar, a gaseous fragment has been heated up and is flying away from the structure, underscoring the violent nature of star-forming regions. “These pillars represent a very dynamic, active process,” Scowen said. “The gas is not being passively heated up and gently wafting away into space. The gaseous pillars are actually getting ionized, a process by which electrons are stripped off of atoms, and heated up by radiation from the massive stars. And then they are being eroded by the stars’ strong winds and barrage of charged particles, which are literally sandblasting away the tops of these pillars.”

When Scowen and Hester used Hubble to make the initial observations of the Eagle Nebula in 1995, astronomers had seen the pillar-like structures in ground-based images, but not in detail. They knew that the physical processes are not unique to the Eagle Nebula because star birth takes place across the universe. But at a distance of just 6,500 light-years, M16 is the most dramatic nearby example – as the team soon realized.



The original 1995 image was beautiful. Compare this view to the 2014 image in a [side-by-side montage](#)

As Scowen was piecing together the Hubble exposures of the Eagle, he was amazed at what he saw. “I called Jeff Hester on his phone and said, ‘You need to get here now,’” Scowen recalled. “We laid the pictures out on the table, and we were just gushing because of all the incredible detail that we were seeing for the very first time.”

The first features that jumped out at the team in 1995 were the streamers of gas seemingly floating away from the columns. Astronomers had previously debated what effect nearby massive stars would have on the surrounding gas in stellar nurseries. “There is the only one thing that can light up a neighborhood like this: massive stars kicking out enough horsepower in ultraviolet light to ionize the gas clouds and make them glow,” Scowen said. “Nebulous star-forming regions like M16 are the interstellar neon signs that say, ‘We just made a bunch of massive stars here.’ This was the first time we had directly seen observational evidence that the erosive process, not only the radiation but the mechanical stripping away of the gas from the columns, was actually being seen.”

By comparing the 1995 and 2014 pictures, astronomers also noticed a lengthening of a narrow jet-like feature that may have been ejected from a newly forming star. The jet looks like a stream of water from a garden hose. Over the intervening 19 years, this jet has stretched farther into space, across an additional 60 billion miles, at an estimated speed of about 450,000 miles per hour.

Our sun probably formed in a similar turbulent star-forming region. There is evidence that the forming solar system was seasoned with radioactive shrapnel from a nearby supernova. That means that our sun was formed as part of a cluster that included stars massive enough to produce powerful ionizing radiation, such as is seen in the Eagle Nebula. “That’s the only way the nebula from which the sun was born could have been exposed to a supernova that quickly, in the short period of time that represents, because supernovae only come from massive stars, and those stars only live

a few tens of millions of years,” Scowen explained. “What that means is when you look at the environment of the Eagle Nebula or other star-forming regions, you’re looking at exactly the kind of nascent environment that our sun formed in.”

Credits:

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

More information:

The Hubble Space Telescope is a project of international cooperation between NASA and the European Space Agency. NASA's Goddard Space Flight Center in Greenbelt, Maryland, manages the telescope. The Space Telescope Science Institute (STScI) in Baltimore conducts Hubble science operations. STScI is operated for NASA by the Association of Universities for Research in Astronomy, Inc., in Washington.

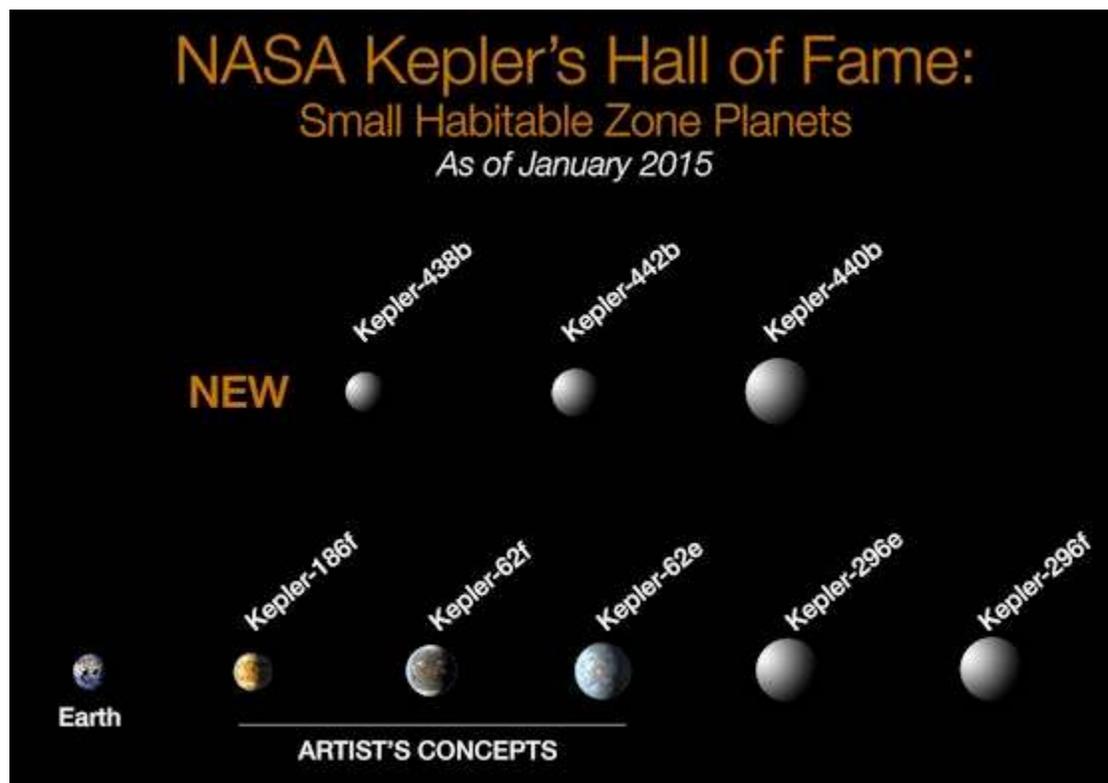
NASA is exploring our solar system and beyond to understand the universe and our place in it. We seek to unravel the secrets of our universe, its origins and evolution, and search for life among the stars. Today’s announcement shares the discovery of our ever-changing cosmos, and brings us closer to learning whether we are alone in the universe.

Kepler Discovers 1000th Exoplanet

Jan. 6, 2015: How many stars like our sun host planets like our Earth? NASA’s Kepler Space Telescope continuously monitored more than 150,000 stars beyond our solar system, and to date has offered scientists an assortment of more than 4,000 candidate planets for further study -- the 1,000th of which was recently verified.

Using Kepler data, scientists reached this millenary milestone after validating that eight more candidates spotted by the planet-hunting telescope are, in fact, planets. The Kepler team also has added another 554 candidates to the roll

of potential planets, six of which are near-Earth-size and orbit in the habitable zone of stars similar to our sun.



NASA Kepler's Hall of Fame: Of the more than 1,000 verified planets found by NASA's Kepler Space Telescope, eight are less than twice Earth-size and in their stars' habitable zone. All eight orbit stars cooler and smaller than our sun.

Three of the newly-validated planets are located in their distant

sun's habitable zone, the range of distances from the host star where liquid water might exist on the surface of an orbiting planet. Of the three, two are likely made of rock, like Earth.

"Each result from the planet-hunting Kepler mission's treasure trove of data takes us another step closer to answering the question of whether we are alone in the Universe," said John Grunsfeld, associate administrator of NASA's Science Mission Directorate at the agency's headquarters in Washington. "The Kepler team and its science community continue to produce impressive results with the data from this venerable explorer."

To determine whether a planet is made of rock, water or gas, scientists must know its size and mass. When its mass can't be directly determined, scientists can infer what the planet is made of based on its size.

Two of the newly validated planets, Kepler-438b and Kepler-442b, are less than 1.5 times the diameter of Earth. Kepler-438b, 475 light-years away, is 12 percent bigger than Earth and orbits its star once every 35.2 days. Kepler-442b, 1,100 light-years away, is 33 percent bigger than Earth and orbits its star once every 112 days.

Both Kepler-438b and Kepler-442b orbit stars smaller and cooler than our sun, making the habitable zone closer to their parent star, in the direction of the constellation Lyra. The research paper reporting this finding has been accepted for publication in *The Astrophysical Journal*.

"With each new discovery of these small, possibly rocky worlds, our confidence strengthens in the determination of the true frequency of planets like Earth," said co-author Doug Caldwell, SETI Institute Kepler scientist at NASA's Ames Research Center at Moffett Field, California. "The day is on the horizon when we'll know how common temperate, rocky planets like Earth are."

With the detection of 554 more planet candidates from Kepler observations conducted May 2009 to April 2013, the Kepler team has raised the candidate count to 4,175. Eight of these new candidates are between one to two times the size of Earth, and orbit in their sun's habitable zone. Of these eight, six orbit stars that are similar to our sun in size and temperature. All candidates require follow-up observations and analysis to verify they are actual planets.

"Kepler collected data for four years -- long enough that we can now tease out the Earth-size candidates in one Earth-year orbits", said Fergal Mullally, SETI Institute Kepler scientist at Ames who led the analysis of a new candidate catalog. "We're closer than we've ever been to finding Earth twins around other sun-like stars. These are the planets we're looking for".

These findings also have been submitted for publication in *The Astrophysical Journal Supplement*.

Work is underway to translate these recent discoveries into estimates of how often rocky planets appear in the habitable zones of stars like our sun, a key step toward NASA's goal of understanding our place in the universe.

Credits:

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

More information:

Ames is responsible for Kepler's mission operations, ground system development and science data analysis. NASA's Jet Propulsion Laboratory in Pasadena, California, managed Kepler mission development. Ball Aerospace & Technologies Corp. in Boulder, Colorado, developed the Kepler flight system and supports mission operations with the Laboratory for Atmospheric and Space Physics at the University of Colorado in Boulder. The Space Telescope Science Institute in Baltimore archives, hosts and distributes Kepler science data. Kepler is NASA's 10th Discovery Mission and was funded by the agency's Science Mission Directorate in Washington.

For more information about the Kepler mission, visit: <http://www.nasa.gov/kepler>



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

1. Memberships, with dues payment, are for one year. 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, or 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.