

★ ABOVE THE FOG

• BULLETIN OF THE SAN FRANCISCO AMATEUR ASTRONOMERS •

Vol. 66, No. 06 – June 2018

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***** Note: SFAA Lecture date and location change! *****

**NEW Location: Randall Museum
199 Museum Way / San Francisco, CA 94114**

(Free parking & conveniently located for public transportation)

---Note: Meeting day change to 3rd WEDNESDAYS---

**Next Meeting: WEDNESDAY, JUNE 20, 2018
Doors open 7:00 PM | Meeting starts at 8:00 PM**

SFAA PRESIDENT'S NOTE | SUN IN MOTION

Solstice comes from the Latin 'solstitium', which means 'the Sun stand still', as the Sun appears to stop moving north or south in declination for a few days before continuing its path into Fall or Spring. From our point of view, if one doesn't have precise measurements, it simply looks like the days are equally long for a while before they start becoming shorter again. But to paraphrase Galileo: it moves, sucker!

One of my first experiences with astronomy was at the age of 8 or 9 years old. I had built a sun dial out of some wood scraps my grandfather had in his workshop. I convinced my dad to let me leave it out on the back porch, and I checked it every morning before leaving for school. One day, as my watch marked 7 am, I took some color marker, and draw on the ground a mark where the shadow of the sun dial pointed.

A few weeks later, I noticed that even though my watch said 7 am, the sun dial was no longer pointed at the same location. The gnomon's shadow was a few degrees off. This was fascinating to me. I asked every adult I knew what this meant, but they did not know. With my parents' help, I tried to find the answer at the nearest library.

As time went on, I found information to feed my curiosity, but the marks on the ground from the sun dial position increased. School had ended, but I still checked the sun dial at 7 am, and made a new mark every couple of weeks. Then, suddenly, for several consecutive days, it seemed the Sun had stopped! The sun dial pointed to the same location day after day. I became anxious. Something was going to happen, I just knew it. I had no idea what or why, but something strange was up.

And then, the Sun started moving again. But it was moving back the other way. What?!? Inconceivable. In my mind 9 year old mind, I actually thought the world was going to end. I had to tell somebody! The next day, my parents took me to the library, where I told the librarians what I had found. They made some phone calls and a professor came and explained to me what was happening. He helped me find a book, which had a diagram in it. He showed me how my sun dial markings resembled one part of that diagram. Unbeknownst to me, my markings had a name: analemma.

That simple experiment, although it was arrived at completely by accident, was the start of a lifetime of asking myself 'Hmm, how does that work?' every time I saw something not behave as expected. And from that came an appreciation of the sky that continues to this day.

P.J. Cabrera
President, SFAA

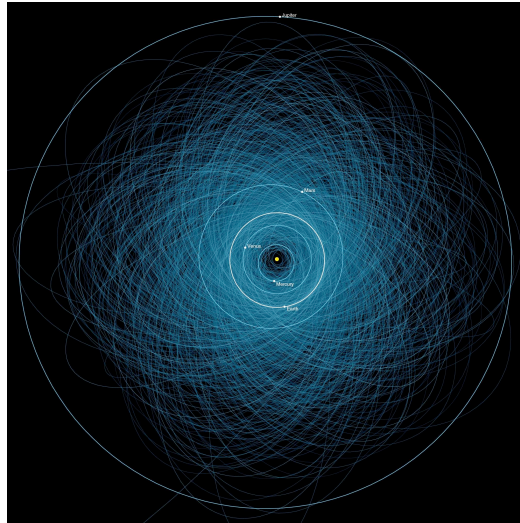
SFAA Board Officers and Directors:

| | | |
|----------------|--|-----------------------------------|
| President | P.J. Cabrera | president@sfaa-astronomy.org |
| Vice President | Liz Triggs | vice-president@sfaa-astronomy.org |
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| Secretary | Anthony Barreiro | secretary@sfaa-astronomy.org |
| Directors: | Matthew Jones, Tom Kellogg, Brian Kruse, Jessica Miller, Will Silberman, and Douglas Smith | |

SFAA LECTURE SCHEDULE 2018

7:00 pm Doors Open & Light Refreshments | 7:30 pm Club Announcements | 7:45 pm Speaker

**NOTE: STARTING IN JUNE 2018
SFAA'S GENERAL MEETINGS OCCUR ON THE 3RD WEDNESDAY
OF EACH MONTH
AT THE RANDALL MUSEUM
199 MUSEUM WAY, SAN FRANCISCO**



JUNE 20TH | DR. MICHAEL BUSCH, RESEARCH SCIENTIST SETI INSTITUTE



“NEAR EARTH ASTEROIDS AND SPACE MISSIONS”

The near-Earth asteroids (NEAs) are a population of objects on orbits around the Sun that cross or come near that of the Earth. They represent remnants of material from the early solar system that never accreted into planets. In addition to scientific motivations, NEAs are important because of the asteroid impact hazard. Many NEAs are accessible targets for spacecraft missions; some require less fuel to get to than the Moon.

Dr. Busch will review the near-Earth population, as well as efforts to discover and characterize NEAs from the ground, and will also discuss past, current, and future missions to near-Earth asteroids. These include missions by NASA, ESA, JAXA, the Chinese National Space Agency, and other groups.

Brief Bio

Michael Busch received his BS in physics and astronomy at the University of Minnesota, and his PhD in planetary science in at Caltech. He was a postdoctoral scholar at UCLA and the National Radio Astronomy Observatory before starting as a research scientist at the SETI Institute in 2013.

UPCOMING SFAA LECTURES 2018

7:00 pm Doors Open & Light Refreshments | 7:30 pm Club Announcements | 7:45 pm Speaker

**THE RANDALL MUSEUM
199 MUSEUM WAY, SAN FRANCISCO**

JULY 18TH | DR. ZEESHAN AHMED, SLAC, KAVLI INSTITUTE



“VIEWING THE BEGINNING OF TIME FROM THE MOST REMOTE PLACES ON EARTH”

Shortly after the birth of the universe, space was filled by a plasma that was literally red-hot. The light radiated by that plasma has traveled the vast emptiness of space for billions of years, with the expansion of the universe slowly stretching its waves until today it appears as microwave radiation. This is the Cosmic Microwave Background (CMB), a glow still visible in the night sky. This glow is almost uniform, but small variations from point to point hold information about the conditions of the universe 13.8 billion years ago.

This lecture will introduce the CMB, present the sophisticated cameras we build to observe it, and describe the remote outposts of our planet where we deploy these cameras to take pictures of this faint radiation. As we image the CMB in finer and finer detail, we hope to improve our understanding of the beginning of the universe and perhaps of time itself.

* * * * *

***** Fun Links For Your Night Sky Viewing *****

SPOT THE STATION: see the International Space Station! As the third brightest object in the sky the space station is easy to see if you know when to look up.

Sighting Opportunities

Sighting Opportunities. Find your next opportunity for spotting the station.

Subscribe to Spot The Station Alerts

Subscribe to email or text notifications and get alerts when the space station will be passing overhead in your area

IRIDIUM FLARES: Most Iridium satellites are still controlled, so their flares can be predicted. The Iridium communication satellites have a peculiar shape with three polished door-sized antennas, 120° apart and at 40° angles with the main bus. The forward antenna faces the direction the satellite is traveling. Occasionally, an antenna reflects sunlight directly down at Earth, creating a predictable and quickly moving illuminated spot on the surface below of about 10 km (6.2 mi) diameter. To an observer this looks like a bright flash, or flare in the sky, with a duration of a few seconds.

Iridium Flares Sighting Schedule, courtesy of Heavens Above

ASTRONOMY EVENTS



SAN FRANCISCO AMATEUR ASTRONOMERS EVENTS

JUNE 16, 2017 – JULY 21, 2018

Details at: <http://www.sfaa-astronomy.org>

Saturday, June 16, 8:30 pm – 11:00 pm
Mt. Tam Public Star Party

Wednesday, June 20, 7:30 pm – 9:15 pm
Meeting and Lecture, ***new venue* Randall Museum**

Thursday, June 21, 8:00 pm – 11:00 pm
City Star Party, Presidio

Saturday, July 7, 8:30 pm – 2:00 am
Mt. Tam Members Night

Saturday, July 14, 8:30 pm – 11:00 pm
Mt. Tam Public Star Party

Wednesday, July 18, 7:30 pm – 9:15 pm
Meeting and Lecture, ***new venue* Randall Museum**

Sunday, July 21, 8:00 pm – 11:00 pm
City Star Party, Point Lobos – Land's End

Friday August 3 – Sunday August 5
2018 Yosemite Star Party @ Glacier Point, Yosemite

Saturday August 11, 7:05 pm – 2:00 am
Mt. Tam Members Night

Wednesday August 15, 7:00 pm - 9:15 pm
Meeting and Lecture, *** new venue* Randall Museum**

Saturday/Sunday September 1-2 <All-day Event>
Robert Ferguson Observatory, Sugarloaf Ridge State Park,
Members Only Picnic and Star Party

BAY AREA ASTRONOMY EVENTS

Each month, long-time SFAA member Kenneth Lum assembles and sends out a list of Bay Area Astronomy events.

As each month unfolds, check the following link for information regarding additional events:

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

* * * * *
**GET REAL, LIVE HELP
WITH YOUR TELESCOPE!**

* * * * *

Are you a new telescope owner?

Or perhaps you could use some help with alignment, collimation or other adjustments?

Collimating a reflector, like playing guitar or dancing the tango, can, with great effort, be learned from reading, but it is much easier and more enjoyable to learn hands-on from somebody who already knows how to do it.

Bring your telescope to a Star Party – we'll be happy to help!

05.

NEW LECTURE LOCATION DETAILS

**** NEW SFAA LECTURE LOCATION & DAY ****

NEW Location:

Randall Museum

199 Museum Way / San Francisco, CA 94114

(Free parking & conveniently located for public transportation)

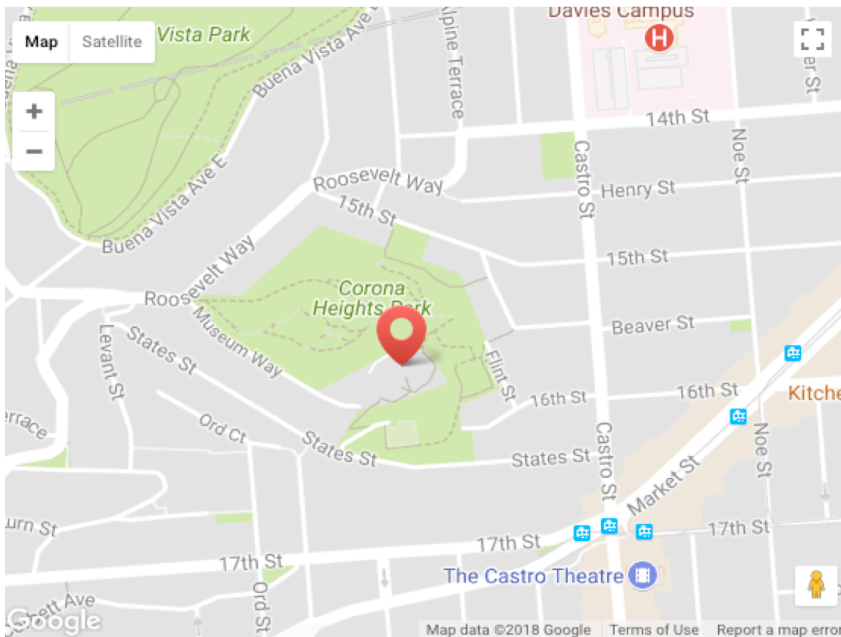
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For more information, visit www.sfaa-astronomy.org



06.

SFAA NEEDS YOU: VOLUNTEER OPPORTUNITIES | ANTHONY BARREIRO AND PJ CABRERA

Volunteer Opportunities in May and June

SFAA depends on our members to provide people of all ages a first-hand experience of the wonders of the universe. Outreach activities are often centered around telescope observing, but there are many ways to teach people about astronomy, and there are always roles for members at all levels of expertise, including beginners, whether or not you bring a telescope. Here are some upcoming outreach opportunities. Please help out as you're able.

Snack Volunteers Needed

SFAA also needs members to volunteer to bring **light refreshments** to our monthly **meetings and lectures** at the Presidio Officers Club, on the **Third Tuesday of Each Month**. Refreshments help to create a welcoming, sociable atmosphere for members and guests. If a few members each bring something, there's less burden on any one member, and we'll have a good variety of snacks and beverages. You may donate snack items or simply provide receipts to be reimbursed for your expenses, and your fellow members will be grateful to you! If you can bring refreshments, please send an email to Linda Mahan, speakerchair@sfaa-astronomy.org

Let Linda know which month or months you can help with, and what you would like to bring.

Ongoing Opportunities to Participate in our SFAA Club

SFAA is also looking for volunteers to help in these areas:

- **Marketing** – we can use help posting SFAA event updates to SFGate, SF FunCheap, Eventful, Bay Area Science, etc.
- **Above The Fog** – submit an occasional article, astrophoto and/or serve as a member of the editorial team.

Please send an email to volunteer@sfaa-astronomy.org if you're interested.

Outreach Opportunities at Star Parties

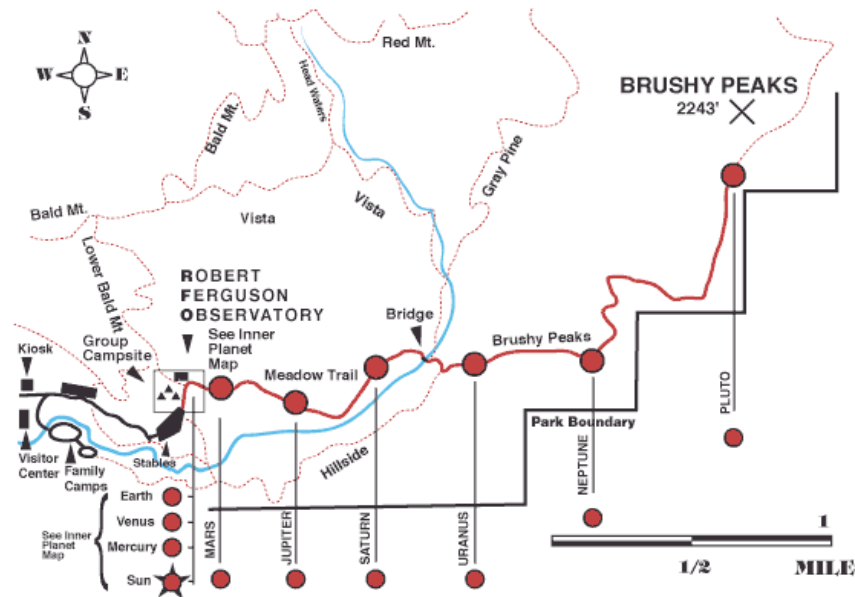
SFAA is also looking for volunteers to help bring and operate telescopes at our monthly star parties. We also need contact people to greet observers and visitors, and direct traffic in the parking area at Mt. Tam and city star party locations.

Please send an email to volunteer@sfaa-astronomy.org if you're interested, or if you have any questions about the responsibilities of contact people and telescope operators.

On behalf of the board of directors and your fellow SFAA members, thank you for your willingness to help out!

07.

ROBERT FERGUSON OBSERVATORY STAR PARTY: 2018 SEPTEMBER 1ST TO SEPTEMBER 2ND



On Saturday September 1, the SFAA will be having an afternoon picnic and overnight star party and tour of [Robert Ferguson Observatory](#) in Santa Rosa. This will be a fantastic event, a chance to explore & learn about RFO and a way to support our neighboring local astronomy club.

Robert Ferguson Observatory is a beautiful spot nestled among the trees and rolling hills of Sugarloaf Ridge State Park near [Kenwood, CA](#). The Observatory is named in honor of Robert Ferguson, an amateur astronomer who built telescopes. The observatory was built in multiple phases by volunteer labor and is still run by volunteers.



Hopefully by the time we have our event, the Planet Walk will be fully restored. (Much of it was damaged in the wild fires last year, and is currently being restored by a local Boy Scout troop.) The campground opens to us at 2pm. Feel free to arrive early and walk the Planet Walk or take a hike in the beautiful State Park.

This event is only open to SFAA members in good standing (both at the time of sign up and at time of event). Individual members are only allowed to bring themselves. Family memberships are allowed to bring two adults and minors. We also encourage each party attending to bring a telescope as this is a not just a tour but also a star party. This is a free event for SFAA members.



ROBERT FERGUSON OBSERVATORY STAR PARTY (CONTINUED)



Everyone attending must arrive by 5pm at the latest. There will be a BBQ potluck to start, starting by 4 pm, with all attendees being asked to bring a side, salad, or dessert that would feed 10 people. SFAA is providing some drinks, hamburgers, veggie burgers and accessories.

Our tour of the observatory will start at 7:30pm. Just like on Tam during a star party, white light is not allowed at RFO after dark. That is part of why we are asking members to arrive at 5pm at the latest, so your camping spot can be fully setup before the tour/star party starts. There is also no cell phone service at the observatory, so plan accordingly.

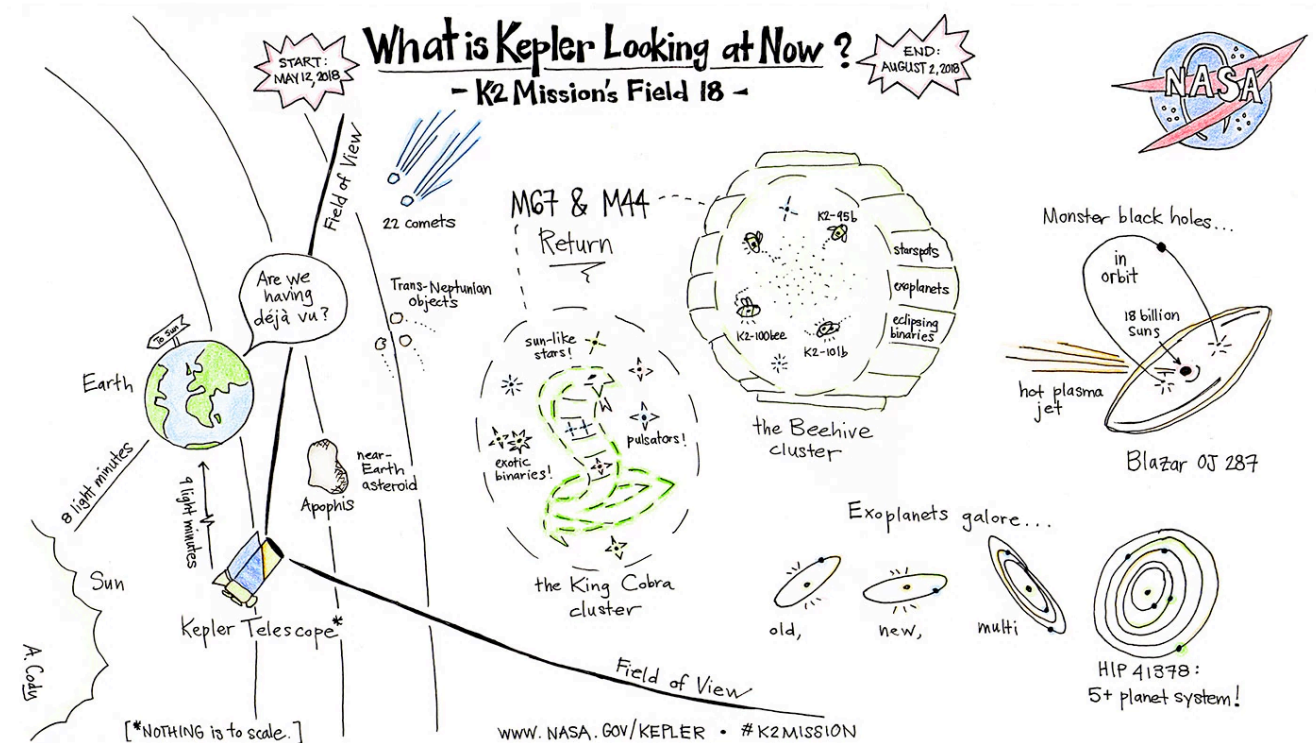
How to Sign Up:

To sign up for this event, please visit the [SFAA](https://www.sfaa.org/) website or follow this link:
<https://goo.gl/7VSvt5>.

Remember, the trip is available to MEMBERS ONLY



Kepler Begins 18th Observing Campaign with a Focus On Star Clusters



NASA's planet-hunting Kepler spacecraft began the 18th observing campaign of its extended mission, K2, on May 12. For the next 82 days, Kepler will stare at clusters of stars, faraway galaxies, and a handful of solar system objects, including comets, objects beyond Neptune, and an asteroid. The Kepler spacecraft is expected to run out of fuel within several months.

Campaign 18 is a familiar patch of space, as it's approximately the same region of sky that Kepler observed during Campaign 5 in 2015. One of the advantages of observing a field over again is that planets outside the solar system, called exoplanets, may be found orbiting farther from their stars. Astronomers hope to not only discover new exoplanets during this campaign, but also to confirm candidates that were previously identified.

Open clusters are regions where stars formed at roughly the same age, including Messier 67 and Messier 44, otherwise known as Praesepe or the Beehive cluster. Home to six known exoplanets, the Praesepe cluster will be searched anew for objects that are transiting, or crossing, around these and other stars.

At approximately 800 million years old, the stars in Praesepe are in their teenage years compared to our Sun. Many of these youthful stars are active and have large spots that can reveal information about a star's magnetic field, a fundamental component of a star that drives flaring and other activity that may have influence over habitability. By comparing brightness data collected in Campaign 18 and 5, scientists can learn more about how a star's spots cycle over time.

At several billion years, the Messier 67 cluster is much older and has many Sun-like stars. It is one of the best-studied open clusters in the sky. Astronomers will continue their studies of stellar astrophysics by analyzing Messier 67's stars for changes in brightness. They will search for the signatures of exoplanets, observe the pulsations of evolved stars, and measure the rotation rates of many other stars in the cluster.

Beyond these clusters, Kepler will observe blazars, the energetic nuclei of faraway galaxies with black holes in their centers. These objects propel jets of hot plasma toward Earth (though they are far too distant to affect us). The most notable of these targets is OJ 287, a system hosting two black holes in orbit around each other, one of which weighs 18 billion times the mass of the Sun!

NASA SCIENCE NEWS (CONTINUED)

Even closer to home, Kepler will look at solar system objects, including comets, trans-Neptunian objects, and the near-Earth asteroid 99942 Apophis. This 1,000-foot chunk of rock will pass within 20,000 miles of Earth in the year 2029 -- close but still comfortably far enough to not pose any danger to Earthlings.

NASA's Ames Research Center in California's Silicon Valley manages the Kepler and K2 missions for NASA's Science Mission Directorate. NASA's Jet Propulsion Laboratory in Pasadena, California, managed Kepler mission development. Ball Aerospace & Technologies Corporation operates the flight system with support from the Laboratory for Atmospheric and Space Physics at the University of Colorado in Boulder.

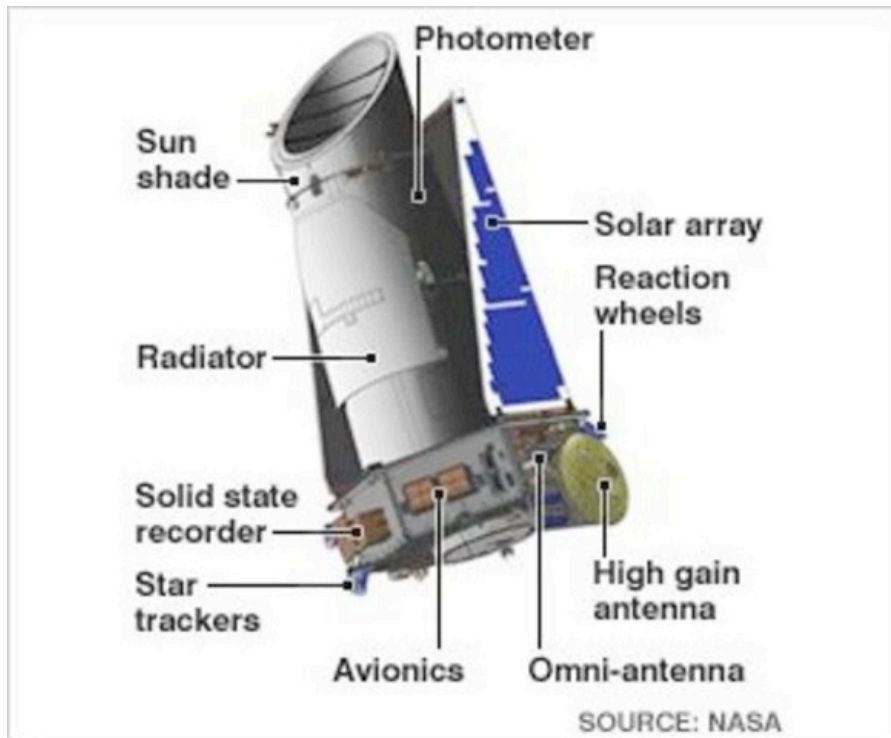
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2018-115

Kepler Space Telescope components





Application for New or Renewing Membership

1. Memberships, with dues payment, are for one year running from the member's join or renewal date.
2. New or renewal memberships sent in via USPS mail will have membership start date based on postmark date.
3. SFAA is a 501(c)(3) nonprofit organization. Membership dues are tax-deductible, as allowed by law.

This application is for:

New

Renewing

Name: _____

Address: _____

Email: _____

Contact phone (optional): _____

Membership Type: Individual \$25.00 Family \$30.00 Student \$10.00

Supporting \$75.00 Institutional \$40.00

(All dues tax-deductible as allowed by law.)

Please mail to me a Mt. Tamalpais Parking Permit (1 per membership)

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

Both new and renewing members will receive a verifying email from the SFAA upon completion of the membership process.