

Vol. 66, No. 08 – October 2018

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### **\*\*\* 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

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## SFAA PRESIDENT'S NOTE | INTERNATIONAL OBSERVE THE MOON NIGHT

October often brings the best weather to the Bay area, and to San Francisco and coastal communities in particular. While other nights of the year bring fog and chilly temperatures, October has many nights with warm air and clear skies, inviting all to take a pleasant stroll outside after sunset. This makes October a great month for sidewalk astronomy.

October 20<sup>th</sup>, 2018 is International Observe the Moon night, and astronomy clubs around the world will be out in full force that evening, bringing astronomy to their communities with sidewalk astronomy programs. SFAA has an event at Pier 17 on the Embarcadero that evening, and we hope to have several telescope operators there, inviting our fellow Earth denizens to look up.

We hope you can join us! Stop by Pier 17 after sunset on October 20 and say hello to the Moon.

Clear skies,

**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
Treasurer	Scott Miller	treasurer@sfaa-astronomy.org
Secretary	Anthony Barreiro	secretary@sfaa-astronomy.org
Directors:	Matthew Jones, Tom Kellogg, Brian Kruse, Jessica Miller, Will Silberman, and Douglas Smith	

### **\* \* \* SFAA featured in local journalist's podcast \* \* \***

SFAA member Jerry Kay has been an environmental journalist for many years (CBS Radio, KCBS in San Francisco, Sirius Satellite Radio) but these days he is looking for stories about art, design, architecture and innovation for his delightful and informative podcast, *Jerry Kay's Journal*. The September 21, 2018 episode, "**CURIOUS ABOUT THE NIGHT SKY AND ASTRONOMY?**", features a brief interview about the SFAA with club president, PJ Cabrera.

Check out the podcast and share it with your friends and family. You can listen with this direct link: <https://anchor.fm/JerryKaysJournal/episodes/CURIOUS-ABOUT-THE-NIGHT-SKY-AND-ASTRONOMY-e2949g/a-a5em74> or listen in your favorite app (this program is available on 8 platforms). Subscribe to be sure to get future episodes delivered right to your device.

What a great way to inform the public about our club and attract potential new members. Jerry is willing to add future episodes that could cover topics such as:

1. What we can see in the Night sky during the fall/winter
2. Ideas for things that would make great holiday gifts for astronomy enthusiasts
3. Questions that you have about astronomy, telescopes, viewing tips and best practices, etc.

Please submit your ideas for podcasts and your astronomy questions to [president@sfaa-astronomy.org](mailto:president@sfaa-astronomy.org) and we will coordinate with Jerry.

**SFAA LECTURE SCHEDULE 2018**

7:00 pm Doors Open & Light Refreshments | 7:45 pm Program Begins  
**THE RANDALL MUSEUM**  
**199 MUSEUM WAY, SAN FRANCISCO**

**OCTOBER 17TH | JOSH DILLON, PHD, UC BERKELEY**



**“MAKING THE LARGEST-EVER 3D MAPS OF OUR UNIVERSE”**

The last century has seen a revolution in our understanding of the universe and our place in it. We now know that the universe is about 13.8 billion years old and is only about 5% normal matter – the stuff we’re made up of, like protons, neutrons, electrons. Uncovering the nature of the other 95%, the mysterious dark matter and even more mysterious dark energy, is one of the most important questions in fundamental physics today.

Dr. Dillon will talk about a new technique being developed at Berkeley, with collaborators around the world, using radio telescopes to make huge 3D maps of hydrogen, the most abundant element in the universe, to test our cosmological theories. He will explain the observational challenges being faced and the reason why we’re building a giant array of 350 dishes, each one almost 50 feet across, in the middle of the South African desert. He will discuss how we know what we know about cosmology today and how we use radio telescopes to map out the ancient hydrogen and see the impact that the very first stars, galaxies, black holes, and maybe even dark matter had on it.

***Brief Bio***

*Josh Dillon received his PhD in physics in 2015 from the Massachusetts Institute of Technology, working with Professor Max Tegmark. He is now an NSF Astronomy and Astrophysics Postdoctoral Fellow at the University of California, Berkeley, working with Professor Aaron Parsons on the Hydrogen Epoch of Reionization Array (HERA) project. Josh’s research focuses on the theory and practice of data analysis for 21 cm Cosmology, a new way to map neutral hydrogen throughout cosmic time with low-frequency radio telescopes. Josh grew up outside Chicago and got a BS in physics from Stanford University.*

## UPCOMING SFAA LECTURES 2018

7:00 pm Doors Open & Light Refreshments | 7:45 pm Program Begins

**THE RANDALL MUSEUM**

**199 MUSEUM WAY, SAN FRANCISCO**

**DECEMBER 19TH | DR. LYNN ROTHSCILD, NASA AMES ASTROBIOLOGIST**

### “IS THERE A UNIVERSAL BIOLOGY”



Why would anyone think that the “laws” of biology - far less life itself - might be universal? The law of evolution through natural selection seems beyond reproach. However, we don’t understand how life arose on Earth, so speculating on life’s origin elsewhere seems risky. Still, terrestrial biology is strictly based on chemistry, and chemistry on universal physics. The uniformity of the laws of physics - evident in every ray of light that we receive from the cosmos and every experiment that our robots perform in the Solar System - implies that biology should be just like good ol’ geobiology: greenery everywhere it’s possible. Join Dr. Rothschild for her ideas from her long study of astrobiology.

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### **\*\*\* Proposed Change in SFAA Bylaws \*\*\***

Per the SFAA Bylaws, members must be notified 40 days prior to a bylaw change. Bylaw changes are voted on by a majority of members present at a membership meeting.

The SFAA Board proposes that Article 5 of the Bylaws be changed to the following:

#### **Article 5: Dues**

**Section 3. Membership shall commence on the first day of payment of dues; and shall expire twelve months later.**

This change will be voted on at the December general meeting, on December 19, 2018.

### **\*\*\* SFAA Board Elections \*\*\***

SFAA will hold an election for a new Board of Directors, at the December general meeting, to be held on December 19, 2018. Members are advised to attend and vote!

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## ASTRONOMY EVENTS



### SAN FRANCISCO AMATEUR ASTRONOMERS EVENTS OCTOBER - DECEMBER 2018

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

**Saturday, October 13, 8:30 pm – 11:00 pm**  
Mt. Tam Public Star Party

**Wednesday, October 17, 7:45 pm – 9:15 pm**  
Meeting and Lecture, Randall Museum

**Saturday, October 20, 7:30 pm – 10:00 pm**  
City Star Party, Pier 17, Embarcadero

**Saturday November 3, 6:10 pm – 2:00 am**  
Mt. Tam Members Night

**Saturday, November 17, 7:00 pm – 10:00 pm**  
City Star Party, Point Lobos – Land's End

**Saturday, December 8, 4:30 pm – 2:00 am**  
Mt. Tam Members Night

**Wednesday, December 19, 7:45 pm – 9:15 pm**  
Meeting and Lecture, Randall Museum

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**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!

### 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>

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## SFAA NEEDS YOU: VOLUNTEER OPPORTUNITIES

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 Randall Museum, on the **Third Wednesday 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](mailto: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](mailto: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](mailto: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!**

### Opportunity Emerges in a Dusty Picture

NASA still hasn't heard from the Opportunity rover, but at least we can see it again. A new image produced by HiRISE, a high-resolution camera aboard NASA's Mars Reconnaissance Orbiter (MRO), shows a small object on the slopes of the Red Planet's Perseverance Valley. That object is Opportunity, which was descending into the Martian valley when a dust storm swept over the region a little more than 100 days ago.



The storm was one of several that stirred up enough dust to enshroud most of the Red Planet and block sunlight from reaching the surface. The lack of sunlight caused the solar-powered Opportunity to go into hibernation. The rover's team at NASA's Jet Propulsion Laboratory in Pasadena, California, hasn't heard from it since. [On Sept. 11](#), JPL began increasing the frequency of commands it beams to the 14-year-old rover.

The tau -- a measurement of how much sunlight reaches the surface -- over Opportunity was estimated to be a little higher than 10 during some points during the dust storm. The tau has steadily fallen in the last several months. On Thursday, Sept. 20, when this image was taken, tau was estimated to be about 1.3 by MRO's Mars Color Imager camera.

The University of Arizona in Tucson operates HiRISE, which was built by Ball Aerospace & Technologies Corp., in Boulder, Colorado. NASA's Jet Propulsion Laboratory, a division of Caltech in Pasadena, California, manages the Mars Reconnaissance Orbiter Project for NASA's Science Mission Directorate in Washington.

For more, visit:

[https://www.uahirise.org/ESP\\_056955\\_1775](https://www.uahirise.org/ESP_056955_1775)

Updates about Opportunity can be found here:

<https://mars.nasa.gov/mer/mission/status.html>

### News Media Contact

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## AS KEPLER MISSION ENDS, TESS MISSION BEGINS

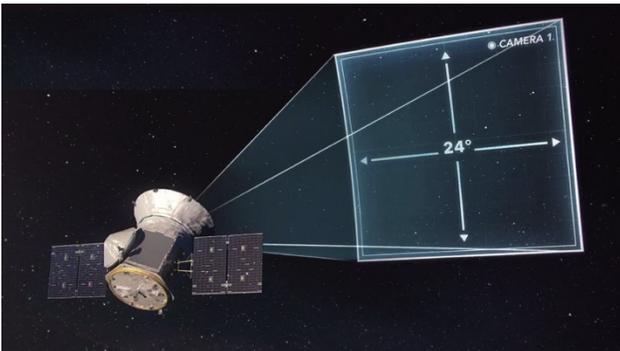
| BY SFAA MEMBER, JOE CASTROVINCI

Interesting times for astronomers: at some point in the next few months we'll say goodbye to the Kepler space telescope, which will run out of fuel and drift out of communications range, ending a mission that revolutionized our understanding of the cosmos. But as we do that, we'll also say hello to Kepler's heir, TESS, NASA's Transiting Exoplanet Sky Survey satellite, which recently achieved first light and has begun sharing images with scientists and the general public.

It's hard to overstate the impact of Kepler. In the early 1980s, when NASA astronomer Bill Borucki first conceived of a space telescope designed to find exoplanets, the number of known exoplanets was zero. At Kepler launch on March 7, 2009, the exoplanet count was at about 400.

That number would soon begin to soar. Shortly after launch, Kepler began staring at a small section of the sky known as the Kepler field, and kept doing it for four years in the first phase of what later became a two-part mission. Since that time, [Kepler has discovered](#) 2,327 confirmed exoplanets and 2,244 exoplanet candidates. Those numbers will continue to go up as scientists sift through data generated by the space telescope. The mission proved that exoplanets are common and come in all shapes and sizes.

Kepler was expected to last for about four years, but thanks to superb equipment design and some brilliant people at NASA, may actually make it to its tenth birthday in 2019. In 2013, after two of the telescope's four gyroscopes failed and the space telescope was no longer able to stare at the Kepler field, NASA began a second, K2 phase of Kepler's mission which involved using reflected sunlight to steer the spacecraft. That allowed the telescope to continue working for several more years and generate more data. But now, with fuel running out and more equipment failing, the mission is expected to end late this year or early next.



TESS, Kepler's heir, went into orbit on April 18, 2018 on a SpaceX Falcon rocket. Unlike Kepler, which stared at only one part of the sky, TESS is a two-year, all-sky survey, which will examine 200,000 of the brightest stars near our sun. It's expected to catalogue thousands of exoplanets, at least some of which may harbor life.

Shortly after achieving first light in May, TESS began sending images back to Earth. Some of those first images can be viewed [here](#). In coming years, the first-ever space-based all-sky transit survey will send back images of exoplanets ranging from gas giants to Earth-sized rocky planets—an achievement beyond the capabilities of any ground-based telescope.

A final word on Kepler. Long after TESS has completed its mission, our descendants may be able to welcome Kepler back to Earth. Franck Marchis, SETI Institute senior planetary astronomer and exoplanet group chair, recently noted that Kepler will return to the vicinity of Earth in about fifty-three years. At that time may it be possible, he speculates, for some future technology to capture the craft and return it to Earth, where it can assume a well-earned position of prominence in a museum dedicated to the history of aviation and space flight. "Clearly, it deserves a special place here on Earth," Marchis continued, "the planet that launched it into the cosmos, and in the mind and heart of the species that built it and sent it on its astonishing mission of discovery."



## 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.