



Vol. 65, No. 10 – October 2017

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### **\*\* October Observing Basics: Members Share Eclipse Stories & Photos \*\***

Many SFAA members experienced the Eclipse in August. Whether you traveled to the path of the Totality or enjoyed the Partial Eclipse, we invite you to share your stories, photos and videos prior to the October SFAA lecture.

All are welcome to submit material and attend this session, which will be in place of the October Observing Basics slot.

All materials should be submitted by Tuesday, October 10 to SFAA Board Member, P.J. Cabrera, at [pjcabrera@pobox.com](mailto:pjcabrera@pobox.com)

Date: Tuesday, October 17, 2019

Time: 7:00pm

Location: The Officers Club at the Presidio

# 01.

## SFAA PRESIDENT'S NOTE | LESS DAY, MORE NIGHT

As of 22 September, where there were approximately as many hours of day and night (the Sun being up in the sky versus not) and now we are into the gradual slide of more hours of night than day. For many people this is a disconcerting time of year and will continue to be so until 21 December when the Sun begins showing itself more and more every day. For amateur astronomers, well, it isn't all that bad, now is it? There are simply more hours to be able to see our solar system, our galaxy and other galaxies. The wonders of the universe are there to behold if you would only look up.

Autumn and Winter are great times of the year for astronomers, professional and amateur alike. And you don't need a telescope – simply looking up (in a sky not overwhelmed by light pollution) and identifying constellations is a delight (please, more than just Orion) and a challenge, too, as many are not all that obvious. The sky is divided up into eighty-eight constellations, approximately half in the southern hemisphere that are not all visible to us in the northern hemisphere. If you want to find a deep space object, you first have to know which constellation it is located in.

As experienced as many of us are, it is a great experience to be able to show beginners the constellations and then they have a sense of what they are looking at when they look up during the longer nights before us.

Dark, clear and stable skies,

**Michael Patrick**  
President, SFAA

### **SFAA Board Officers and Directors:**

President	Michael Patrick	<a href="mailto:president@sfaa-astronomy.org">president@sfaa-astronomy.org</a>
Vice President	Liz Triggs	<a href="mailto:vice-president@sfaa-astronomy.org">vice-president@sfaa-astronomy.org</a>
Treasurer	Michael Patrick	<a href="mailto:treasurer@sfaa-astronomy.org">treasurer@sfaa-astronomy.org</a>
Secretary	Anthony Barreiro	<a href="mailto:secretary@sfaa-astronomy.org">secretary@sfaa-astronomy.org</a>
Directors:	PJ Cabrera, Anil Chopra, Brian Kruse, Matthew Jones, Jessica Miller, Scott Miller, Douglas Smith, Paul Salazar	

### **\*\*\* Call For Design Submissions \*\*\***

**Calling all Designers! The SFAA Board is excited to announce that we are looking to create SFAA Hoodies; the exact item that all well-dressed night sky watchers need!**

**Three simple steps:**

- 1. Think up a great design idea**
- 2. Draw it**
- 3. Submit it to [president@sfaa-astronomy.org](mailto:president@sfaa-astronomy.org)**

**Got more than 1 idea? Fantastic! Repeat steps 1 – 3.**

**Your design might be the winner. What are you waiting for? The sky's the limit!**

# 02. ASTRONOMY EVENTS



## SAN FRANCISCO AMATEUR ASTRONOMERS EVENTS OCTOBER 17, 2017 – DECEMBER 19, 2017

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

**Tuesday, October 17, 7:30 pm – 9:15 pm**  
Meeting and Lecture, Presidio Officers Club

**Saturday, October 21, 6:00 pm – 2:00 am**  
Mt. Tam Members Night

**Saturday, October 28, 6:30 pm – 11:00 pm**  
Mt. Tam Public Astronomy Night: Lecture and Star Party  
Mountain Theater and Rock Springs Parking Lot

**Sunday, October 29, 7:00 pm – 10:00 pm**  
City Star Party, Pier 17, Adjacent to Exploratorium

**Saturday, November 11, 7:30 pm – 10:30 pm**  
City Star Party, Presidio Main Parade Ground

**Saturday, November 18, 5:00 pm – 2:00 am**  
Mt. Tam Members Night

**Saturday, December 9, 5:30 pm – 10:00 pm**  
City Star Party, Pint Lobos

**Saturday, December 16, 4:30 pm – 2:00 am**  
Mt. Tam Members Night

**Tuesday, December 19, 7:30 pm – 9:15 pm**  
Meeting and Lecture, Presidio Officers Club

\* \* \* \* \*  
**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>

### \* \* \* Mark Your Calendars \* \* \*

**Quarterly in-person SFAA Board Meetings – all SFAA members are welcome to attend:**

**\*\* UPDATE: Tuesday, November 14 Meeting has been POSTPONED until 2018. \*\***

Come join us to learn what's going on with upcoming club events such as: public outreach, star viewing trips, scientific lectures, telescope making, members-only dark sky viewing nights, opportunities to participate in Astronomy, and much more.

# 03.

## **SFAA NEEDS YOU: VOLUNTEER OPPORTUNITIES | ANTHONY BARREIRO**

### **Volunteers Needed for SFAA Star Parties**

Throughout the year SFAA provides two or three star parties a month. Every month of the year we do a City Star Party at various locations in San Francisco and a members night on Mount Tamalpais. From April through October, in collaboration with Mt. Tam State Park, the Friends of Mt. Tam, and Wonderfest, SFAA provides telescope observing as part of the monthly public astronomy program. That's a total of 31 star parties a year! We need a couple of experienced SFAA members to serve as contact people for each of these events. If you've been to at least a few star parties, you're familiar with the procedures, and you're able to commit to attending a specific star party, we need your help.

Star party contact persons check the weather forecast during the days before a star party, keep in touch with the other contact person, and make a decision whether or not to cancel the event because of rain, or because of high fire danger on Mt. Tam. On the day of the star party, contact people arrive early, welcome and orient members, and hold a brief huddle for all the telescope operators to review procedures and answer questions. On Mount Tamalpais contact people make sure that every vehicle belongs to an SFAA member and has a parking pass. For the Mt. Tam public astronomy program, SFAA contact people coordinate with the Friends of Mount Tam volunteers who manage the visitor parking area. Contact people always have plenty of time to set up and use their own equipment and to enjoy the star party. At the end of the night on Mt. Tam, the contact persons need to make sure members know to lock the gate behind them on the way out.

A small number of SFAA members have been serving as contact people for all our star parties. It would be great to have a larger pool of volunteers, so that we could all take turns. If you sign up you will receive one email a month asking people to volunteer for upcoming star parties.

If you're willing to help out, or if you have questions, please contact Anthony Barreiro at [secretary@sfaa-astronomy.org](mailto:secretary@sfaa-astronomy.org).

### **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](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:

- **Star Parties** – both on Mt. Tam and for City Star Parties
- **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 Michael Patrick at [president@sfaa-astronomy.org](mailto:president@sfaa-astronomy.org) if you're interested.

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

# 04.

## FOCUS ON SFAA MEMBERS' SCOPES: MY FIRST TELESCOPE | **GEORGE TEIBER**

My introduction to Astronomy was at the Stonestown YMCA. I had retired in 2000 and after several years of woodworking and remodeling the house, I started going to the gym three times a week. I rode a stationary bike and also worked out on the weight machines. One day while riding the bike I was reading an issue of Sky and Telescope. While reading the magazine I wondered if you could make a telescope. An article at the end of the magazine was about a gentleman who made a telescope. My interest was piqued. In the article he stated the hardest part of making the telescope was the woodworking involved in the mounting of the scope. The mirror making he said, was the easiest. I thought the opposite would be true for me.

I remembered that the Randall Museum had classes on telescope making. I called Randall and was informed that a class was to begin the following week. The following Tuesday I went to Randall and started the class, which was taught by Douglas Smith and Mitchell Schoenbrun, of the SFAA. Also attending the class were Angie Traeger and Adam Esposito, they too were members of the SFAA. I began the task of grinding and polishing the mirror on April 13, 2011.

While grinding the mirror I also started to design the mounts and optical tube cradle. In my professional life I was an Architect and specialized in production of construction drawings. With that background I went through several different designs for the wood components for the telescope. When I got to the final figuring of the mirror I went over to the Cabot Telescope Workshop in Oakland that meets every Friday night. There I worked for three Friday nights on the final figuring with help from Richard Ozer and Dave Barroso. The mirror was completed and coated by Bob Fies on Aug. 13, 2011. By this time I had completed the other components and the mirror was installed that day. That night I saw the moon through a telescope that I made myself!



*Photo credit: George Teiber  
Left: My completed telescope  
on our second floor deck with  
an Eastern and Southern  
view.*

The telescope has an eight-inch mirror and a focal length of 72". The reason for the length is the mirror is ground closer to a circular curve than a parabolic curve for shorter focal length. This was intentional as it would be an easier mirror to grind and figure. As it turns out it is a great planetary and lunar telescope. With a 26mm eyepiece it has a magnification of about 70X. At star parties I usually like to train the scope on the moon with the 26mm eyepiece and then add a 3X Barlow lens. With this setup I get a

magnification of 210X. I like to switch from the 26mm to the Barlow with the 26mm eyepiece; this gives the viewers a nice overall view and then a close-up. Views along the terminator say at the 1st quarter are quite nice with the higher magnifications. Needless to say I prefer viewing the moon.

The completed telescope on our second floor deck with an Eastern and Southern view. I used to keep the telescope on the second level so I could set it up on the deck. But I then had to carry it to the basement on the nights of Star Parties to load into the car. After a major illness, it is now in the basement for ease of loading for Star parties. In July of 2012 I made an equatorial platform for the scope and I get hours worth of viewing without adjusting the scope. This is very handy at the star parties. I have incorporated locking devices so the scope can not be moved during viewing, thus I can spend time talking with guests.

I have completed a 6" travel scope and was working on an 8" scope for the Makers Faire when I had my illness. I hope to complete it before next year's Faire. I have plans to build a 4.25" Schiefspiegler F27 in the future. Only time will tell.



Photo credit: George Teiber  
Above: Star Party October 6, 2016, Presidio Parade Grounds

\* \* \* \* \*

**Editor's Note: Introducing a New Above The Fog Feature**

\* \* \* \* \*

After attending several SFAA Star Parties, I have seen that our Members have some AMAZING telescopes. This new feature puts the spotlight on our Members and their telescopes. Thank you, George, for kicking off this exciting new feature!

Please share the story of your telescope with other Members—you know they will be interested! Here are a couple of suggestions that might be helpful in putting your submission together:

- History of telescope, i.e. Did you make it?, Who did you get it from?, How long have you had it?
- Size and type of telescope, including magnification
- Noteworthy or favorite objects to view, including the first object you saw through your scope
- Members' own astrophotos are welcome, too
- Include photos of your scopes and a photo of yourself with your scope

Submit your articles and photos to [newslettereditor@sfaa-astronomy.org](mailto:newslettereditor@sfaa-astronomy.org)

## 05. SFAA IN THE COMMUNITY: EVENT SUMMARIES

### SFAA September 19<sup>th</sup> Lecture at the Presidio Observation Post |

**Scott Miller**

SFAA had a temporary relocation back to the Presidio Observation Post for the September lecture, “A Planet For Goldilocks: NASA’s Search For Life Beyond The Solar System”, featuring Natalie Batalha, Ph.D., NASA Ames Research Center. This was a one-time relocation, and there was some concern that SFAA Members might not see the update on the change in venue. As you can see in the photo, we had a full house. It was an outstanding lecture and Dr. Batalha captivated the crowd until the very end, answering questions and posing for photos until the event staff asked us to wrap it so they could close the building.



*Photo credit: Scott Miller*

*Above: SFAA Members and guests at the September 2017 lecture at the Presidio Observation Post*

### SFAA September 28<sup>th</sup> City Star Party at the Presidio Parade Ground |

**Liz Triggs**

On Thursday, September 28<sup>th</sup>, **Scott Miller, George Teiber, P.J. Cabrera, Liz Triggs** and new member **Travis G.**, represented the San Francisco Amateur Astronomers at the city star party at the Presidio. We set up 4 telescopes and enjoyed outstanding views of our moon, Arcturus and Saturn until the fog rolled in and put an end to the evening. Over the course of the evening, we had over 60 people stop by to enjoy the views, including new members **Anand** and **Nate**.

**Looking forward to seeing you at the next SFAA event!**

# 06.

## **CITIZEN SCIENCE PROJECT: HELP MAP MARS! | P.J. CABRERA**

### **Citizen Science Overview**

With the increasing popularity of the Internet over the last two decades, it has become easier to communicate and distribute information to people spread all around the globe. Scientists have seized on the proliferation of the Internet to coordinate collaborative activities with members of the general public interested in science. These projects seek not only to publish their information on the Internet, but also to enlist the public's help in the observation, cataloguing and categorizing of astronomical phenomena.

Citizen science projects are an exciting way in which amateur astronomers can contribute their time and effort to the advancement of science. They also provide a way to learn more about the science by being involved more directly in the process. Many of these projects do not require heavy or expensive equipment, and some only require access to a computer connected to the Internet.

Over the next several ***Above The Fog*** issues, I will give overviews of different citizen science projects looking for help from the public.

### **Citizen Science Project - Help Map Mars!**

With winter coming, humidity in the Bay area will increase and clear nights will become rare. What is an avid astronomer to do during these coming months of gloom? With the great reach of the Internet and images from the Mars Reconnaissance Orbiter (MRO), you can help do great science and map the surface of Mars in greater detail.

The Planet Four: Terrains project is looking for volunteers to help catalogue different kinds of terrain in the south polar region of Mars.

Using images from the Context Camera aboard MRO, citizen scientists can map where different types of terrain occur. The Planet Four scientists will use this mapping to determine where to take more detailed photos with the MRO High Resolution Imaging Science Experiment camera (a.k.a. HiRISE) . HiRISE is a the highest resolution camera to ever orbit another planet!. It can capture detail down to 1 foot per pixel, resolving objects below a meter across. With HiRISE, scientists can study these new regions of interest in detail and examine how they change over time.

To help, and to find out more, go to <https://www.zooniverse.org/projects/mschwamb/planet-four-terrains>



# 07.

**\*\*\* NOTE: NEW SFAA MEETING LOCATION FOR 2017 \*\*\***

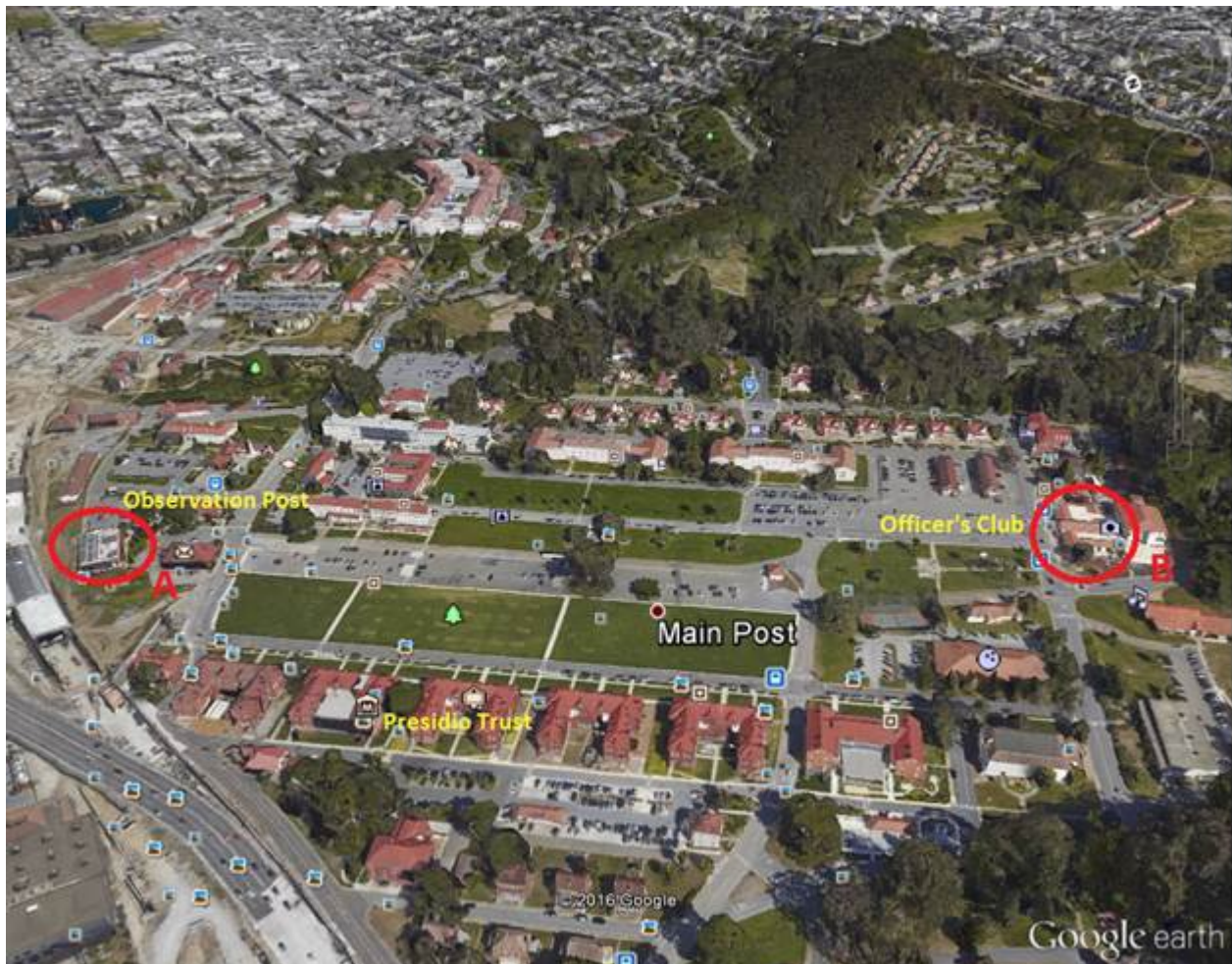
We are happy to announce that, starting in 2017, we will be meeting at:  
The San Francisco Presidio Officers' Club  
50 Moraga Avenue, San Francisco, CA 94129

The SFAA meetings will take place in Moraga Hall, which is just inside the main entrance.

(As you may or may not know, the building where we have been meeting is scheduled to be demolished)

The image below illustrates the location of the Presidio Officers' Club relative to our prior location at the Observation Post.

**\* \* \* 7:00pm Doors open | 7:45pm Lecture starts \* \* \***



# 08.

## **OCTOBER 17<sup>TH</sup> LECTURE | TOM ABEL, KAVLI INSTITUTE, DIRECTOR OF KIPAC, STANFORD**

**THE PRESIDIO . PRESIDIO OFFICERS' CLUB, BUILDING 50 . MORAGA HALL**

**50 Moraga Avenue, San Francisco**

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

**SFAA'S GENERAL MEETINGS OCCUR ON THE 3<sup>RD</sup> TUESDAY OF EACH MONTH (EXCEPT JANUARY)**

### **“ HOW THE FIRST THINGS IN THE UNIVERSE CAME ABOUT, AND HOW THEY ENDED UP WITHIN US”**



**TOM ABEL, PH. D.  
DIRECTOR, KAVLI INSTITUTE, PROFESSOR,  
STANFORD, DEPARTMENT OF PHYSICS**

Join us for a fascinating journey through the early universe using the latest computer animations of early star formation, supernova explosions and the build-up of the first galaxies. Dr. Abel's work has shown that the first luminous objects in the universe were very massive stars shining one million times as brightly as our Sun. They died quickly and seeded the cosmos with the chemical elements necessary for life.

One star at a time, galaxies started to assemble just one hundred million years after the Big Bang, and they are still growing now. Computer simulations of these events use the physics of dark matter, of ordinary atoms and molecules, and of expanding space to deliver remarkable insights into the early history of the cosmos.

#### **Brief Bio**

*Tom Abel is a computational cosmologist at the Kavli Institute for Particle Astrophysics and Cosmology and a Professor both at the SLAC National Accelerator Laboratory and the Physics Department at Stanford University. In 2013, he became the Director of the Kavli Institute for Particle Astrophysics and Cosmology. He was on the faculty at the Department of Astronomy and Astrophysics at Penn State University in State College Pennsylvania from 2002 until 2004. He was a postdoctoral fellow at the Harvard Smithsonian Center for Astrophysics and at the Institute of Astronomy in Cambridge, UK.*

*Dr. Abel's PhD thesis was on the Formation of the First Objects in the Universe which was submitted at the Ludwig-Maxemillian University in Munich in 1999. From 1993 through 1998 he was a visiting scientist at the National Center for Supercomputing Applications at the University of Illinois in Urbana Champaign. He was originally from a small village in Lower Bavaria, Germany.*

# 09.

## UPCOMING SFAA LECTURES 2017

**THE PRESIDIO . PRESIDIO OFFICERS' CLUB, BUILDING 50 . MORAGA HALL**

50 Moraga Avenue, San Francisco

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

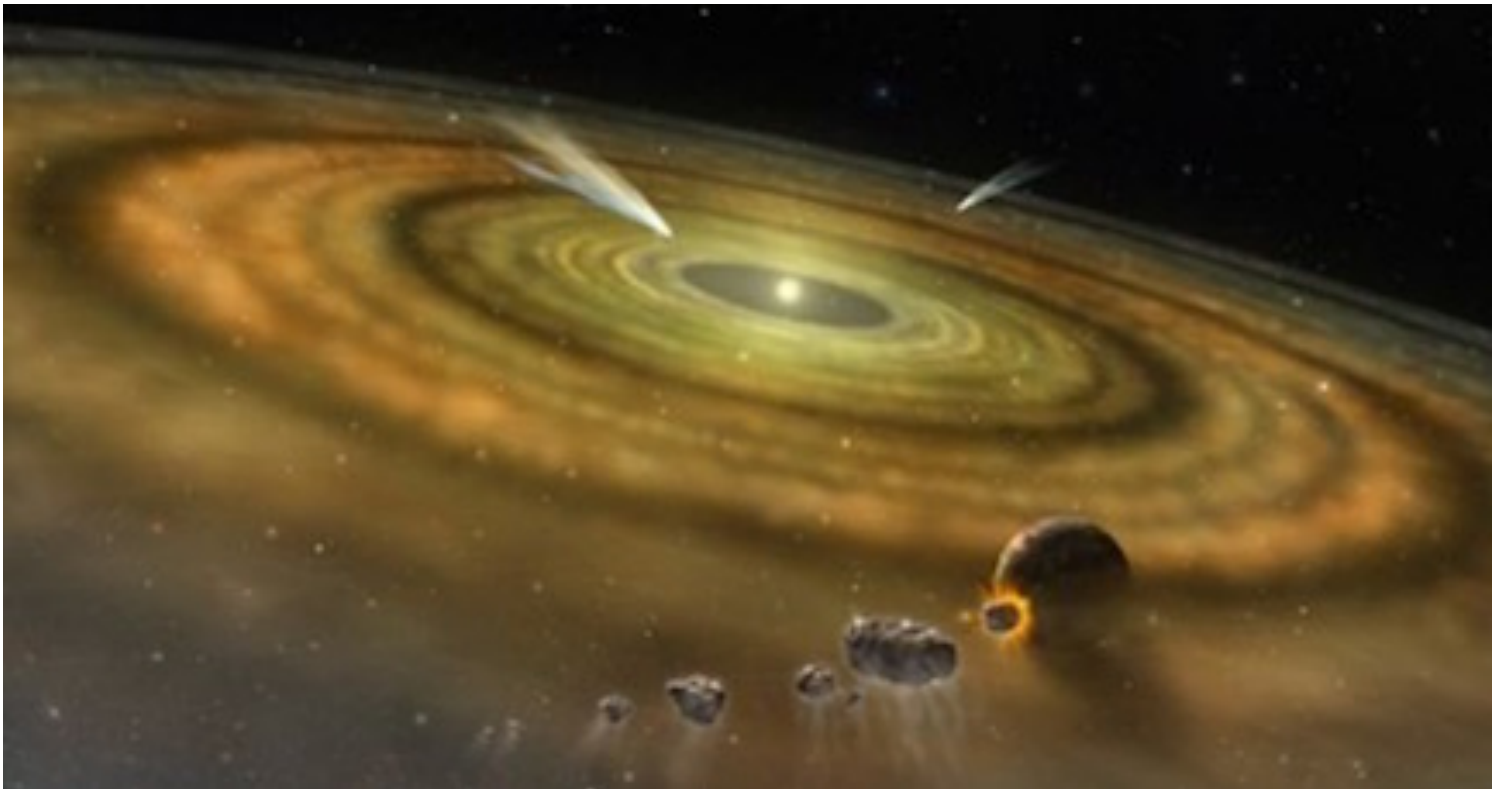
SFAA'S GENERAL MEETINGS OCCUR ON THE **3<sup>RD</sup> TUESDAY** OF EACH MONTH (EXCEPT JANUARY)

**NOTE: NOVEMBER LECTURE DATE IS CANCELLED DUE TO THANKSGIVING HOLIDAY**

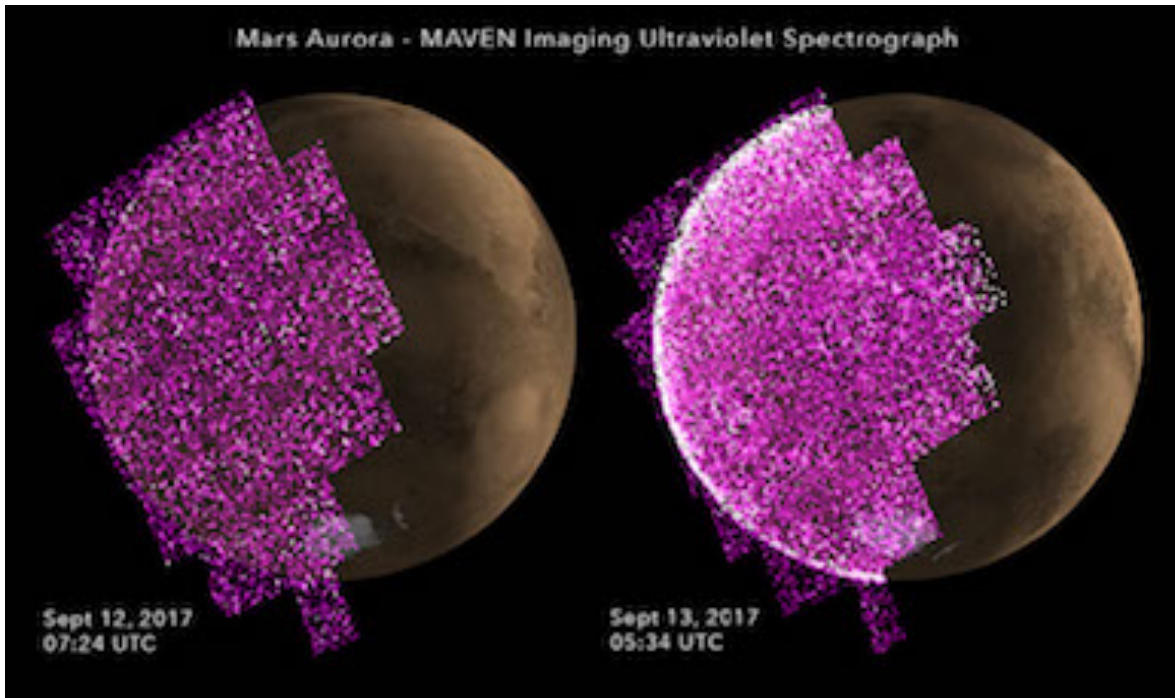
**DECEMBER 19TH | BARRY WELSH, UC BERKELEY SSL**

**"EXOCOMETS: NOW YOU SEE THEM, NOW YOU DON'T"**

Using high-resolution spectrographs mounted on large aperture ground based telescopes, we have discovered 15 young stars that harbor swarms of exocomets. This lecture will describe attributes of comets in our solar system, and observing techniques to detect evaporating exocomets around young stars. The relevance of Kepler's discovery of "Tabby's Star" will also be discussed.



## LARGE SOLAR STORM SPARKS GLOBAL AURORA AND DOUBLES RADIATION LEVELS ON THE MARTIAN SURFACE



*These images show the sudden appearance of a bright aurora on Mars during a solar storm in September 2017. The purple-white color scheme shows the intensity of ultraviolet light seen on Mars' night side before (left) and during (right) the event.*

*A simulated image of Mars for the same time and orientation has been added, with the dayside crescent visible*

*on the right. The auroral emission appears brightest at the edges of the planet where the line of sight passes along the length of the glowing atmosphere layer.*

*The data are from observations by the Imaging Ultraviolet Spectrograph instrument (IUVS) on NASA's Mars Atmosphere and Volatile Evolution orbiter, or MAVEN.*

*Note that, unlike auroras on Earth, the Martian aurora is not concentrated at the planet's polar regions. This is because Mars has no strong magnetic field like Earth's to concentrate the aurora near the poles.*

*NASA's Goddard Space Flight Center in Greenbelt, Maryland, manages the MAVEN project for NASA's Science Mission Directorate, Washington. MAVEN's principal investigator is based at the University of Colorado Boulder's Laboratory for Atmospheric and Space Physics, where the mission's IUVS team is also based. Lockheed Martin Space Systems, Denver, built and operates the spacecraft.*

*For more information about MAVEN, visit <http://www.nasa.gov/maven> and <http://lasp.colorado.edu/home/maven/>. *Image Credit: NASA/Univ. of Colorado**

An unexpectedly strong blast from the Sun hit Mars this month, observed by NASA missions in orbit and on the surface.

"NASA's distributed set of science missions is in the right place to detect activity on the Sun and examine the effects of such solar events at Mars as never possible before," said MAVEN Program Scientist Elsayed Talaat, program scientist at NASA Headquarters, Washington, for NASA's Mars Atmosphere and Volatile Evolution, or MAVEN, mission.

The solar event on Sept. 11, 2017 sparked a global aurora at Mars more than 25 times brighter than any previously seen by the MAVEN orbiter, which has been studying the Martian atmosphere's interaction with the solar wind since 2014.

It produced radiation levels on the surface more than double any previously measured by the Curiosity rover's Radiation Assessment Detector, or RAD, since that mission's landing in 2012. The high readings lasted more than two days.

Strangely, it occurred in conjunction with a spate of solar activity during what is usually a quiet period in the Sun's 11-year sunspot and storm-activity cycle. This event was big enough to be detected at Earth too, even though Earth was on the opposite side of the Sun from Mars.

"The current solar cycle has been an odd one, with less activity than usual during the peak, and now we have this large event as we're approaching solar minimum," said Sonal Jain of the University of Colorado Boulder's Laboratory for Atmospheric and Space Physics, who is a member of MAVEN's Imaging Ultraviolet Spectrograph instrument team.

"This is exactly the type of event both missions were designed to study, and it's the biggest we've seen on the surface so far," said RAD Principal Investigator Don Hassler of the Southwest Research Institute's Boulder, Colorado, office. "It will improve our understanding of how such solar events affect the Martian environment, from the top of the atmosphere all the way down to the surface."

RAD monitored radiation levels inside the encapsulated spacecraft that carried Curiosity from Earth to Mars in 2011 and 2012 and has been steadily monitoring the radiation environment at Mars' surface for more than five years.

RAD findings strengthen understanding of radiation's impact on Mars habitability, a key objective of the Curiosity mission. NASA is also using RAD findings for planning the safety of human-crew missions to Mars. Highly energetic solar events can significantly increase the radiation that penetrates through the atmosphere to the Mars surface. The increased radiation also interacts with the atmosphere to produce additional, secondary particles, which need to be understood and shielded against to ensure the safety of future human explorers.

"If you were outdoors on a Mars walk and learned that an event like this was imminent, you would definitely want to take shelter, just as you would if you were on a space walk outside the International Space Station," Hassler said. "To protect our astronauts on Mars in the future, we need to continue to provide this type of space weather monitoring there."

The Sun is always emitting a continuous stream of charged particles, mainly electrons and protons. Occasionally, eruptions called coronal mass ejections occur, with higher density, energy and speed of the ejected particles. These events vary in strength. Strong ones cause dramatic aurora displays on Earth, and very strong ones can disrupt communications. Some coronal mass ejections, such as this month's event, are broad enough in extent to affect planets in quite different directions from the Sun.

Jain said, "When a solar storm hits the Martian atmosphere, it can trigger auroras that light up the whole planet in ultraviolet light. The recent one lit up Mars like a light bulb. An aurora on Mars can envelope the entire planet because Mars has no strong magnetic field like Earth's to concentrate the aurora near polar regions. The energetic particles from the Sun also can be absorbed by the upper atmosphere, increasing its temperature and causing it to swell up."

Analysis of the data is just beginning. "We expect to get a better understanding of how the process operates in the upper atmosphere of Mars today, and a better understanding of how storms like this may have stripped away much of the Martian atmosphere in the past," said MAVEN Principal Investigator Bruce Jakosky of the University of Colorado Boulder. The loss of most of Mars' original atmosphere to space is linked to the planet's change from wet to dry, long ago.

Besides the observations by instruments on MAVEN and Curiosity, effects of the Sept. 11, 2017 event were also detected by instruments on NASA's Mars Odyssey orbiter and Mars Reconnaissance Orbiter and by the European Space Agency's Mars Express orbiter.

NASA's Goddard Space Flight Center, Greenbelt, Maryland, manages the MAVEN mission for the principal investigator at the University of Colorado. NASA's Jet Propulsion Laboratory, Pasadena, California, manages the Curiosity mission for NASA's Science Mission Directorate, Washington. RAD is supported by NASA's Human Exploration and Operations Mission Directorate, Washington, under JPL subcontract to Southwest Research Institute, San Antonio, and by Germany's national space agency (DLR) under contract with Christian-Albrechts-Universitat, Kiel, Germany.

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laura.l.cantillo@nasa.gov / dwayne.c.brown@nasa.gov

### **\*\*\* Call For Design Submissions \*\*\***

**Calling all Designers! The SFAA Board is excited to announce that we are looking to create SFAA Hoodies; the exact item that all well-dressed night sky watchers need!**

**Three simple steps:**

- 4. Think up a great design idea**
- 5. Draw it**
- 6. Submit it to [president@sfaa-astronomy.org](mailto:president@sfaa-astronomy.org)**

**Got more than 1 idea? Fantastic! Repeat steps 1 – 3.**

**Your design might be the winner. What are you waiting for? The sky's the limit!**



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**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. SFAA is a 501(c)(3) nonprofit organization. Membership dues are tax-deductible, as allowed by law.
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  
 Institutional \$40.00                      **(All dues tax-deductible as allowed by law.)**

**SFAA T-shirt, add \$10.00 and select size:**     XL     XXL

**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.