

# ABOVE THE FOG

• BULLETIN OF THE SAN FRANCISCO AMATEUR ASTRONOMERS •

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(\*The newsletter was not published in June or July)

## IN THIS ISSUE

01. AUGUST 16 LECTURE: DR. SUSAN MULLALLY
02. UPCOMING LECTURE SERIES TOPICS
03. SFAA PRESIDENT'S NOTE
04. 2016 YOSEMITE TRIP RECAP (WITH PHOTOS)
05. 2017 TOTAL SOLAR ECLIPSE TRIP
06. BAY AREA ASTRONOMY EVENTS
07. NASA JPL SCIENCE NEWS
08. MEMBERSHIP RENEWAL FORM

### Editorial Note:

The Board and members of the San Francisco Amateur Astronomers wish to extend a special thank you to Annette Gabrielli. Annette has served as the Editor of this newsletter for the past thirteen years and is retiring from the post. In recognition of her efforts, the Board has awarded Annette an SFAA Honorary Lifetime Membership. Everyone at the SFAA appreciates all of Annette's hard work over the years and we wish her all the best!

# 01.

## UPCOMING MEETING

THE PRESIDIO . OBSERVATION POST . BUILDING 211

211 Lincoln Boulevard, San Francisco

7:00 pm Doors Open | 7:30 pm Light Refreshments | 7:45 pm Announcements | 8:00 pm Speaker

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

### AUGUST 16, 2016

DR. SUSAN MULLALLY

SETI Institute, NASA Ames

## “KEPLER’S HEARTBEAT STARS: WHEN BINARY STARS GET FUNKY”



Using the continuous, high-precision photometry available from the Kepler spacecraft, the Kepler team discovered a type of eccentric binary star named heartbeat stars. In these systems, the two stars come close enough to each other to cause large, periodic changes in the tidal deformation and mutual irradiation of the stars. Additionally, these tidal forces are known to cause the stars in some of these systems to continually ‘ring’ at shorter periods. Currently, we have discovered more than 150 of these in the Kepler data and have been taking extensive follow-up spectroscopy to model and understand these systems.

Dr. Mullally will present an overview of these systems and discuss how these systems are allowing us to explore the physics of stellar tidal dissipation.

*Susan Mullally received her PhD from University of N. Carolina, Department of Physics. She currently pursues scientific inquiries on planets and variable stars, using both the Kepler Space Telescope and Kepler 2 photometric data. Her research also uses Kepler data to observe and characterize tidally induced orbital parameters of binary star systems.*

# 02.



## **SFAA 2016 LECTURE SERIES**

**SEPTEMBER 20<sup>TH</sup> - LYNN COMINSKY, CHAIR, PHYSICS & ASTRONOMY, SONOMA STATE UNIVERSITY**

**"LIGO: GRAVITATIONAL WAVES FROM MERGING BLACK HOLES"**

Professor Lynn Cominsky will report on the recent observations of merging Black Holes as detected by the twin facilities that comprise the Laser Interferometer Gravitational-wave Observatory, (LIGO)

**OCTOBER 18<sup>TH</sup> - ANDREW WESTPHAL, UC BERKELEY SPACE SCIENCES LAB**

**"STARDUST: ANALYSIS OF COMETARY AND INTERSTELLAR DUST IN THE LAB"**

Stardust was the first spacecraft to collect dust samples from following Comet Wild-2, followed by 200 days of collecting samples of the interstellar dust stream.

Dr. Westphal will present the most recent lab results from the return capsule.

**NOVEMBER 15<sup>TH</sup> - R. JAY GABANY, ASTROPHOTOGRAPHER**

**"GALACTIC ARCHEOLOGY: GOOD SCIENCE WITH MODEST EQUIPMENT"**

Using modest aperture, commercially produced semi-robotic telescopes under steady dark skies, GaBany produces long exposure images that reveal previously undetected merging star streams. He collaborates with a team of international astrophysicists, processing his images for over 100 hours to reveal faint details.

R. Jay GaBany is a Chambliss awardee by the American Astronomical Society.

**DECEMBER 20<sup>TH</sup> - LEO BLITZ, UC BERKELEY DEPARTMENT OF ASTRONOMY**

**"ARE ANCIENT GALAXIES REALLY RED AND DEAD?"**

Galaxies are generally observed as spiral and elliptical shapes. The early type elliptical galaxies, with their old stars, are seen as reddish and often referred to as 'red and dead.' We will learn that some of these galaxies hold surprising new areas or research.

# 03.

## SFAA PRESIDENT’S NOTE | ONE THIRD OF HUMANITY

In June, an article was published by a team of researchers led by Fabio Falchi in ‘Science Advances’ titled “The New World Atlas of Artificial Night Sky Brightness”. In the article, which documents a refinement of previous research, maps were produced that showed the incidence of artificial light – street lamps, buildings, etc – around the planet that interfered with a person’s ability to see the winter or summer Milky Way. One of the conclusions of this research is that: “Due to light pollution, the Milky Way is not visible to more than one-third of humanity, including 60% of Europeans and nearly 80% of North Americans. Moreover, 23% of the world’s land surfaces between 75°N and 60°S, 88% of Europe, and almost half of the United States experience light-polluted nights.” (1) In some areas the lack of night sky visibility approaches 98%, thereby not allowing the eyes of people living there to adapt to darkness at all.

The consequences of such a scale of light pollution are many and varied, including impacts on human physiology and psychology, not to mention cultural in that millions of people grow up and live their lives without ever have seen the galaxy in which they inhabit. In addition, such a scale of light pollution affects birds, turtles and other animals, which rely on night darkness and/or the stars as important elements in their lifecycle. I leave to the reader to ponder the many implications of not being able to see the night sky and the sense of place, wonder and curiosity that such a view enables.

We take many things for granted, but one-third of humanity cannot take for granted their ability to see the Milky Way. I find this painful to contemplate but it is a reality and the situation is not getting any better.

Before I became aware of the “The New World Atlas...” research and maps, I saw the recently released IMAX production of “A Beautiful Planet” which shows the Earth from the International Space Station. As only IMAX can do it is truly spectacular to see, but there was one scene which showed Japan at night and the narrator said something to the effect of “...how beautiful entire countries and cities look at night, lit up...”. I almost said out loud “No it isn’t beautiful because the people in those areas can’t see what is up in the sky at night”. A typical amateur astronomer response I suppose, but one that we should all appreciate every time we do look up at night with or without our telescopes and can see our galaxy. One-third of humanity can’t.

(1) *Science Advances*, Volume 2, No. 6, 3 June 2016  
<http://advances.sciencemag.org/content/2/6/e1600377.full>

**Michael Patrick**  
President, SFAA

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

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Vice President	Matthew Jones	vice-president@sfaa-astronomy.org
Treasurer	Katie Gallinger	treasurer@sfaa-astronomy.org
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# 04.

## THE 2016 YOSEMITE TRIP | DOUGLAS SMITH

The San Francisco Amateur Astronomers 2016 Yosemite trip had some complications this year, as it has other years in the past, but a group of undaunted SFAA members packed their gear in and had another memorable event. In previous years the Bridalveil Creek Campground had been closed due to extreme events ranging from fire crews taking over the campsite as a base for fighting blazes to the closure because of frozen leach fields.

This year was similar as there were infrastructure issues. We received late notice of the closure from the National Park Rangers. They invited a much smaller group to camp on their facility near Glacier Point. Trip organizer David Frey hosted a lottery to randomly select our small representation. Other SFAA members opted to take part at other dark spots, camping at the other end of the Park. SFAA member Ken Frank gave the presentation to the public. I shared views of the sky along with Ken, David, and Al Stern. Weather held up and there was good viewing. The crowd appreciated views of the Ring Nebula, Spiral Galaxies, Saturn and other various night sky objects. There were also some nice 'shooting stars' – one with an especially long and bright streak.

Hopefully next year won't have issues and we'll fill up Glacier Point with more and more scopes to share! Enjoy the gallery of photos from the trip...



Panorama View of SFAA scopes set up for viewing- from left to right: Al Stern and Ken Frank, David Frey with his 20" Dobsonian, and Douglas Smith with his 16 1/2" Dobsonian FirstLight. Photo by David Frey.

## THE 2016 YOSEMITE TRIP PHOTOS (cont.)



Al Stern and his telescope. Photo by David Frey.



Ken Frank sharing his telescope. Photo by David Frey.

## THE 2016 YOSEMITE TRIP PHOTOS (cont.)



Ken Frank getting ready to give the public presentation. Photo by David Frey.



David Frey with his son, Matt, and his home-made 20" Dobsonian.

# 05.

## **SFAA EXPEDITION 2017** **TOTAL SOLAR ECLIPSE** August 21, 2017

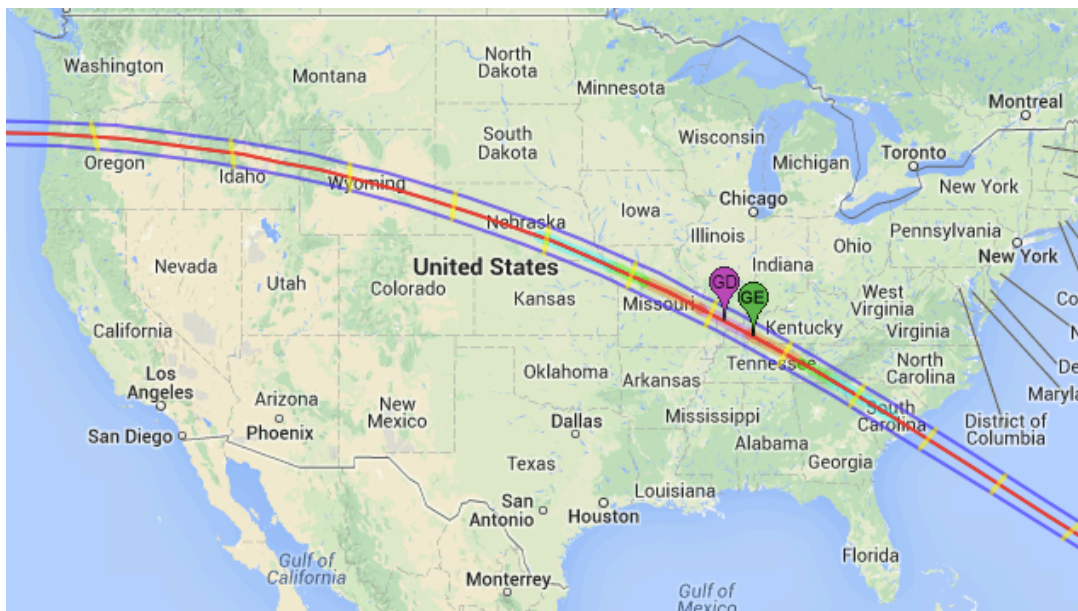
### **Jackson Hole, Wyoming** **(Teton Mountains)**



The San Francisco Amateur Astronomers is organizing an expedition to witness the August 21, 2017 Total Solar Eclipse. The eclipse will be visible across a broad swath of the USA, and club members will gather near Jackson Hole, Wyoming, to witness this spectacle high in the Teton Mountains. The trip is an opportunity for club members to gather in one place along the path of totality and journey together up the mountains for viewing of this spectacular astronomical phenomenon.

The club has arranged with a hotel in Teton Village, Wyoming, to enable advance bookings (2 years in advance!) with a special club rate of 10% discount. If you are a member of the SFAA and are interested in this, send an email to [2017eclipse@sfaa-astronomy.org](mailto:2017eclipse@sfaa-astronomy.org) and you'll be provided with additional details on the hotel and booking code. In the coming months the club will organize additional talks and events that will take place at the hotel on and before the date of totality. At this time, the most important thing is to book your hotel room so if you are at all considering this eclipse, get in touch and get your reservation in today. SFAA is not organizing air or ground transportation; that is left to each individual group or attendee.

If you have any other questions, send to [2017eclipse@sfaa-astronomy.org](mailto:2017eclipse@sfaa-astronomy.org).





# 06.

## **ASTRONOMY EVENTS**

### **SAN FRANCISCO AMATEUR ASTRONOMERS EVENTS JULY 30 – SEPTEMBER 20, 2016**

Saturday July 30, 7:00 pm  
Mt. Tam Members Night

Saturday August 6, 7:00 pm  
Mt. Tam Public Astronomy Program

Sunday August 7, 7:00 pm  
City Star Party, Presidio Main Parade Ground

Tuesday August 16, 7:30 p.m.  
Meeting and Lecture, Presidio Observation Post

Saturday September 3, 6:30 pm  
Mt. Tam Members Night

Thursday September 8, 6:30 pm  
City Star Party, Land's End

Saturday September 10, 6:30 pm  
Mt. Tam Public Astronomy Program

Tuesday September 20, 7:30 p.m.  
Meeting and Lecture, Presidio Observation Post

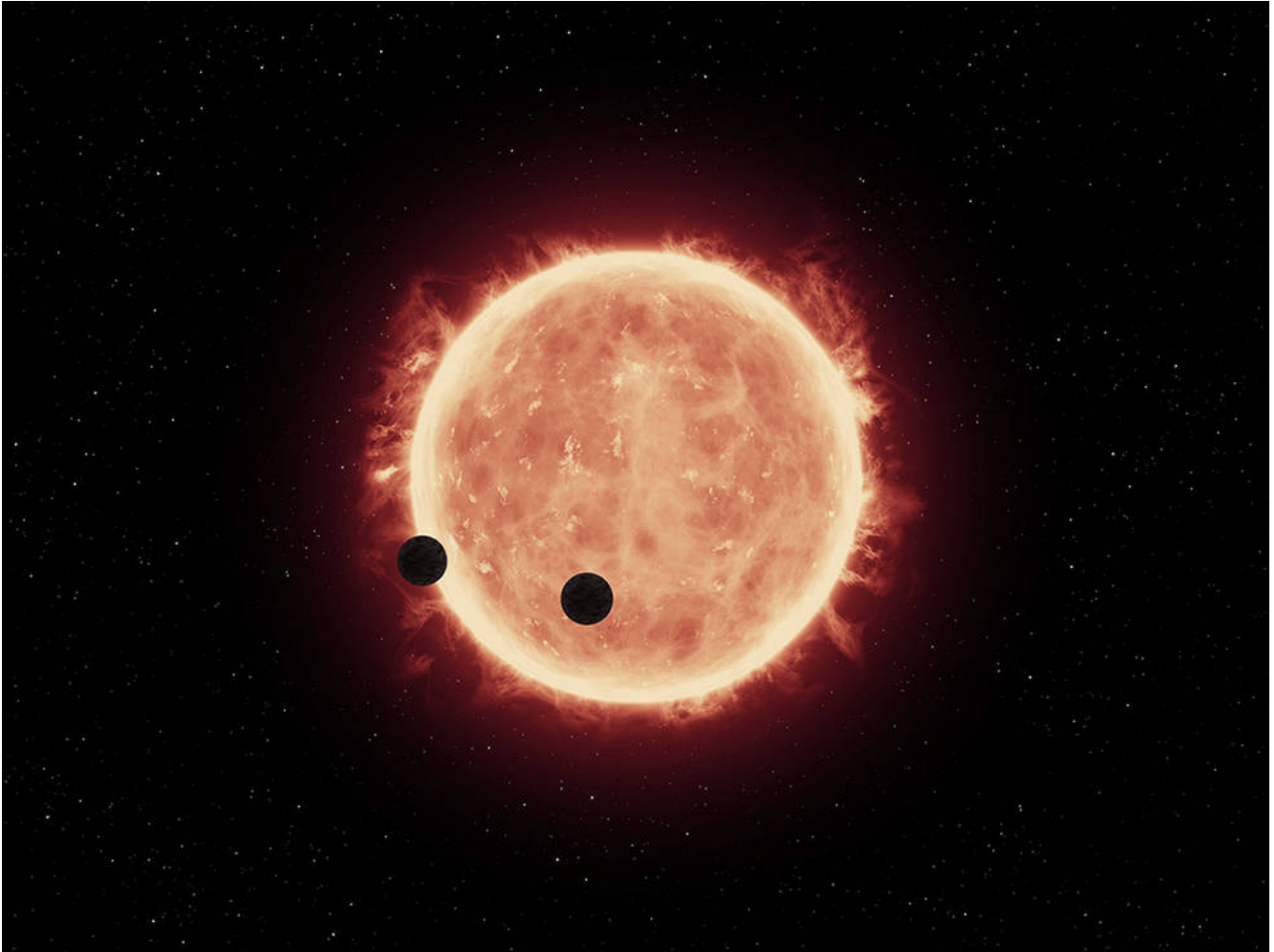


## **BAY AREA ASTRONOMY EVENTS**

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>

## NASA'S HUBBLE TELESCOPE MAKES FIRST ATMOSPHERIC STUDY OF EARTH-SIZED EXOPLANETS



This artist's illustration shows two Earth-sized planets, TRAPPIST-1b and TRAPPIST-1c, passing in front of their parent red dwarf star, which is much smaller and cooler than our sun. NASA's Hubble Space Telescope looked for signs of atmospheres around these planets.

**Credits: NASA/ESA/STScI/J. de Wit (MIT)**

Using NASA's Hubble Space Telescope, astronomers have conducted the first search for atmospheres around temperate, Earth-sized planets beyond our solar system and found indications that increase the chances of habitability on two exoplanets.

Specifically, they discovered that the exoplanets TRAPPIST-1b and TRAPPIST-1c, approximately 40 light-years away, are unlikely to have puffy, hydrogen-dominated atmospheres usually found on gaseous worlds.

"The lack of a smothering hydrogen-helium envelope increases the chances for habitability on these planets," said team member Nikole Lewis of the Space Telescope Science Institute (STScI) in Baltimore. "If they had a significant hydrogen-helium envelope, there is no chance that either one of them could potentially support life because the dense atmosphere would act like a greenhouse."

Julien de Wit of the Massachusetts Institute of Technology in Cambridge, Massachusetts, led a team of scientists to observe the planets in near-infrared light using Hubble's Wide Field Camera 3. They used spectroscopy to decode the light and reveal clues to the chemical makeup of an atmosphere. While the content of the atmospheres is unknown and will have to await further observations, the low concentration of hydrogen and helium has scientists excited about the implications.

"These initial Hubble observations are a promising first step in learning more about these nearby worlds, whether they could be rocky like Earth, and whether they could sustain life," says Geoff Yoder, acting associate administrator for NASA's Science Mission Directorate in Washington. "This is an exciting time for NASA and exoplanet research."

The planets orbit a red dwarf star at least 500 million years old, in the constellation of Aquarius. They were discovered in late 2015 through a series of observations by the TRAnsiting Planets and Planetesimals Small Telescope (TRAPPIST), a Belgian robotic telescope located at ESA's (European Space Agency's) La Silla Observatory in Chile.

TRAPPIST-1b completes a circuit around its red dwarf star in 1.5 days and TRAPPIST-1c in 2.4 days. The planets are between 20 and 100 times closer to their star than the Earth is to the sun. Because their star is so much fainter than our sun, researchers think that at least one of the planets, TRAPPIST-1c, may be within the star's habitable zone, where moderate temperatures could allow for liquid water to pool.

On May 4, astronomers took advantage of a rare simultaneous transit, when both planets crossed the face of their star within minutes of each other, to measure starlight as it filtered through any existing atmosphere. This double-transit, which occurs only every two years, provided a combined signal that offered simultaneous indicators of the atmospheric characters of the planets.

The researchers hope to use Hubble to conduct follow-up observations to search for thinner atmospheres, composed of elements heavier than hydrogen, like those of Earth and Venus.

"With more data, we could perhaps detect methane or see water features in the atmospheres, which would give us estimates of the depth of the atmospheres," said Hannah Wakeford, the paper's second author, at NASA's Goddard Space Flight Center in Greenbelt, Maryland.

Observations from future telescopes, including NASA's James Webb Space Telescope, will help determine the full composition of these atmospheres and hunt for potential biosignatures, such as carbon dioxide and ozone, in addition to water vapor and methane. Webb also will analyze a planet's temperature and surface pressure – key factors in assessing its habitability.

"These Earth-sized planets are the first worlds that astronomers can study in detail with current and planned telescopes to determine whether they are suitable for life," said de Wit. "Hubble has the facility to play the central atmospheric pre-screening role to tell astronomers which of these Earth-sized planets are prime candidates for more detailed study with the Webb telescope."

The results of the study appear in the July 20 issue of the journal Nature.

The Hubble Space Telescope is a project of international cooperation between NASA and ESA. Goddard manages the telescope and STScI conducts Hubble science operations. STScI is operated for NASA by the Association of Universities for Research in Astronomy in Washington.

For images and more information about Hubble, visit:

<http://www.nasa.gov/hubble>

<http://hubblesite.org/news/2016/27>



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

1. Memberships, with dues payment, are for one year running from standard renewal dates of 1 July to 30 June and 1 January to 31 December.
2. Submitting appropriate dues in April, May, June, July, August, September, membership will run to 30 June of the next year.
3. Submitting appropriate dues in October, November, December, membership will run to 31 December of the next year; submitting appropriate dues in January, February or March, membership will run to 31 December of the same year.
4. Renewals are maintained at the original membership date unless the renewal is made later than the original cutoff date (e.g. September or March as described in 3). In such cases the membership date is shifted to the next renewal date 30 June or 31 December.
5. New or renewal memberships sent in via USPS mail will have membership start date based on postmark date.

**This application is for:**

- New
- Renewing

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Email: \_\_\_\_\_

Home Telephone (optional): \_\_\_\_\_

Cell Phone (optional): \_\_\_\_\_

**Membership Type\***:  Individual \$25.00 /  Family \$30.00 /  Student \$10.00 /  Supporting \$75.00

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

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.