



Vol. 65, No. 6 – June 2017

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*** * * June 20 Observing Basics: Safe Eclipse Viewing * * ***

In preparation for the upcoming total solar eclipse on August 21, 2017, a.k.a. “The Great American Eclipse”, SFAA will devote this Observing Basics session to SAFE eclipse viewing. It does not matter where you are—from the path of the Totality or anywhere with a partial eclipse, it is always essential to protect your eyes with proper solar filter safety glasses or hand-held viewers. At the upcoming Observing Basics session (June 20, beginning at 7:00 PM at the Presidio Officers Club), we will focus on safe viewing tools and techniques. See you there!

01.

SFAA PRESIDENT'S NOTE | HEROES OF THE NIGHT SKY

Saturday night, 27 May 2017 I attended the Public Star Party on Mt. Tamalpais, but I didn't take my telescope this time as I volunteered to give a brief star talk after the Friends of Mt. Tam sponsored lecture at the Mountain Theater to the attending crowd of 200-300 people. This was a bit intimidating as I was following a very successful and appreciated presentation by Thomas Targett, Ph.D Asst. Professor of Physics and Astronomy at Sonoma State University on "Popular Myths of Astronomy". Anyone who has met me has quickly realized that I do not have a Ph.D and am not in line for tenure at any university, and, if anything, quite the contrary. But I pointed out some stars, Arcturus, Spica, Regulus A and the constellations in which they reside. I also gave some suggestions on how the public should approach the SFAA members and their telescopes in the nearby Rock Springs parking lot. The public then gathered their seats (you really need one at the Mountain Theater!) and headed out to Rock Springs.

As it was dark I had trouble counting telescopes but typically there are 15 to 20 set up, various types, makes and models along with the attending SFAA member. By the time I got to Rock Springs every telescope had a line of 20 people or more, each waiting their turn and looking forward to a sight that many had never seen (other than in a photograph) or was their first look through a telescope. This was particularly true for the children who were brought by their parents. Who knows how many young minds may be influenced by the sight of a globular cluster, Jupiter, galaxy and so on and eventually lead to a lifelong interest as an amateur or a career in astronomy.

As I looked at the lines of people and could hear the 'ooohs' and 'aaahs' after observing a planet or galaxy, the thought came to me that the SFAA members, operating their telescopes and patiently explaining what the public were looking at – over and over and over – were indeed Heroes of the Night Sky. They were enthusiastically sharing their fascination and deep interest in astronomy and the universe with others in a selfless way, hopefully giving people whom they don't know (and can barely see) an appreciation and inspiring respect for the universe in which we live. I believe it's a perspective that is found in no other field and hopefully it will encourage the same people, at a future time, to look up at the night sky, when they might not have even thought of it before, and have some of the same enthusiasm and fascination as the SFAA members on Mt. Tam. Volunteering this way and getting engaged with the public in an educational endeavor is one of the most satisfying aspects of SFAA membership and telescope ownership, and to the members who do this month after month at Public Star Party nights, on Mt. Tam or City Star Parties, I say you are Heroes of the Night Sky and I greatly appreciate your time and effort and the entire membership of the SFAA and the public whom you serve does so as well!

Dark, clear and stable skies,

Michael Patrick
President, SFAA

SFAA Board Officers and Directors:

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

02. ASTRONOMY EVENTS



SAN FRANCISCO AMATEUR ASTRONOMERS EVENTS JUNE 1, 2017 – JULY 31, 2017

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

Saturday June 3, 10:00 am – 2:00 pm

** Volunteer Opportunity **

Astronomy Festival @ Bay Area Discovery Museum

Thursday June 15, 8:00 pm – 11:00 pm

City Star Party, Presidio Main Parade Ground

Tuesday June 20, 7:00 pm – 9:15 pm

Presidio Officers Club

Observing Basics: "Safe Eclipse Viewing" at 7:00pm

Meeting and Lecture starts at 7:45pm

Saturday June 24, 7:30 pm – 2:00 am

Mt. Tam Members Night

Thursday June 29, 4:00 pm – 11:00 pm

** Volunteer Opportunity ** CAS Asteroid Day Nightlife (evening)

@ California Academy of Sciences

Friday June 30, all day

** Volunteer Opportunity ** CAS Asteroid Day (daytime programs)

@ California Academy of Sciences

Saturday July 1, 7:30 pm – 11:00 pm

Mt. Tam Public Astronomy Night: Lecture and Star Party

Mountain Theater and Rock Springs Parking Lot

Tuesday July 18, 7:30 pm – 9:15 pm

Presidio Officers Club

Meeting and Lecture

Saturday July 22, 7:00 pm – 2:00 am

Mt. Tam Members Night

Saturday July 29, 7:30 pm – 11:00 pm

Mt. Tam Public Astronomy Night: Lecture and Star Party

Mountain Theater and Rock Springs Parking Lot

Sunday July 30, 8:00 pm – 11:00 pm

City Star Party, Embarcadero at Pier 17, adjacent to Exploratorium

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!

03.

SFAA NEEDS YOU: VOLUNTEER OPPORTUNITIES | ANTHONY BARREIRO

Upcoming Volunteer Outreach Opportunities

In addition to our lectures and star parties, SFAA often partners with schools, museums, and other community organizations to offer astronomy-related outreach activities. We depend 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.

The California Academy of Sciences is looking for help with the following activities. In addition to volunteers willing to help out, SFAA also needs a coordinator for each event. A coordinator needs to make a firm commitment to attending the event and will need to do some advance planning and coordination with Academy staff and other SFAA volunteers. If you're interested in helping with one or more of these events, either as a coordinator or as a volunteer, please send an email to Anthony Barreiro, secretary@sfaa-astronomy.org

- **Thursday, June 29** (NightLife) and/or **Friday, June 30 - ASTEROID DAY** (daytime programming)

The Bay Area Discovery Museum is planning an **Astronomy Festival, Saturday, June 3**, 10 am-2 pm. Michael Patrick is coordinating SFAA's participation in this festival. We're in the early planning stages, so ideas and suggestions are welcome. Solar telescopes are always a big hit at daytime astronomy events. If you're interested in helping out with this event, please send an email to president@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

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 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.

2017 YOSEMITE STAR PARTY: JULY 28-29

Come join us for our members-only yearly star part at Glacier Point in Yosemite. Members can sign up to join us for a couple days of camping, fun, and astronomy.

If you would like to join us at our group campsite provided by the park service, please email Dave Frey at yosemite2017@sfaa-astronomy.org with your name, if you'll be bringing any family members and whether you have a telescope or not. Priority will be given to those with telescopes.

Anyone can join us at Glacier Point on those nights to view through our scopes and get a tour of our skies in a dark, beautiful area.



Photo: Panoramic View of SFAA Star Party at Glacier Point, 2016

How to Sign Up:

To signup, send an email to yosemite2017@sfaa-astronomy.org

Be sure to put "Yosemite Sign Up" in the subject line to reserve your campsite.

Sign up soon – It's filling up fast!

Remember, the trip is available to MEMBERS ONLY

Since this is a Public Viewing Event that the SFAA attends as guests of the National Parks, all campers are expected to bring a telescope and be willing to host public viewing. The club aims to bring one telescope for every two SFAA members attending.

2017 YOSEMITE STAR PARTY: JULY 28-29 (continued)

About the Trip

The SFAA is provided with FREE admission to Yosemite National Park as well as FREE reserved, shared campgrounds at Bridalveil Group Campground. The campsite is 8.5 miles away from Glacier Point.

We will host two public star parties at Glacier Point, on Friday and Saturday night. We have the public (about 200 – 300 people) from twilight for a few hours, and then the rest of the night (and all day) to ourselves; this is a mighty good deal, considering how some folks come 12,000 miles to see these rocks. The National Park Service limits astronomy clubs to a maximum of 30 SFAA campers. Please do not ask if your friends can come ...unless they are SFAA members and have telescopes.

Observing site at Glacier Point

The observing area is mostly open, with incredible views from about NNW to the east, around to due south. The horizon from south around to the west is partly blocked by tall trees. Still, there is a lot of open sky, and typically, the seeing and transparency are excellent. It has warm temperatures of 70 to 90 during the day, and cool to chilly 40's at night, due to the elevation of 7200 feet.

Star Party

One of the rangers does a sunset talk, and then delivers the crowd to us. Following that, a member of the club will give an evening talk, (want to volunteer?) The public will have white flashlights, and we need to be tolerant of that. We will have 3 club members with red brake light tape to politely cover the offending flashlights. Expect many questions from the public.

The Reward

By around 9:30 or so, we will have the place to ourselves, and can stay until dawn if you so choose. Scopes must be removed when we quit, then set up again on Saturday. Some of us may set up sun scopes during the afternoon, show Half Dome festooned with rock climbers, and invite people to come back again after sunset.

Gastronomic Astronomic

Early Saturday eve is the traditional potluck meal and is always tons of fun. Please provide enough food for ~ say 3 or 4 people. Salads, main courses, pu pu's and desserts are all welcome. The question is: Who will have the best astronomical gastronomic theme of incredible edibles this year? Remember the Brown Dwarfs? Prizes will be awarded! Please remember this repast takes time. It's better to start our own gastronomic party early so that there's no need to rush for set up Saturday evening on Glacier Point.

Check the National Weather Service for up-to-date weather info on Yosemite Park current weather and conditions.

See you at the campsite.

05.

CITIZEN SCIENCE: ECLIPSE MEGAMOVIE PROJECT | BRIAN KRUSE

We're excited to announce an opportunity to contribute to a first-of-its-kind citizen science project: the Eclipse Megamovie!

Representing a collaboration between Google, UC Berkeley, the Astronomical Society of the Pacific and others, the project will use photographs of the upcoming August 21st total solar eclipse to build a movie of the entire eclipse from coast to coast. We need skilled photographers to help create the movie as well as support solar science research. For more on the goals of the project, see UC Berkeley's official press release:

<http://news.berkeley.edu/2017/02/21/megamovie-project-to-crowdsource-images-of-august-solar-eclipse/>

Our aim is to recruit over 1,000 amateur photographers and astronomers who will be on the path of totality on August 21, 2017. Team members receive training and submit a practice image before the eclipse. Once you qualify, you will receive a pin to designate your status as an official photographer for the project. Your name will also be included in the credits of the final Eclipse Megamovie. If you want to participate, visit our website at: <https://eclipsemega.movie> and SIGN IN to apply!

- Basic equipment necessary for participating in the Eclipse Megamovie Project:
- Camera: DSLR (digital single lens reflex)
- Telephoto or zoom lens: minimum focal length of 300mm
- A stable and level tripod
- Ability to identify the GPS coordinates and time to the nearest second



* * SFAA ECLIPSE SAFETY GLASSES NOW AVAILABLE -- \$1.00 EACH * *



A solar eclipse occurs when the Moon blocks any part of the Sun. On Monday, August 21, 2017, a solar eclipse will be visible (weather permitting) across all of North America. The whole continent will experience a partial eclipse lasting 2 to 3 hours. Halfway through the event, anyone within a roughly 70-mile-wide path from Oregon to South Carolina will experience a brief total eclipse, when the Moon completely blocks the Sun's bright face for up to 2 minutes 40 seconds, turning day into night and making visible the otherwise hidden solar corona — the Sun's outer atmosphere — one of nature's most awesome sights.

Bright stars and planets will become visible as well.

Looking directly at the Sun is unsafe except during the brief total phase of a solar eclipse ("totality"), when the Moon entirely blocks the Sun's bright face, which will happen only within the narrow path of totality.

The only safe way to look directly at the unclipsed or partially eclipsed Sun is through special-purpose solar filters, such as "eclipse glasses" (example at left) or hand-held solar viewers.

Get your safety glasses at the next meeting. SFAA is selling them for \$1.00 each.

06.

***** 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 * * ***



07.

JUNE 20TH LECTURE | NATHAN WHITEHORN, UC BERKELEY

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 3RD TUESDAY OF EACH MONTH (EXCEPT JANUARY)

“THE EARLIEST AND THE BRIGHTEST: THE DISTANT AND HIGH ENERGY UNIVERSE FROM THE SOUTH POLE”



NATHAN WHITEHORN, UC BERKELEY

The universe at its extremes is only dimly understood, with many fundamental questions unanswered: What were the first luminous objects to form? What powers the universe's biggest explosions? How do omnipresent dark matter and dark radiation like neutrinos affect the history of the cosmos? What is the origin of cosmic particles seen at energies a hundred million times what we can produce on Earth? I will discuss how the 3rd-generation

South Pole Telescope, deployed in February at Amundsen-Scott South Pole Station and observing in the millimeter band, and the IceCube Neutrino Observatory, completed in 2011 at the same site, provide insight into these questions and are bringing the barely perceptible into view.

Brief Bio

Nathan Whitehorn, UC Berkeley, was named a "Young Star" by the Astrophysics Division of the American Physical Society in 2014. He became an active member of the IceCube Neutrino Observatory collaboration in 2007. Whitehorn's contributions go beyond scientific results. He has been an enthusiastic team member, improving IceCube analysis tools and techniques, which are being used by many other studies within the collaboration

He is currently assisting in deploying the third-generation South Polar Telescope.

Photo: Nathan Whitehorn is shown at the South Pole.

08.

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 **3RD TUESDAY** OF EACH MONTH (EXCEPT JANUARY)

JULY 18TH | IMKE DE PATER,

UC BERKELEY, PROF. ASTRONOMY, EARTH AND PLANETARY SCIENCE

"PEERING THROUGH JUPITER'S CLOUDS WITH KECK AND THE VLA"



Despite the fact that Jupiter has been observed for decades from the ground and in situ by spacecraft, we still do not know its bulk composition nor do we understand its global atmospheric dynamics well. The sensitivity upgrade to the Very Large Array (VLA), combined with novel data reduction techniques, has enabled us to produce detailed longitude-resolved maps of Jupiter's atmosphere at different wavelengths. Since at these wavelengths the main source of opacity is ammonia gas, our maps provide a 3D picture of ammonia gas in Jupiter's atmosphere, within and below the planet's visible cloud layers. These maps reveal upward and downward motions within the turbulent atmosphere, and bear a striking resemblance to visible-light images taken by amateur astronomers and Hubble.

At the 10-m Keck telescope we use 5-micron spectroscopy, which provides complementary information on cloud altitudes and composition. The results provide important context for NASA's Juno spacecraft that arrived at Jupiter on July 4th, 2016, after a five-year flight.

AUGUST 15TH | YASHAR HEZAVEH, HUBBLE FELLOW AT THE KAVLI INSTITUTE FOR PARTICLE ASTROPHYSICS AND COSMOLOGY AT STANFORD UNIVERSITY

"UNVEILING THE DARK UNIVERSE: A TALE OF FISH TANKS, WINE GLASSES, AND THE SMALLEST DARK MATTER CLUMPS"



What is "dark matter"? This is a question that has preoccupied astrophysicists for many decades. Observations show that 80% of the matter in our universe is in this mysterious, invisible form. In this talk, Dr. Hezaveh discusses how ALMA, the world's most sophisticated radio telescope, is used to observe some of the most distant galaxies of our universe to learn new things about dark matter. On their 12 billion light year journey to us, light rays from these galaxies pass near other galaxies. As this happens, the dark matter halos of the intervening galaxies, large and small, bend their trajectories, causing the images here on the Earth to look distorted, like images in a funhouse mirror.

UPCOMING SFAA LECTURES 2017 (continued)

SEPTEMBER 19TH | NATALIE BATALHA, SPACE SCIENCES, NASA

"A PLANET FOR GOLDBLOCKS: NASA'S SEARCH FOR LIFE BEYOND THE SOLAR SYSTEM"

Not too hot, not too cold, for a world just right for life. Launched in 2009, NASA's Kepler Space Mission is exploring planets orbiting other stars in the galaxy, to determine if Goldilocks planets abound. Dr Batalha will describe possibilities for finding inhabited environments in the future.

OCTOBER 17TH | TOM ABEL, KAVLI INSTITUTE. DIRECTOR OF KIPAC, STANFORD "HOW THE FIRST THINGS IN THE UNIVERSE CAME ABOUT, AND HOW THEY ENDED UP WITHIN US"

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. The first luminous objects were massive stars that seeded the cosmos with the chemistry needed for life.

NOVEMBER DATE IS CANCELLED DUE TO THANKSGIVING HOLIDAY

DECEMBER 19TH | TO BE ANNOUNCED

***** Mark Your Calendars *****

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

Tuesday August 8, 7:00 pm – 8:45 pm

SF Public Library: Presidio Branch Meeting Room / 3150 Sacramento Street, San Francisco

Tuesday November 14, 7:00 pm – 8:45 pm

SF Public Library: Presidio Branch Meeting Room / 3150 Sacramento Street, San Francisco

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.

09. SFAA EXPEDITION 2017

TOTAL SOLAR ECLIPSE

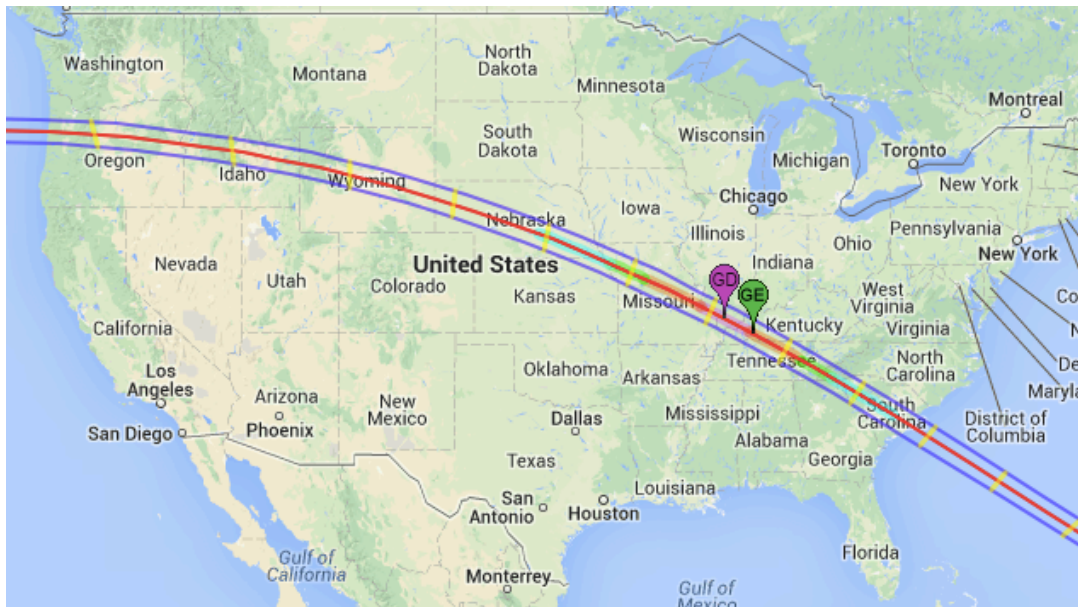
August 21, 2017

Jackson Hole, Wyoming (Teton Mountains)

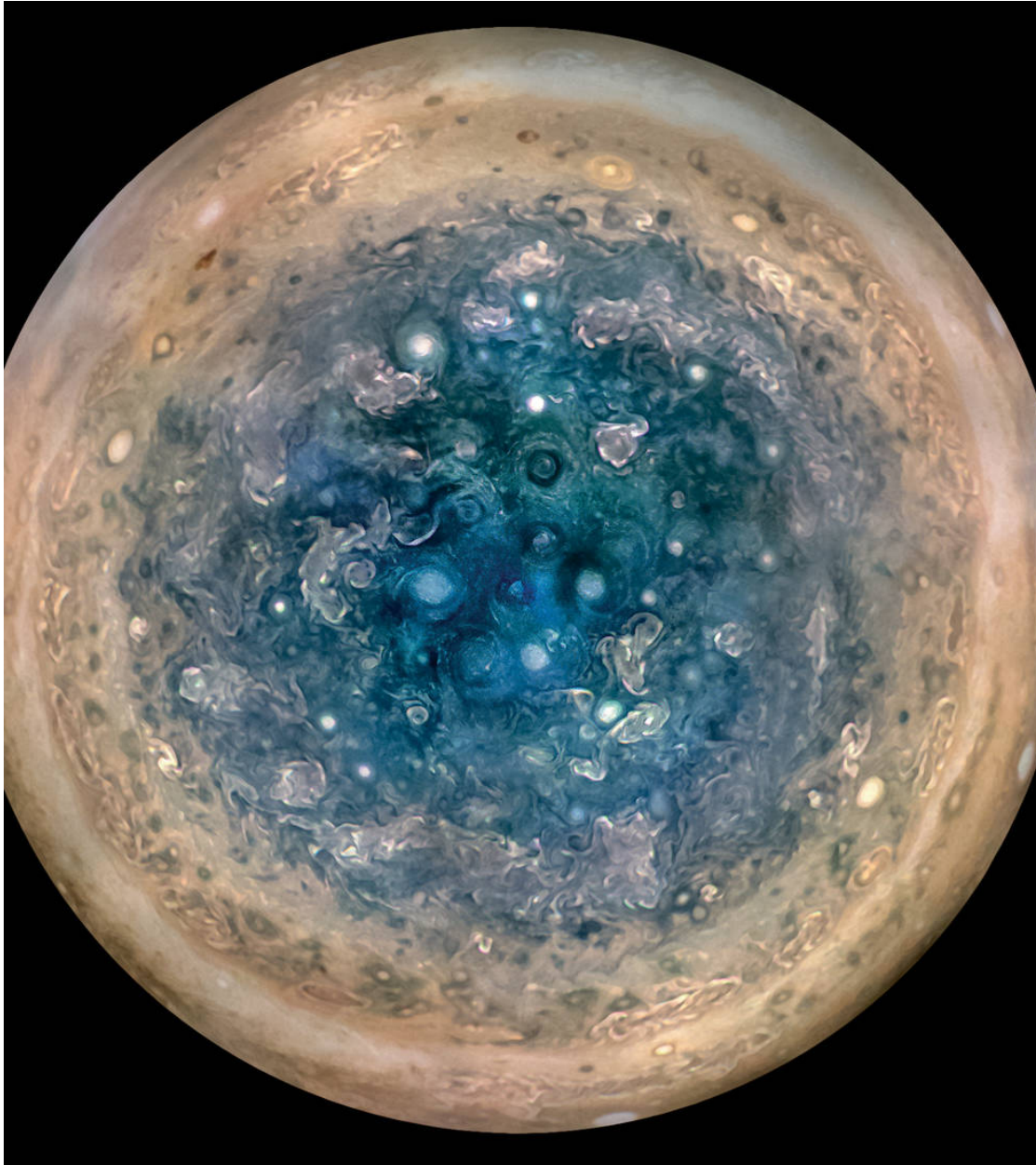
The San Francisco Amateur Astronomers is organizing an expedition to witness the August 21, 2017 Total Solar Eclipse. The eclipse will be visible across a broad swath of the USA, and club members will gather near Jackson Hole, Wyoming, to witness this spectacle high in the Teton Mountains. The trip is 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.

Over the past year as we have promoted this event, hotel space in all of the Jackson Hole region has sold out. So at this point in time, we welcome SFAA members to join us for the weekend of August 19th and 20th at our location in Teton Village, and for totality on Monday August 21st. However, you will have to find hotel or camping accommodations elsewhere and drive in. If you wish to join us or just to get updates, send an email to 2017eclipse@sfaa-astronomy.org to receive periodic updates.

If you have any other questions, send to 2017eclipse@sfaa-astronomy.org.



A WHOLE NEW JUPITER: FIRST SCIENCE RESULTS FROM NASA'S JUNO MISSION



This image shows Jupiter's south pole, as seen by NASA's Juno spacecraft from an altitude of 32,000 miles (52,000 kilometers). The oval features are cyclones, up to 600 miles (1,000 kilometers) in diameter. Multiple images taken with the JunoCam instrument on three separate orbits were combined to show all areas in daylight, enhanced color, and stereographic projection.

Image credit: NASA/JPL-Caltech / SwRI / MSSS / Betsy Asher Hall / Gervasio Robles

Early science results from NASA's Juno mission to Jupiter portray the largest planet in our solar system as a complex, gigantic, turbulent world, with Earth-sized polar cyclones, plunging storm systems that travel deep into the heart of the gas giant, and a mammoth, lumpy magnetic field that may indicate it was generated closer to the planet's surface than previously thought.

"We are excited to share these early discoveries, which help us better understand what makes Jupiter so fascinating," said Diane Brown, Juno program executive at NASA Headquarters in Washington. "It

was a long trip to get to Jupiter, but these first results already demonstrate it was well worth the journey.”

Juno launched on Aug. 5, 2011, entering Jupiter's orbit on July 4, 2016. The findings from the first data-collection pass, which flew within about 2,600 miles (4,200 kilometers) of Jupiter's swirling cloud tops on Aug. 27, are being published this week in two papers in the journal *Science*, as well as 44 papers in *Geophysical Research Letters*.

“We knew, going in, that Jupiter would throw us some curves,” said Scott Bolton, Juno principal investigator from the Southwest Research Institute in San Antonio. “But now that we are here we are finding that Jupiter can throw the heat, as well as knuckleballs and sliders. There is so much going on here that we didn't expect that we have had to take a step back and begin to rethink of this as a whole new Jupiter.”

Among the findings that challenge assumptions are those provided by Juno's imager, JunoCam. The images show both of Jupiter's poles are covered in Earth-sized swirling storms that are densely clustered and rubbing together.

“We're puzzled as to how they could be formed, how stable the configuration is, and why Jupiter's north pole doesn't look like the south pole,” said Bolton. “We're questioning whether this is a dynamic system, and are we seeing just one stage, and over the next year, we're going to watch it disappear, or is this a stable configuration and these storms are circulating around one another?”

Another surprise comes from Juno's Microwave Radiometer (MWR), which samples the thermal microwave radiation from Jupiter's atmosphere, from the top of the ammonia clouds to deep within its atmosphere. The MWR data indicates that Jupiter's iconic belts and zones are mysterious, with the belt near the equator penetrating all the way down, while the belts and zones at other latitudes seem to evolve to other structures. The data suggest the ammonia is quite variable and continues to increase as far down as we can see with MWR, which is a few hundred miles or kilometers.

Prior to the Juno mission, it was known that Jupiter had the most intense magnetic field in the solar system. Measurements of the massive planet's magnetosphere, from Juno's magnetometer investigation (MAG), indicate that Jupiter's magnetic field is even stronger than models expected, and more irregular in shape. MAG data indicates the magnetic field greatly exceeded expectations at 7.766 Gauss, about 10 times stronger than the strongest magnetic field found on Earth.

“Juno is giving us a view of the magnetic field close to Jupiter that we've never had before,” said Jack Connerney, Juno deputy principal investigator and the lead for the mission's magnetic field investigation at NASA's Goddard Space Flight Center in Greenbelt, Maryland. “Already we see that the magnetic field looks lumpy: it is stronger in some places and weaker in others. This uneven distribution suggests that the field might be generated by dynamo action closer to the surface, above the layer of metallic hydrogen. Every flyby we execute gets us closer to determining where and how Jupiter's dynamo works.”

Juno also is designed to study the polar magnetosphere and the origin of Jupiter's powerful auroras—its northern and southern lights. These auroral emissions are caused by particles that pick up energy, slamming into atmospheric molecules. Juno's initial observations indicate that the process seems to work differently at Jupiter than at Earth.

Juno is in a polar orbit around Jupiter, and the majority of each orbit is spent well away from the gas giant. But, once every 53 days, its trajectory approaches Jupiter from above its north pole, where it begins a two-hour transit (from pole to pole) flying north to south with its eight science instruments collecting data and its JunoCam public outreach camera snapping pictures. The download of six megabytes of data collected during the transit can take 1.5 days.

“Every 53 days, we go screaming by Jupiter, get doused by a fire hose of Jovian science, and there is always something new,” said Bolton. “On our next flyby on July 11, we will fly directly over one of the most iconic features in the entire solar system -- one that every school kid knows -- Jupiter’s Great Red Spot. If anybody is going to get to the bottom of what is going on below those mammoth swirling crimson cloud tops, it’s Juno and her cloud-piercing science instruments.”

NASA's Jet Propulsion Laboratory in Pasadena, California, manages the Juno mission for NASA. The principal investigator is Scott Bolton of the Southwest Research Institute in San Antonio. The Juno mission is part of the New Frontiers Program managed by NASA's Marshall Space Flight Center in Huntsville, Alabama, for the agency’s Science Mission Directorate. Lockheed Martin Space Systems, in Denver, built the spacecraft.

More information on the Juno mission is available at:

<https://www.nasa.gov/juno>

<http://missionjuno.org>

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dschmid@swri.org



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: S M L 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:

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