

# PRIMEFOCUS

Tri-Valley Stargazers



September 2011



## Meeting Info

### What:

Avoiding Conflicts on the Moon?  
Developing Policies for Future  
Human Activities on our Nearest  
Neighbor

### Who:

Dr. Margaret Race

### When:

September 16, 2011  
Doors open at 7:00 p.m.  
Lecture at 7:30 p.m.

### Where:

Unitarian Universalist  
Church in Livermore  
1893 N. Vasco Road

## Inside

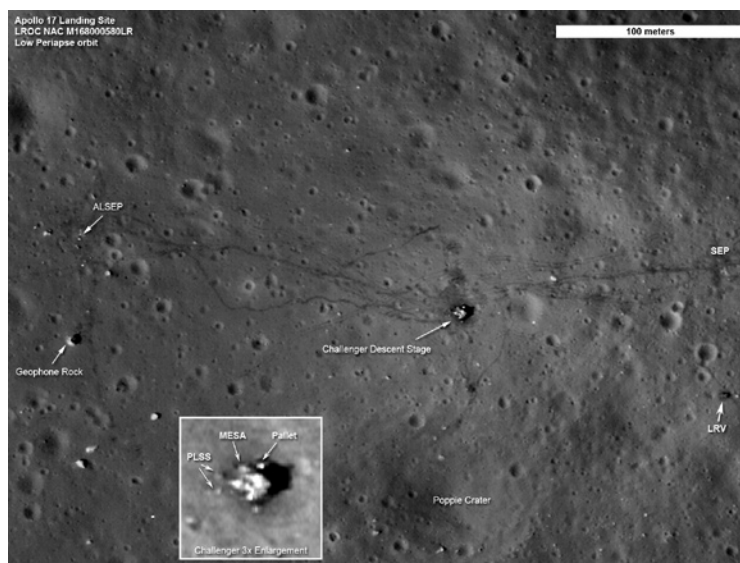
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## September Meeting

### Avoiding Conflicts on the Moon? Developing Policies for Future Human Activities on our Nearest Neighbor

#### Dr. Margaret Race

Dr. Margaret Race of the SETI Institute will give a presentation that addresses policies for future space exploration, including (1) How to develop guidelines for visits to the historic Apollo sites, particularly for use by the commercial sector as part of the Google X Lunar Competition. Historical and scientific preservation are key issues to be addressed, and (2) Consideration of science and legal issues ahead in space exploration, particularly as we contemplate other groups getting involved in activities beyond Low Earth Orbit and Geosynchronous Earth Orbit. Until now, it's only been government space agencies and the scientific community who have been interested in activities on the Moon and beyond. New considerations include tourism, mining, commercial 'rights', contamination, environmental zoning, acceptable/unacceptable activities, waste disposal, space debris around other bodies, astroburials (really!), etc. Many of these issues are very similar to the considerations that have applied over the decades in Antarctica.



Caption: The Apollo 17 landing site as imaged by the Lunar Reconnaissance Orbiter.  
Image Credit: NASA/Goddard/ASU.

Dr. Margaret Race received a Ph.D. in Zoology (Ecology) from UC Berkeley in 1979. Since 1991 she has been at the SETI Institute where she has been active in research on planetary protection, societal issues and risk communication related to astrobiology and solar system exploration. She is also a Research Associate and member of the Science Advisory Board, and is active in Educational and Program Planning in Astrobiology Science and Technology at St. Mary's College of California, Moranga, CA.

## News & Notes

### 2011 TVS Meeting Dates

The following lists the TVS meeting dates for 2011. The lecture meetings are on the third Friday of the month, with the Board meetings on the Monday following the lecture meeting.

Lecture Meeting	Board Meeting	Prime Focus Deadline
Sep. 16	Sep. 19	
Oct. 21	Oct. 24	Sep. 30
Nov. 18	Nov. 21	Oct. 28
Dec. 16	Dec. 19	Nov. 25

### Money Matters

Treasurer David Feindel indicates that as of July 18, 2011 the TVS account balances are:

Checking	\$5,420.09
CD #1	\$3,764.24 rolled over 5/17/2011
CD #2	\$2,657.00 rolled over 5/27/2011

### TVS Positions: Filled and Needed

We thank Jill Evanko for taking on the role of club Secretary. The Secretary takes the minutes of the board meeting, which is an important function for the club in maintaining its tax exempt non-profit status.

Jim Alves will vacate the Program Director position in January 2012, but for the next few months he will continue to book as many speakers as possible for the next year and develop leads for future speakers. He will also be available to assist in transitioning someone into that role, including providing contact information, examples of communications, etc. If you would like to take on this important club position, please contact Jim and/or any TVS officer or board member.

Additionally, we still need people to fill the position of Vice-President, and to serve on the Board of Directors. Please consider offering some of your time to influence the future direction of TVS. If you wish to help with any of these positions, please contact any officer or board member.

## Journal Club by Ken Sperber

On August 23, 2011 the Palomar Transient Factory identified a new supernova (SN2011FE aka PTF11KY) in spiral galaxy M101, which is located about 21 million light years away in the constellation of Ursa Major. On the night of August 27, 2011, I took images of M101 with my Takahashi FS-102 telescope and SBIG-2000XM. As seen on page 5, my image clearly shows SN2011FE in comparison to a previous image of M101 that I took in 2006. Other club members, including Ron Markham and Konrad Thuermer, have taken similar images of this supernova, further attesting to the interest this super-

nova has inspired among amateur astronomers.

Post-discovery professional observations indicate the supernova to be Type Ia, the type of supernovae that were used as "standard candles" in the determination that the universe is expanding at an accelerating rate. As you may recall from my previous series of TVS PrimeFocus articles on supernovae, Type Ia supernovae are believed to explode when (1) a white dwarf star exceeds the Chandrasekar mass limit via accretion of matter from a companion star, or (2) the merger of 2 white dwarf stars.

Professional astronomers are particularly interested in this supernova, since it's detection came within one day or less of detonation, and it is the closest Type Ia supernova in nearly 40 years. Given the range of wavelengths covered by satellites and with advanced ground telescopes, new aspects of the explosion mechanism and evolution are sure to be uncovered. One of the leading unknowns is the effect that metallicity plays in the explosion, including how it might affect the brightness. Another unknown is the role that rotation of the white dwarf may play in delaying the detonation of Type Ia supernovae. Recent work has suggested that super-Chandrasekar white dwarfs might exist. These are white dwarf stars that are more massive than the Chandrasekar limit. As a white dwarf accretes material from its companion star it will gain angular momentum (as long as the rotation direction of the star and the accretion disk are the same) and its rotation rate will increase. Theoretical calculations suggest that the spun-up white dwarf can resist gravitational collapse until it's rotation rate has slowed sufficiently, most likely due to the effect of it's magnetic field. Being more massive, the resulting supernova explosion would be more powerful. See the paper by Di Stefano et al. (2011; <http://arxiv.org/abs/1102.4342>) for more information on the effect of rotation on Type Ia supernovae. The improved understanding of Type Ia supernovae may result in a refinement to the distance scale and the acceleration rate estimate of the expansion of the universe.

The Palomar Transient Factory is an automated search facility that uses the 1.2m Oschin Telescope at Palomar Mountain (see page 1 header image). For more information see: <http://www.astro.caltech.edu/ptf/>

For additional information on SN2011FE, see: <http://www.astro.caltech.edu/ptf/> <http://newscenter.lbl.gov/feature-stories/2011/08/25/supernova/> <http://www.universetoday.com/88784/ptf11kly-messier-101-supernova-update/> [http://blogs.nature.com/news/2011/08/bright\\_supernova\\_one\\_of\\_the\\_ne.html](http://blogs.nature.com/news/2011/08/bright_supernova_one_of_the_ne.html).

**Header Image:** Image of the 1.2m Samuel Oschin telescope, the workhorse of the Palomar Transient Factory. 60-second survey exposures reach 20-21 magnitude in the red and green channels. Image credit: Caltech; <http://www.astro.caltech.edu/palomar/hrsot.html>

## Calendar of Events

### September 14, Noon - 1pm

**What:** Gravitational wave astronomy: a peek through the window  
**Who:** Paul Groot, Radboud University, The Netherlands  
**Where:** SETI Headquarters, 189 N. Bernardo Ave., Mountainview  
**Cost:** Free

The direct detection of gravitational waves will offer a completely new window onto our Universe: one that is dominated by degenerate objects, black holes, explosions and mergers. Although this window is so far still obscured, a glimpse of its richness can be seen from electromagnetic observations of gravitational wave sources. Dr. Groot will overview the progress in the fields of ultracompact binaries and the promise and results of synoptic surveys such the Kepler observations and the Palomar Transient Surveys. As an aside, and to connect to the SETI mission, Dr. Groot will briefly discuss the possibility of life on planets around white dwarfs as well.

For more information see: <http://www.seti.org/csc/lectures>, e-mail [info@seti.org](mailto:info@seti.org), or phone 650-961-6633.

### September 17, 11am

**What:** How to Build a Planet  
**Who:** Dr. Meredith Hughes, UC Berkeley  
**Where:** UC Berkeley, Genetics and Plant Biology Building, Room 100  
**Cost:** Free

The discovery of extrasolar planetary systems has overturned entrenched ideas about how our own planetary system formed. Around other stars we find exotic planets like nothing we see around our Sun: hot Jupiters, super-Earths, and massive planets at Kuiper Belt distances and beyond. Where

do they come from, and can we devise a story of planet formation that can account for the wide diversity of systems we see around our own star and others? This talk will introduce you to some of the ways we learn about planet formation, starting with evidence from observations with the naked eye and small telescopes and proceeding to the latest in high-resolution optical, infrared, and radio telescope observations of the disks of gas and dust around young stars. We will explore the main theories and open questions about how planets form in circumstellar disks, and attempt to place our solar system in context: are we normal?

For more information see: <http://scienceatcal.berkeley.edu/lectures>

### September 21, 7:00pm

**What:** SpaceX and the Dragon Spacecraft  
**Who:** Abhishek Tripathi, SpaceX Inc.  
**Where:** SETI Headquarters, 189 N. Bernardo Ave., Mountainview  
**Cost:** Free

With the retirement of the Space Shuttle this past summer the United States entered a new era, one in which U.S. astronauts will be flying only aboard the Russian Soyuz vehicle in order to access Low Earth Orbit and the International Space Station. California headquartered Space Exploration Technologies (SpaceX) has developed and twice launched a brand new launch vehicle (Falcon9), as well as launched and recovered a space capsule designed for humans (Dragon). SpaceX will soon begin delivering cargo, and ultimately plans on launching crew, to the International Space Station from U.S. soil. And all that is just the beginning of what SpaceX has in mind to revolutionize human access into Space.

continued page 4

#### **Officers**

**President:**  
Chuck Grant  
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**Vice-President:**  
unfilled  
**Treasurer:**  
David Feindel  
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**Secretary:**  
Jill Evanko

#### **Volunteer Positions**

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**Newsletter Editor:**  
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**Webmaster:**  
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**Observatory Director/**  
**Key Master:**  
Chuck Grant

#### **Public Star Party Chair:**

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**Historian:**  
unfilled  
**Mentor:**  
Mike Rushford  
[rushford@eyes-on-the-skies.org](mailto:rushford@eyes-on-the-skies.org)  
**Refreshment Coordinator:**  
Laurie Grefsheim

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[tvs@trivalleystargazers.org](mailto:tvs@trivalleystargazers.org)

#### **Eyes on the Skies**

Eyes on the Skies is a robotic solar telescope run by Mike Rushford ([rushford@eyes-on-the-skies.org](mailto:rushford@eyes-on-the-skies.org)). You may access it by visiting [www.eyes-on-the-skies.org](http://www.eyes-on-the-skies.org).

#### **TVS E-Group**

So how do you join the TVS e-group, you ask? Just send an e-mail message to the TVS e-mail address ([trivalleystargazers@gmail.com](mailto:trivalleystargazers@gmail.com)) asking to join the group. Make sure you specify the e-mail address you want to use to read and post to the group.

## Calendar of Events (continued)

For more information see: <http://www.seti.org/csc/lectures>, e-mail [info@seti.org](mailto:info@seti.org), or phone 650-961-6633.

### September 23, 6pm-10pm

What: Neptune Night  
Who: Chabot Space and Science Center  
Where: 10000 Skyline Boulevard, Oakland, CA 94619  
Cost: Free with General Admission

Getting the blues never felt so good. Mark the anniversary of Neptune's first solar orbit since its discovery. This blue-themed event will be fun for all ages as visitors enjoy hands-on activities, point telescopes to the sky for some nighttime viewing and engage in conversations about the blue planet.

For more information see: <http://www.chabotspace.org/solar-viewing.htm>, or call (510) 336-7300.

### September 28, Noon - 1pm

What: Cassini/Huygens Results for the Titan Haze  
Who: Robert West, Jet Propulsion Laboratory  
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountainview  
Cost: Free

Dr. West will review what is known about Titan's massive global haze. Most remarkable is the behavior of a thin high layer which has undergone a large-amplitude seasonal change in altitude, returning to the altitude observed by the Voyager cameras almost 30 years (1 Titan year) earlier.

Dr. West is an atmospheric planetary scientist based at the Jet Propulsion Laboratory in southern California. He is a member of the Cassini team and has worked on the Voyager and Galileo missions to the outer planets.

For more information see: <http://www.seti.org/csc/lectures>, e-mail [info@seti.org](mailto:info@seti.org), or phone 650-961-6633.

### October 1, 7:30pm

What: Milky Way Galaxies Across the Universe  
Who: Dr. Anne Metevier, UC Santa Cruz/Sonoma State University  
Where: Mt. Tamalpais State Park, Cushing Memorial Amphitheater, more commonly known as the Mountain Theater, Rock Spring parking area  
Cost: Free

The universe contains many vast galaxies containing stars, gas, and dust. What do we know about the formation and evolution of galaxies most like our own Milky Way?

For more information see: <http://www.mttam.net/astronomy/schedule.html>

### October 5, Noon - 1pm

What: Detecting Circumbinary Planets

Who: Laurance Doyle (SETI)  
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountainview  
Cost: Free

Details of this presentation are unavailable.

For more information see: <http://www.seti.org/csc/lectures>, e-mail [info@seti.org](mailto:info@seti.org), or phone 650-961-6633.

### October 12, Noon - 1pm

What: Earth science collaborative for ecological forecasting  
Who: Ramakrishna Nemani, NASA Ames  
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountainview  
Cost: Free

Details of this presentation are unavailable.

For more information see: <http://www.seti.org/csc/lectures>, e-mail [info@seti.org](mailto:info@seti.org), or phone 650-961-6633.

### October 17, 7:30pm

What: Tiny But Powerful: The Smallest Supermassive Black Holes  
Who: Dr. Jenny Greene, Department of Astrophysical Sciences, Princeton University  
Where: California Academy of Science, 55 Music Concourse Dr., Golden Gate Park, San Francisco, CA  
Cost: Adults \$12, Seniors \$10, Academy members \$6. Reserve a Space Online or call 800-794-7576

Supermassive black holes, with masses of millions to billions of times that of our own Sun, are found lurking at the centers of most nearby large galaxies. But which came first, the black hole or the galaxy? Dr. Greene will talk about the search for the smallest supermassive black holes today, and what they teach us about the first black holes.

See <http://www.calacademy.org/events/lectures/> for lecture and reservation information.

### October 19, Noon - 1pm

What: The oxygen isotopic composition of the Sun: implications for solar nebula chemistry  
Who: Kevin McKeegan, UCLA  
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountainview  
Cost: Free

Details of this presentation are unavailable.

For more information see: <http://www.seti.org/csc/lectures>, e-mail [info@seti.org](mailto:info@seti.org), or phone 650-961-6633.



**M101 and Supernova SN2011FE**  
**Imaged: August 27, 2011**  
**Comparison Image: May 29, 2006**  
**Ken Sperber**  
**Takahashi FS-102 (24 x 5min Exposures)**



## What's Up by Ken Sperber (adapted from The Year in Space and S&T)

All times Pacific Daylight Time, unless otherwise noted.

### September

- 12 Mon Full Moon (2:27am)
- 16 Fri Jupiter to the right of the Moon
- 16 Fri Ceres at opposition (see August S&T, p. 53. for finder chart)
- 20 Tue Last-Quarter Moon (6:39am)
- 23 Fri Mars to upper-left of waning crescent Moon
- 25-26 Sun- Uranus at opposition (see September S&T, p.53 for finder chart)
- 25-10 Sun- Zodiacal light visible in the eastern sky (predawn)
- 27 Tue New Moon (4:09am)
- 28 Wed Saturn 2 degrees above Venus with a setting crescent Moon (15 minutes after sunset)

### October

- 1 Sat Mars conjunction with M44, the Beehive Cluster (predawn)
- 3 Mon First-Quarter Moon (8:15pm)
- 8 Sat Draconid Meteor Shower, nearly full Moon will compromise visibility
- 11 Tue Full Moon (7:06pm)
- 12-14 Wed- Jupiter near the full Moon
- 19 Wed Last-Quarter Moon (8:30pm)
- 21-22 Fri- Orionid Meteor peaks in the early morning hours of the 22nd



IC5146, 12.5" F8 CDK, HRGB 200:65:70:85min., ST10XME 1x1 -15C, Sept 2011, Gert Gottschalk

Caption: Image of IC5146 taken by Gert Gottschalk over the course of 2 night in August and September. The total exposure time was nearly 7 hours using H-alpha and RGB filters.



## Solar System Size Surprise

By Dr. Tony Phillips

News flash: You may be closer to interstellar space than you previously thought.

A team of researchers led by Tom Krimigis of the Johns Hopkins University Applied Physics Laboratory announced the finding in the June 2011 issue of *Nature*. The complicated title of their article, "Zero outward flow velocity for plasma in a heliosheath transition layer," belies a simple conclusion: The solar system appears to be a billion or more kilometers smaller than earlier estimates.

The recalculation is prompted by data from NASA's Voyager 1 probe, now 18 billion kilometers from Earth. Voyagers 1 and 2 were designed and built and are managed by NASA's Jet Propulsion Laboratory. Aging but active, the spacecraft have been traveling toward the stars since 1977 on a heroic mission to leave the solar system and find out what lies beyond.

To accomplish their task, the Voyagers must penetrate the outer walls of the heliosphere, a great bubble of plasma and magnetism blown in space by the solar wind. The heliosphere is so big, it contains all the planets, comets, and asteroids that orbit the sun. Indeed many astronomers hold that the heliosphere defines the boundaries of the solar system. Inside it is "home." Outside lies the Milky Way. For 30+ years, the spacecraft have been hurtling toward the transition zone. Voyager 1 is closing in.

Much of Voyager 1's long journey has been uneventful. Last year, however, things began to change. In June 2010, Voyager 1 beamed back a startling number: zero. That's the outward velocity of the solar wind where the probe is now.

"This is the first sign that the frontier is upon us," says Krimigis.

Previously, researchers thought the crossing was still years and billions of kilometers away, but a new analysis gave them second thoughts. Krimigis and colleagues combined Voyager data with previously unpublished measurements from the Cassini spacecraft. Cassini, on a mission to study Saturn, is nowhere near the edge of the solar system, but one of its instruments can detect atoms streaming into our solar system from the outside. Comparing data from the two locations, the team concluded that the edge of the heliosphere lies somewhere between 16 to 23 billion kilometers from the sun, with a best estimate of approximately 18 billion kilometers.

Because Voyager 1 is already nearly 18 billion kilometers out, it could cross into interstellar space at any time—maybe even as you are reading this article.

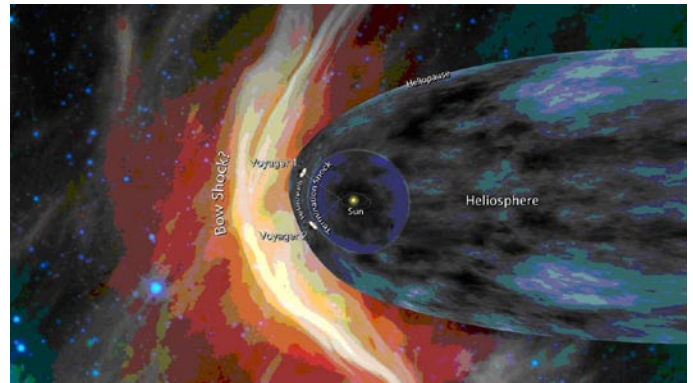
"How close are we?" wonders Ed Stone, Caltech professor

and principal investigator of the Voyager project since the beginning. "We don't know, but Voyager 1 speeds outward a billion miles every three years, so we may not have long to wait."

Stay tuned for the crossing.

For more about the missions of Voyager 1 and 2, see <http://voyager.jpl.nasa.gov/>. Another Voyager project scientist, Merav Opher, is the guest on the newest Space Place Live cartoon interview show for kids at <http://spaceplace.nasa.gov/space-place-live>.

This article was provided courtesy of the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



Caption: This artist's concept shows NASA's two Voyager spacecraft exploring a turbulent region of space known as the heliosheath, the outer shell of the bubble of charged particles around our sun. Image credit: NASA/JPL-Caltech

Tri-Valley Stargazers  
P.O. Box 2476  
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## PRIMEFOCUS

### Tri-Valley Stargazers Membership Application

Member agrees to hold Tri-Valley Stargazers, and any cooperating organizations or landowners, harmless from all claims of liability for any injury or loss sustained at a TVS function.

Name \_\_\_\_\_ Phone \_\_\_\_\_ e-mail \_\_\_\_\_

Address \_\_\_\_\_

Do not release my: \_\_\_\_\_ address, \_\_\_\_\_ phone, or \_\_\_\_\_ e-mail information to other TVS members.

Membership category: \_\_\_\_\_ \$5 Student.  
\_\_\_\_\_ \$30 Basic. You will receive e-mail notification when the PDF version of Prime Focus is available for download off the TVS web site.  
\_\_\_\_\_ \$10 Hidden Hill Observatory (H2O) yearly access fee. You need to be a key holder to access the site.  
\_\_\_\_\_ \$20 H2O key holder fee. (A refundable key deposit—key property of TVS).  
\_\_\_\_\_ \$40 Patron Membership. Must be a member for at least a year and a key holder.  
\_\_\_\_\_ \$34 One year subscription to Astronomy magazine.  
\_\_\_\_\_ \$60 Two year subscription to Astronomy magazine.  
\_\_\_\_\_ \$32.95 One year subscription to Sky & Telescope magazine. Note: Subscription to S&T is for new subscribers only. Existing subscribers please renew directly through S&T.  
\$ \_\_\_\_\_ Tax deductible contribution to Tri-Valley Stargazers.  
\$ \_\_\_\_\_ TOTAL – Return to: Tri-Valley Stargazers, P.O. Box 2476, Livermore, CA 94551

Membership information: Term is one calendar year, January through December. Student members must be less than 18 years old or still in high school.