

PrimeFocus



WHEN:

July 16, 2021
Meeting at 7:30pm
Lecture at 8:00pm

WHERE:

Virtual Meeting using Zoom
See the April 2020 issue of PrimeFocus for info on getting connected using Zoom

TVS QR Code



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N~1: Alone in the Milky Way

Dr. Pascal Lee, Mars Institute, SETI Institute, NASA Ames

At the heart of the Search for Extraterrestrial Intelligence (SETI) lies the Drake Equation, a mathematically simple yet fascinatingly enigmatic formula proposed by American astronomer and SETI founder Frank Drake. The Drake Equation provides a way to estimate the number, N , of advanced civilizations present in our Milky Way galaxy. Although N is often assumed to be large - there would be many civilizations in the Galaxy -, large numbers for N are in apparent conflict with observation, a contradiction known as the Fermi Paradox, named after Italian-American physicist and 1938 Nobel Prize winner Enrico Fermi.

Pascal Lee, planetary scientist at the SETI Institute, examines the state-of-the-art of our knowledge about each term of the Drake Equation, and reaches the perhaps surprising conclusion that N might actually be a very small number, close to 1. We could be it. The implications of $N \sim 1$ are profound and will be discussed. The Drake Equation is:

$$N = R^* \times f_p \times n_e \times f_l \times f_i \times f_c \times L, \text{ where}$$

N = number of civilizations that can communicate with humans

R^* = mean rate of star formation

f_p = fraction of stars with planets

n_e = mean number of planets that can support life per star with planets

f_l = fraction of life-supporting planets that develop life

f_i = fraction of planets with life where life is intelligent

f_c = fraction of intelligent civilizations that develop communication

L = mean length of time that civilizations can communicate

For more information on the Drake Equation, see: <https://www.seti.org/understanding-drake-equation>

Dr Pascal Lee got his Ph.D. in astronomy and space sciences at Cornell University where he was Carl Sagan's last Teaching Assistant. His research focuses on water on Mars, caves on the Moon and Mars, and the origin of Mars' two moons, Phobos and Deimos. He has led over 30 expeditions to the Arctic and Antarctica to study the Moon and Mars by analogy with the Earth. Since 1997, he directs the NASA Haughton-Mars Project (HMP), the leading Moon and Mars analog field research project on Devon Island in the High Arctic.

Dr. Lee is also known for his work on advancing strategies and technologies for the future human exploration of the Moon and Mars, including spacesuits, habitats, rovers, flyers, and drones. He worked on early studies of helicopters for Mars and was scientist-pilot of NASA's experimental Small Pressurized Rover project.

Dr. Lee also works on the Search for Extra-Terrestrial Intelligence (SETI). He was first to argue, on the basis of the long time it took for intelligent life to emerge on Earth, that the number of advanced civilizations in our Galaxy, N , is likely very small: $N \sim 1$. He proposes that SETI should focus on extragalactic searches.

Dr Lee's first book, Mission: Mars, won the 2015 Prize for Excellence in children's science books from the American Association for the Advancement of Science.

News and Notes

2021 Meeting Dates

Lecture Meeting	Board Meeting	PrimeFocus Deadline
Jul. 16	Jul. 19	
Aug. 20	Aug. 23	Aug. 6
Sep. 17	Sep. 20	Sep. 3
Oct. 15	Oct. 18	Oct. 1
Nov. 19	Nov. 22	Nov. 5
Dec. 17	Dec. 20	Dec. 3

Money Matters

As of the last Treasurer's Report on 6/21/21, our club's account balance is \$63,496.07. This includes \$44,460.07 in the H2O Rebuild fund.

TVS Welcomes New Members

TVS welcomes new members Sunjeev Bery, Gagan Bhatia, Jeffrey Rossini, Lalitya Sawant, Johnny Verive, and David Wynne. Please say hello and chat with them during our Zoom meetings.

H2O and Del Valle Observing Sites Reopened

The Del Valle and Hidden Hill Observatory sites have reopened for observing by those who have paid their 2021 TVS Membership dues and are approved key holders.

As of June 15, California state guidance on COVID-19 indicates that use of masks is not required for **outdoor** activities. However, common sense dictates that club members and guests

*Do not use either observing site if you are not feeling well or suspect you were recently exposed to the virus

*You use each observing site at your own risk and agree to hold the club and the landowners free of all liability

*H2O users should wear a mask while at the landowner's home depositing the daily usage fee

*H2O keyholders who wish to use the Quick Dome should first contact Ross Gaunt (secretary"at"trivalleystargazers.org) to reserve it for individual use for the day

Ross Gaunt, our club secretary, emailed the updated lock combinations and usage instructions for each site to all H2O key holders and all Del Valle registered users. If you are a H2O key holder or Del Valle registered user and didn't get Ross's email, please let Ron (president"at"trivalleystargazers.org) or Ross know and we'll straighten it out.

Outreach Star Party Schedule

For **indoor** Outreach Events both vaxed and unvaxed persons are required to wear masks for events at K-12 Schools and at

long term care facilities. For more information on COVID Guidance see:

<https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/COVID-19/guidance-for-face-coverings.aspx>

<https://covid19.ca.gov/safely-reopening/>

Contact Eric Dueltgen if you are interested in participating in future events (outreach"at"trivalleystargazers.org).

2021 Club Star Party Schedule

Save the dates for the 2021 Club Star Parties.

Del Valle star parties are also public outreach events. They are jointly hosted with the EBRPD and held at the Arroyo Staging Area. The public is invited for the first 1.5-2 hours, while club members can stay the remainder of the night.

Tesla Vintners star parties are open to only club members and their guests. These star parties end at midnight, but participants can leave earlier, should they wish.

H2O Open House star parties are open to the public. The open house ends at midnight, and all participants are encouraged to stay the duration. The drive to H2O takes about 1 hour, and the caravan leaves promptly from the corner of Mines and Tesla Rds.

September 4, 7:00pm: TVS Club Star Party, Tesla Vintners, 5143 Tesla Rd., Livermore

October 2, 6:30pm: TVS Club Star Party, Tesla Vintners, 5143 Tesla Rd., Livermore

H2O Rebuild

The rebuild committee is planning the next work party activities. It is anticipated that participation by the general membership will be required to assist in the construction of our new observing and imaging capability. Look for club emails soliciting your participation. This is your opportunity to make a hands-on contribution to the legacy of TVS!

Calendar of Events

July 17, 7:30pm

What: Oumuamua: Interstellar Visitor

Who: Prof. Douglas Lin (University of CA, Santa Cruz)

Sponsor: Mt. Tam Astronomy Program

Online: <https://us02web.zoom.us/j/89697734661#success>

In 2017, astronomers detected an elongated object swinging past Earth on its way out of the solar system. The size, shape, and motion of Oumuamua (roughly "scout" in Hawaiian) inspired a few excited researchers to suggest the visitation of an interstellar "spaceship." This presentation will explore the

Calendar of Events

physical nature of Oumuamua and a vast fleet of its extrasolar cohorts

For more information see:

<https://www.mttamastronomy.org/calendar> and
<https://youtube.com/MtTamAstronomy>

July 21, 10:00am

What: Could Rogue Planets Harbor Life?

Who: Prof. Dorian Abbot (University of Chicago) and Prof. Matthew Penny (Louisiana State University)

Sponsor: SETI Institute

Online: REGISTRATION REQUIRED

<https://www.seti.org/event/seti-talks-could-rogue-planets-harbor-life>

Life elsewhere in our galaxy may come in many exotic forms, and scientists have speculated about the existence of life on alien worlds, like rogue planets. Rogue planets are planets that are not orbiting any stars.

It's awe-inspiring that astronomers have discovered more than 4,000 confirmed exoplanets to date (and thousands of more exoplanet candidates). However, most detection techniques rely on the existence of a host star. To detect rogue planets, astronomers use gravitational microlensing, which involves watching foreground objects pass in front of distant background stars. The chances of such an event are slim, but modern astronomers observe thousands of stars, and soon millions every week, to detect them. According to simulations based on star behaviors and interaction, our Milky Way could have 50 billion wandering planets, a staggering number that

may imply that if life exists on those worlds, our galaxy is full of it.

If a planet is ripped from the warm environment of its star and drifts in the frigid depths of space, it could still hold on to a liquid ocean — and maybe life — beneath an icy crust. Could submarine aliens on such a planet have a chance at survival? And for how long?

For more information, see: <https://www.seti.org/talks>

July 22, 5:00pm

What: A Cosmic Perspective: Searching for Aliens, Finding Ourselves

Who: Dr. Jill Tarter (SETI Institute)

Sponsor: Astronomical Society of the Pacific

Online: REGISTRATION REQUIRED

<https://www.seti.org/event/seti-talks-could-rogue-planets-harbor-life>

Are we alone? Humans have been asking this question throughout history. We want to know where we came from, how we fit into the cosmos, and where we are going. We want to know whether there is life beyond the Earth and whether any of it is intelligent.

Since the middle of the twentieth century we have had tools that permit us to embark on a scientific exploration to try to answer this old question. We no longer have to ask the priests and philosophers what we should believe about extraterrestrial life; we can explore and discover what's actually out there. Our tools are getting ever better. We have discovered extremophiles in the most unexpected places on

Officers

President

Ron Kane
president@trivalleystargazers.org

Vice-President

Eric Dueltgen
vice_president@trivalleystargazers.org

Treasurer

John Forrest
treasurer@trivalleystargazers.org

Secretary

Ross Gaunt
secretary@trivalleystargazers.org

Past President

Roland Albers
past_president@trivalleystargazers.org

Volunteer Positions

Astronomical League Rep.

Dennis Beckley
alrep@trivalleystargazers.org

Club Star Party Coordinator

Eric Dueltgen
coordinator@trivalleystargazers.org

Del Valle Coordinator

David Wright
delvalle@trivalleystargazers.org

Historian

Hilary Jones
historian@trivalleystargazers.org

Librarian

Ron Kane
librarian@trivalleystargazers.org

Loaner Scope Manager

Ron Kane
telescopes@trivalleystargazers.org

Newsletter Editor

Ken Sperber
newsletter@trivalleystargazers.org

Night Sky Network Rep.

Ross Gaunt
nnsn@trivalleystargazers.org

Observatory Director/Rebuild Chairman

Chuck Grant
observatory@trivalleystargazers.org

Observing Program Coordinator

Ron Kane
awards@trivalleystargazers.org

Outreach Coordinator

Eric Dueltgen
outreach@trivalleystargazers.org

Potluck Coordinator

OPEN
potluck@trivalleystargazers.org

Program Coordinator

Dan Helmer
programs@trivalleystargazers.org

Publicity and Fundraising

Brian Blau
publicity@trivalleystargazers.org

Refreshment Coordinator

Laurie Grefsheim

Webmaster

Hilary Jones
webmaster@trivalleystargazers.org

Web & E-mail

www.trivalleystargazers.org
info@trivalleystargazers.org

TVS E-Group

To join the TVS e-group just send an email message to TVS at: info@trivalleystargazers.org 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 (con't)

this planet and we have discovered that there really are far more planets than stars out there. We haven't yet found life beyond Earth, but there is currently a debate about the detection of Phosphine in the clouds of Venus, and whether this might imply biology. There is a vast amount of other potentially-habitable real estate to explore beyond our solar system, and there are many plans to do just that. The 21st century will be the century in which we will find some answers, this will be your century.

As we look up and look out, we are forced to see ourselves from a cosmic perspective; a perspective that shows us as all the same, all Earthlings. This perspective is fundamental to finding a way to sustain life on Earth for the long future.

July 24, 6:30pm-10:00pm

What: Sunset Science
Who: Chabot Staff
Where: Chabot Space and Science Center, 10000 Skyline Blvd., Oakland, CA 94619
Cost: Members Free, Adults \$15, Youth \$5

Enjoy a warm summer evening of activities and stargazing on Chabot's stunning Observation Deck! Learn about stellar concepts and preview our new offerings with special demonstrations, hands-on challenges and more. When the Sun goes down, the stars come out for exploring the cosmos through historic telescopes.

During this event, celebrate the 50th Anniversary of the Apollo 14 launch with a night of all things lunar. From cratering to simulated moon rocks and soil, you'll learn about past missions and future expeditions.

Food, wine and beer will be available for purchase on-site.

For more information, see:

<https://chabotspace.org/events/events-listing/>

August 14, 7:30pm

What: Unveiling the Dark Universe with the Dark Energy Survey
Who: Dr. Alexandra Amon (Stanford University)
Sponsor: Mt. Tam Astronomy Program
Online: <https://us02web.zoom.us/j/89697734661>

Throughout history, the Universe has had a way of turning our grandest thoughts upside down. Now, we see that the cosmos is dark: dominated by dark matter and dark energy. With the Dark Energy Survey imaging 1/8th of the night sky — and mapping more than 100 million galaxies — we can get a clearer understanding of the vast Universe we call home.

For more information see:

<https://www.mttamastronomy.org/calendar> and
<https://youtube.com/MtTamAstronomy>

To the Moon: Then and Now

This month's TVS meeting falls on July 16, 2021, which also marks 52 years since the launch of Apollo 11. Presently, NASA is preparing to go back to the Moon, hopefully in a permanent capacity, with the Artemis 1 vehicle being prepared for its maiden voyage later this year. At launch the Saturn V produced 7.5 million pounds of thrust (top), while Artemis 1 will produce 8.8 million pounds of thrust (bottom). Am guessing that Artemis 1, with its massive solid rocket boosters, will get off the pad much more quickly than the Saturn V. Stay tuned!



Image Credits: NASA:

<https://history.nasa.gov/ap11ann/kippsphotos/39525.jpg> and
https://images.nasa.gov/details-KSC-20210612-PH-CSH01_0070



Antares / Rho Ophiuchi Region, 200mm F2.8 Canon lens, UV-IR cut filter, 40x5min., ASI2600MC, 1x1, 0C, June 2021,

(c) Gert Gottschalk

Caption: Gert Gottschalk imaged Antares and the Rho Ophiuchi region from H2O during June. Also seen is the Globular Cluster M4. Rho Ophiuchi is located about 427 light years distant while M4 is located about 7200 light years distant. He used a ZWO ASI2600MC (on-shot-color) camera with a UV-IR cut filter and a Canon 200mm lens at f/2.8. Forty exposures of 5 minutes each were obtained with the camera cooled to 0°C. The data were processed using Pixinsight. The full size image can be obtained from : [https://www.trivalleystargazers.org/gert/CCD Galery/rhooph asi2600.html](https://www.trivalleystargazers.org/gert/CCD%20Galery/rhooph_asi2600.html)

What's Up

By Ken Sperber (adapted from S&T)

All time are Pacific Daylight time

July

- 17 Thu First-Quarter Moon (8:54pm)**
12 Mon Venus and Mars are separated by 0.5° , with the Moon to their upper left (Dusk)
16 Fri The Moon in Virgo is $\sim 6^\circ$ from Spica in the west (Evening)
- 17 Sat First-Quarter Moon (3:11am)**
19 Mon The Moon in Scorpio is $\sim 1^\circ$ from Beta Scorpii, with Antares to their lower left (Evening)
21 Wed Venus in Leo is $\sim 1^\circ$ from Regulus (Dusk)
- 23 Fri Full Moon (7:37pm)**
24 Sat The Moon and Saturn form a vertical pair low in the southwest. Jupiter is to their upper left (Dawn)
25 Sun The Moon is located in between Jupiter and Saturn, forming a shallow arc (Dawn)
26 Mon The Moon and Jupiter are separated by $\sim 5^\circ$ (Dawn)
28- Wed The Southern Delta Aquariid Meteor shower is visible all night
29 Thu Use binoculars to see Mars and Regulus very low on the western horizon. Venus is to their upper left (Dusk)
- 31 Sat Last-Quarter Moon (6:16am)**

August

- 1 Sun Saturn at opposition (Visible all night)
2 Mon The Crescent Moon is near the Pleiades and Hyades Clusters (Dawn)
3 Tue The Crescent Moon in Taurus is $\sim 6^\circ$ from Aldebaran (Dawn; see S&T, August, p. 46)
6 Fri The Crescent Moon in Gemini is $\sim 5^\circ$ from Pollux (Dawn)
- 8 Sun New Moon (6:50am)**
10 Tue The Moon and Venus are 5.5° apart in the west (Dusk)
11 Wed The Perseid Meteor shower peaks the night of Aug. 11-12 (see S&T, August, p. 48)
- 15 Sun First-Quarter Moon (8:20am)**
16 Mon The Moon in Scorpio is $\sim 4^\circ$ from Antares (Dusk)
19 Thu Jupiter at Opposition (Visible all night)
20 Fri The Moon and Saturn are $\sim 4.5^\circ$ apart in the southeast (Dusk)
21 Sat The Moon and Jupiter are $\sim 5^\circ$ apart in the east-southeast (Dusk)
- 22 Sun Full Moon (5:02am)**
22 Sun The Moon, Jupiter, and Saturn form an arc in the southeast (Evening)
- 30 Mon Last-Quarter Moon (12:13am)**
30 Mon The Moon is 5° from Aldebaran, with the Pleiades to their upper right (Dawn)



Observe the Milky Way and Great Rift

By David Prosper

Summer skies bring glorious views of our own Milky Way galaxy to observers blessed with dark skies. For many city dwellers, their first sight of the Milky Way comes during trips to rural areas - so if you are traveling away from city lights, do yourself a favor and look up!



Caption: The Great Rift is shown in more detail in this photo of a portion of the Milky Way along with the bright stars of the Summer Triangle. You can see why it is also called the “Dark Rift.” Credit: NASA / A.Fujii

To observe the Milky Way, you need clear, dark skies, and enough time to adapt your eyes to the dark. Photos of the Milky Way are breathtaking, but they usually show far more detail and color than the human eye can see – that’s the beauty and quietly deceptive nature of long exposure photography. For Northern Hemisphere observers, the most prominent portion of the Milky Way rises in the southeast as marked by the constellations Scorpius and Sagittarius. Take note that, even in dark skies, the Milky Way isn’t easily visible until it rises a bit above the horizon and the thick, turbulent air which obscures the view. The Milky Way is huge, but is also rather faint, and our eyes need time to truly adjust to the dark and see it in any detail. Try not to check your phone while you wait, as its light will reset your night vision. It’s best to attempt to view the Milky Way when the Moon is at a new or crescent phase; you don’t want the Moon’s brilliant light washing out any potential views, especially since a full Moon is up all night. Keeping your eyes dark adapted is especially important if you want to not only see the haze of the Milky Way, but also the dark lane cutting into that haze, stretching from the Summer Triangle to Sagittarius. This dark detail is known as the Great Rift, and is seen more readily in very dark skies, especially dark, dry skies found in high desert regions. What exactly is the Great Rift? You are looking at massive clouds of galactic dust lying between Earth and the interior of the Milky Way. Other

“dark nebulae” of cosmic clouds pepper the Milky Way, including the famed Coalsack, found in the Southern Hemisphere constellation of Crux. Many cultures celebrate these dark clouds in their traditional stories along with the constellations and Milky Way.

Where exactly is our solar system within the Milky Way? Is there a way to get a sense of scale? The “Our Place in Our Galaxy” activity can help you do just that, with only birdseed, a coin, and your imagination: bit.ly/galaxyplace. You can also discover the amazing science NASA is doing to understand our galaxy – and our place in it - at nasa.gov.



Caption: If the Milky Way was shrunk down to the size of North America, our entire Solar System would be about the size of a quarter. At that scale, the North Star, Polaris - which is about 433 light years distant from us - would be 11 miles away! Find more ways to visualize these immense sizes with the Our Place in Our Galaxy activity: bit.ly/galaxyplace

This article is distributed by the NASA Night Sky Network, a coalition of hundreds of astronomy clubs across the US dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, stargazing info and more.



Tri-Valley Stargazers
P.O. Box 2476
Livermore, CA 94551
www.trivalleystargazers.org

Tri-Valley Stargazers Membership Application

Contact information:

Name: _____ Phone: _____

Street Address: _____

City, State, Zip: _____

Email Address: _____

Status (select one): _____ New member _____ Renewing or returning member

Membership category (select one): Membership term is for one calendar year, January through December.

_____ Student member (\$10). Must be a full-time high-school or college student.

_____ Regular member (\$30).

Hidden Hill Observatory Access (optional): Must be 18 or older.

_____ One-time key deposit (\$20). This is a refundable deposit for a key to H2O. New key holders must first hear an orientation lecture and sign a usage agreement form before using the observing site.

_____ Annual access fee (\$10). You must also be a key holder to access the site.

Donation (optional):

_____ Tax-deductible contribution to Tri-Valley Stargazers

Total enclosed: \$ _____

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. TVS will not share information with anyone except as detailed in our Privacy Policy (<http://www.trivalleystargazers.org/privacy.shtml>).

Mail this completed form along with a check to: Tri-Valley Stargazers, P.O. Box 2476, Livermore, CA 94551.