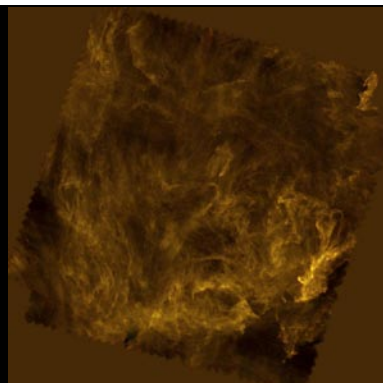


PRIMEFOCUS

Tri-Valley Stargazers

May 2011



Meeting Info

What:

Conversation

Who:

You

When:

May 20, 2011

Doors open at 7:00 p.m.

Lecture at 7:30 p.m.

Where:

Unitarian Universalist

Church in Livermore

1893 N. Vasco Road

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May Meeting

As this newsletter goes to press, we have no speaker for this month's meeting. In case a speaker is lined up please keep an eye on the club website (<http://www.tri-valleystargazers.org/>) and/or the TVS Yahoo users group for possible updates. Even so, please come to the meeting for some pleasant conversation.

Journal Club

What Lurks Within

Check almost any astrophotographer's website, and you'll find that they have imaged IC5146. You might ask: What the heck is IC5146, and what does the IC stand for? IC5146 is the Cocoon Nebula (Now you're saying: Oh yeah, I know that one!), and IC is an acronym for Index Catalogue. This cluster is estimated to be about 1500 light years distant in the constellation of Cygnus (Great, it is visible in the summer and autumn!), and is ~12 arc minutes in diameter (~15 light years at the afore-mentioned distance). The central star that provides the photons that cause the nebula to fluoresce is estimated to be about 100,000 years old. The beauty of the Cocoon Nebula is enhanced by the trailing dark nebula Barnard 168 (B168). At visible wavelengths B168 is so dense that it obscures starlight from more distant stars, as seen in the top image on page 5.

Fortunately, there are numerous satellites that can obtain data at infrared wavelengths because they are located above the obscuring effects of Earth's atmosphere in which water vapor is the primary IR absorber. Using the European Space Agency Herschel satellite, Arzoumanian et al. (2011) have imaged the Cocoon Nebula and B168 at multiple IR wavelengths. As such, they are able to peer into the nebulae to see gas filaments (see the bottom image on p. 5). Their examination of 90 filaments (27 from IC5146/B168 and 63 from the Aquila and Polaris regions [see the header image above]) indicates that irrespective of their length, the filaments have a characteristic width of about 0.3 light years. While there are only about 10^8 molecules cm^{-3} in these interstellar clouds, far fewer than "a good" vacuum on Earth, the density is probably sufficient for sound waves to propagate through the cloud. The results support the hypothesis that large-scale turbulence is responsible for the filaments. The "mildly supersonic" shockwaves "are a result of the copious amounts of turbulent energy injected into interstellar space by exploding stars." The compressed material at the shock-front is the resulting filament when the shockwave dissipates. It is along such filaments that star formation is believed to preferentially occur.

For more information see: http://www.esa.int/SPECIALS/Herschel/SEMK0H7S9MG_0.html, <http://www.universetoday.com/84847/sonic-booms-in-space-linked-to-star-formation/>, Arzoumanian et al. (2011, *Astronomy and Astrophysics*, doi: 10.1051/0004-6361/201116596), and http://en.wikipedia.org/wiki/IC_5146.

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
May 20	May 23	
Jun. 17	Jun. 20	May 27
Jul. 15	Jul. 18	Jun. 24
Aug. 19	Aug. 22	Jul. 29
Sep. 16	Sep. 19	Aug. 26
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 February 12, 2011 the TVS account balances are:

Checking	\$5,823.09
CD #1	\$3,763.79 rolled over 2/17/2011
CD #2	\$2,656.35 rolled over 11/27/2010

TVS Positions Available

We still need people to fill the positions of Vice-President and Secretary, 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.

H2O Open House Dates

On May 21 and July 23 TVS will hold Open House's to visit the club observing site, H2O. Our Open Houses are meant to give members a guided tour of the site, and an opportunity to observe under dark skies. You will have the opportunity to observe through the club's 17.5-inch equatorially mounted Newtonian telescope, housed in a permanent roll-off roof observatory.

Non-key holding members and the general public must be escorted to, while at, and from the site by key holding members -- NO EXCEPTIONS. For those members who have yet to check out the site, it is about an hour's drive south of Livermore, along a very windy road. It is a primitive site—no water or electricity, with a couple of outhouses. What it lacks in amenities, it makes up for in dark skies.

Those interested should meet at the corner of Mines Road and Tesla Road at 6:45 pm. The caravan will depart at 7:00. There is a \$3 per car fee at H2O, which is part of our rental agreement for the hilltop.

Lava Beds National Monument: Assistance Wanted

On July 2nd, Lava Beds National Monument (LBNM) is having its First Annual Astronomy Day and Night Sky Event. LBNM is working on becoming a dark sky park and to this end we have installed many high efficiency, low glare lights. The afternoon/evening will feature a few astronomy/night sky activities/talks, an evening program and finally a chance to look through our two (basic) telescopes. In order to make this event a greater success we are hoping to interest night sky aficionados into attending this event to participate in our activities and see our Mag 6.5 dark skies in all their glory. If you would be willing to volunteer to provide the public with varied telescopes and/or your invaluable expertise, please call Ranger Carolyn Hunt at 530-667-8114 or e-mail her at Carolyn_Hunt at nps.gov

Karen and I (Ken S.) visited Lava Beds National Monument last year, and we had great fun hiking the lava tubes that crisscross the park. Aside from the stalactites and the stalagmites, and the sense of exploration, the caves are cool (temperature-wise) and give respite from the summer outdoor temperatures.

TVS Yosemite Dates

TVS' annual public star party weekend at Glacier Point will take place on September 2-4, the Labor Day weekend. TVS puts on a star party both nights in exchange for free camping at the Bridalveil Campgrounds. The Moon is close to First-Quarter, setting between ~10:20pm and midnight during this weekend. The public star party ends at about midnight, and then the rest of night is yours to observe/image under the excellent dark skies of Yosemite National Park.

Those interested in participating should contact Bob McKoon (rmckoon at yahoo.com).

Header Image: The network of interstellar filaments in Polaris as imaged by ESA's Herschel space observatory at infrared wavelengths 250, 350, and 500 microns. These filaments are not yet forming stars.

Credits: ESA/Herschel/SPIRE/Ph. André (CEA Saclay) for the Gould Belt survey Key Programme Consortium and A. Abergel (IAS Orsay) for the Evolution of Interstellar Dust Key Programme Consortium.

Calendar of Events

May 18, Noon - 1:00 pm

What: Construction on the 10,000 Year Clock Begins
Who: Alexander Rose, Executive Director and Clock Project Manager, Long Now Foundation
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountainview
Cost: Free

20 years ago computer scientist Danny Hillis thought up a monument scale slow moving mechanical clock to serve as an icon to long-term thinking. 10 years ago a first prototype was completed and put into the Science Museum of London. 5 years ago the full size clock project began design. A few months ago that project began construction. Project manager Alexander Rose will discuss the process and methods underway in the Clock of the Long Now.

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

May 18, 7:00pm

What: Multiple Universes and Cosmic Inflation: The Quest to Understand Our Universe (and Find Others)
Who: Prof. Anthony Aguirre, UC Santa Cruz
Where: Foothill College, Smithwick Theater, El Monte Road and Freeway 280, in Los Altos Hills, CA
Cost: Free, \$2 parking (bring change for meters)

About a decade ago, scientists completed a great transformation in the understanding of our cosmos, establishing a broad and deep understanding of how the observable universe has evolved from a hot, dense state 13.7 billion years ago. Yet a second, even bigger transformation may now be taking place, because this understanding points to an early

epoch during which the universe expanded at a stupendous rate to create the vast amount of space we can observe. Cosmologists are now coming to believe that this "cosmic inflation" may do much more: in many versions, inflation goes on forever, generating not just our observable universe but also infinitely many such regions with similar or different properties, together forming a staggeringly complex and vast "multiverse". Dr. Aguirre will trace the genesis of this idea, explore some of its implications, and discuss how cosmologists are currently seeking ways to test this idea by actually searching for hints of other "universes".

See: <http://www.foothill.edu/news/newsfmt.php?words=astronomy> for more information, or call (650) 949-7888.

May 25, Noon - 1:00 pm

What: Why Can't Mimas Be More Like Enceladus?
Who: Bill McKinnon, Department of Earth and Planetary Sciences, Washington University at St. Louis
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountainview
Cost: Free

Pity poor Mimas! The "that's no moon" moon of Saturn ought to be as famous as its sibling Enceladus. All other things being equal, Mimas should be more strongly tidally heated, but this is clearly not the case. This talk will review the latest Cassini findings for both moons, including the astonishing heat flow coming from Enceladus' south pole. It turns out that Mimas' lack of geologic activity is no surprise — the real question is how does Enceladus support its heat flow, active tectonics, and erupting plumes? Episodicity may be key, but even more radical notions have been proposed. These ideas, and

continued page 4

Officers

President:
 Chuck Grant
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 925-422-7278
Vice-President:
 unfilled
Treasurer:
 David Feindel
feindel1@comcast.net
Secretary:
 unfilled

Volunteer Positions

Librarian:
 Jim Alves
ajaengr@yahoo.com
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Newsletter Editor:
 Ken Sperber
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 925-361-7435
Program Director:
 Jim Alves
ajaengr@yahoo.com
Loaner Scope Manager:
 John Swenson
johnswenson1@comcast.net
Webmaster:
 Hilary Jones
hdjones@pacbell.net
Observatory Director/Key Master:
 Chuck Grant

Public Star Party Chair:

Wayne Miller
starpartytvs@gmail.com
Historian:
 unfilled
Mentor:
 Mike Rushford
rushford@eyes-on-the-skies.org
Refreshment Coordinator:
 Laurie Grefsheim

Web & E-mail

www.trivalleystargazers.org
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). You may access it by visiting 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) 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)

perhaps new ones from the 23-24 May Enceladus Workshop at the SETI Institute, will also be discussed.

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

June 1, 7:30 pm

What: First Contact: Scientific Breakthroughs in the Hunt for Life Beyond Earth (BOOK LAUNCH and panel)
Who: Marc Kaufman, Washington Post
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountainview
Cost: Free

For untold centuries, people have looked to the distant skies in search of life -- be it God-like or heavenly, demonic or the whole gamut of bizarre extraterrestrials imagined. Today, for the first time in human history, science is getting close to answering the eternal question of what lies beyond, and the science is generally pointing in one direction: That life is most likely a commonplace in the universe. Discoveries about the census and makeup of exoplanets, about the vast array of long-hidden extremophiles alive here in brutal environments that seem more extraterrestrial than Earthly, the presence of potentially biologically-produced methane on a Mars now known to have once been wet and warm, and the presence of complex carbon and other elements and compounds needed for life as we know it across the universe -- these discoveries and more have the field of astrobiology abuzz. No one factor makes the case that life exists, or once existed beyond Earth, but together they are making an ever-stronger case for extraterrestrial life. And if life exists elsewhere, what's to say it hasn't evolved into complex and intelligent beings?

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

June 4, 8:30pm

What: The Milky Way as a Dark Matter Laboratory
Who: Dr. Michael Kuhlen, Theoretical Astrophysics Center
Where: Mt. Tamalpais State Park, Cushing Memorial Amphitheater, more commonly known as the Mountain Theater, Rock Spring parking area
Cost: Free

Over the next decade, a combination of astronomical observations and particle physics experiments hold great promise to finally shed light on the nature of dark matter, the dominant contributor to the matter content of the universe.

June 6, 7:30pm

What: Galaxy Zoo: Citizen Science
Who: M. Jordan Raddick, Johns Hopkins 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

Anyone can help discover new stuff in Galaxy Zoo- but why do people bother in the first place? Dr. Raddick responds with some unexpected insight into why people donate their time for open science and what they have discovered through the process. More than 250,000 people have taken part in Galaxy Zoo so far, producing a wealth of valuable data and sending telescopes on Earth and in space chasing after their discoveries. The images used in Galaxy Zoo, from NASA's Hubble Space Telescope, are more detailed and beautiful than ever, and allow us to look deeper into the Universe than ever before.

See <http://www.calacademy.org/events/lectures/> for the lecture topic.

June 8, Noon - 1pm

What: Analyzing the atmosphere of Super Earth GJ1214b
Who: Eliza Kempton, Dept. of Astronomy and Astrophysics, UC Santa Cruz
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountainview
Cost: Free

No details of this talk are available.

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

June 15, Noon - 1pm

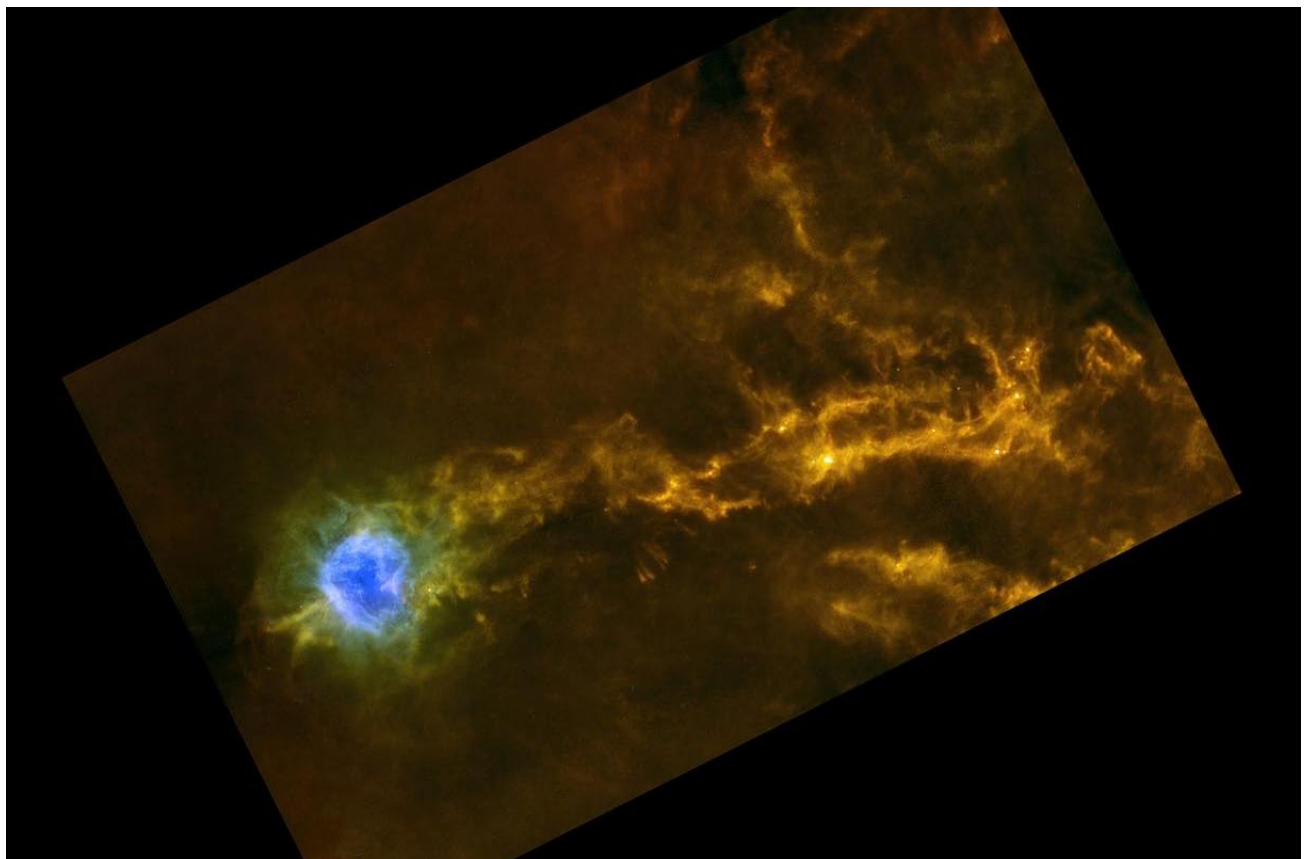
What: Fly Cheap, Fly Often, Fly Safe — Science research & education opportunities on commercial sub-orbital vehicles
Who: Kim Ennico, Ames
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountainview
Cost: Free

No details of this talk are available.

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



Caption: Ken Sperber took this image of IC5146, the Cocoon Nebbula, on September 3, 2005 using a Takahasi FS-102 at f/6. with L(6x10 min, RGB(4x5 min, 2x2x bin)..



Caption: Dense filaments of gas in the IC5146 interstellar cloud. This image was taken by ESA's Herschel space observatory at infrared wavelengths 70, 250, and 500 microns. Stars are forming along these filaments. Credits: ESA/Herschel/ SPIRE/PACS/D. Arzoumanian (CEA Saclay) for the "Gould Belt survey" Key Programme Consortium.

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

All times Pacific Daylight Time, unless otherwise noted.

May

- 15-25 Sun- Mercury, Venus, Jupiter, and Mars are tightly grouped in the early morning sky (pre-dawn)
17 Tue Full Moon (4:09am)
24 Tue Last-Quarter Moon (11:52am)
26-30 Thur- Mercury, Venus, Jupiter, and Mars rapidly move apart in early morning sky (pre-dawn)

June

- 1 Wed New Moon, partial solar eclipse of the Sun visible over the Arctic (2:03pm)
6-12 Mon- Saturn and Gamma Virginis pass within 16 arc minutes of each other
8 Wed First-Quarter Moon (7:11pm)
9-11 Thur- The waxing gibbous Moon passes below Saturn and Spica, and Saturn and the star Porrima (Virgo) pass within 1/4 degree of each other (1 hour after sunset)
15 Wed Full Moon (1:14pm)
19-22 Sun- Mars and The Pleiades are within 5 degrees of each other, a fine binocular view (pre-dawn)



Caption: Konrad Thuermer took this image of the Virgo Nonet, the nine galaxies around M86, near the center of our local galaxy super cluster, around 50-60 Million light years away. The image is the average of six 2-minute exposures taken with a DSLR (Canon EOS 5D) attached to a Celestron CPC800 with focal reducer (1280mm f/6.3, no guiding). He took these images during the rather windy night April 29/30 from a dark location west of Coalinga.



Milky Way Safari

By Dauna Coulter and Dr. Tony Phillips

Safari, anyone? Citizen scientists are invited to join a hunt through the galaxy. As a volunteer for Zooniverse's Milky Way Project, you'll track down exotic creatures like mysterious gas bubbles, twisted green knots of dust and gas, and the notorious "red fuzzies."

"The project began about four months ago," says astrophysicist Robert Simpson of Oxford University. "Already, more than 18,000 people are scouting the Milky Way for these quarry."

The volunteers have been scrutinizing infrared images of the Milky Way's inner regions gathered by NASA's Spitzer Space Telescope. Spitzer's high resolution in infrared helps it pierce the cloaking haze of interstellar gas and dust, revealing strange and beautiful structures invisible to conventional telescopes. The Milky Way Project is helping astronomers catalogue these intriguing features, map our galaxy, and plan future research.

"Participants use drawing tools to flag the objects," explains Simpson. "So far they've made over a million drawings and classified over 300,000 images."

Scientists are especially interested in bubble-like objects believed to represent areas of active star formation. "Every bubble signifies hundreds to thousands of young, hot stars. Our volunteers have circled almost 300,000 bubble candidates, and counting," he says.

Humans are better at this than computers. Computer searches turn up only the objects precisely defined in a program, missing the ones that don't fit a specified mold. A computer would, for example, overlook partial bubbles and those that are skewed into unusual shapes.

"People are more flexible. They tend to pick out patterns computers don't pick up and find things that just look interesting. They're less precise, but very complementary to computer searches, making it less likely we'll miss structures that deserve a closer look. And just the sheer numbers of eyes on the prize mean more comprehensive coverage."

Along the way the project scientists distill the volunteers' data to eliminate repetitive finds (such as different people spotting the same bubbles) and other distortions.

The project's main site (www.milkywayproject.org/) includes links to a blog and a site called Milky Way Talk. Here "hunters" can post comments, chat about images they've found, tag the ones they consider especially intriguing, vote for their favorite images (see the winners at <http://talk.milkywayproject.org/collections/CMWS00002u>), and more.

Zooniverse invites public participation in science missions both to garner interest in science and to help scientists achieve their goals. More than 400,000 volunteers are

involved in their projects at the moment. If you want to help with the Milky Way Project, visit the site, take the tutorial, and ... happy hunting!

You can get a preview some of the bubbles at Spitzer's own web site, www.spitzer.caltech.edu/. Kids will enjoy looking for bubbles in space pictures while playing the Spitzer concentration game at spaceplace.nasa.gov/en/kids/spitzer/concentration/.

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: Volunteers study infrared images of our galaxy from the Spitzer Space Telescope, identifying interesting features using the special tools of the Milky Way Project, part of the Citizen Science Alliance Zooniverse web site.

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



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.