

# PRIMEFOCUS

Tri-Valley Stargazers



February 2015



## Meeting Info

### What:

Rosetta: Wild Bounce at Comet Churyumov-Gerasimenko (pre-recorded; given at the SETI Institute in December 2014)

### Who:

Dr. Claudia Alexander, JPL

### When:

February 20, 2015  
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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## February Meeting

### Rosetta: Wild Bounce at Comet Churyumov-Gerasimenko Dr. Claudia Alexander (pre-recorded video)

This month we will be showing a pre-recorded presentation from the archive of the SETI Institute. The presentation is timely as the Rosetta mission continues to unfold. The additional goal is to expose the membership to excellent repository of SETI Institute presentations that are available for free viewing. Below is the abstract of Dr. Alexander's presentation:

Rosetta is the third cornerstone mission of the European Space Agency's (ESA) Horizon 2000 Programme. Its goals are to examine some of the original material of the solar system with a comprehensive evaluation of the mineralogic, isotopic, and organic constituents of a comet; understand how the body works as a machine to absorb and re-radiate energy from the sun; and understand more about the origins of the solar system.

In this talk, I'll explain the science background of some of the mysteries of comets including pros and cons about why we think comets might have brought Earth's water, concepts regarding missing nitrogen in the outer solar system, and material the comet is made of (CAIs & IDPs). The talk will include early images of the comet's activity. I'll set the stage for the landing and walk through the 60 hours of time spent on the comet's surface. Finally I'll present an overview of initial findings.

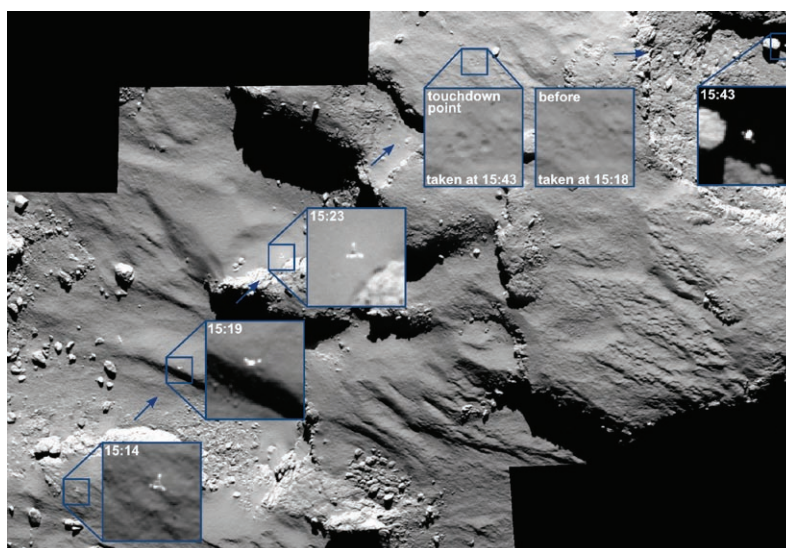


Image Caption: Inset are images of the Philae lander as it bounced its way to its final resting spot on Comet Churyumov-Gerasimenko on November 12, 2014. Credit: ESA/Rosetta/MPS for OSIRIS Team MPS/UPD/LAM/IAA/SSO/INTA/UPM/DASP/IDA

## News & Notes

### 2015 TVS Meeting Dates

The following lists the TVS meeting dates for 2015. 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
Feb. 20	Feb. 23	
Mar. 20	Mar. 23	Feb. 27
Apr. 17	Apr. 20	Mar. 27
May 15	May 18	Apr. 24
Jun. 19	Jun. 22	May 29
Jul. 17	Jul. 20	Jun. 26
Aug. 21	Aug. 24	Jul. 31
Sep. 18	Sep. 21	Aug. 28
Oct. 16	Oct. 19	Sep. 25
Nov. 20	Nov. 23	Oct. 30
Dec. 18	Dec. 21	Nov. 27

### Money Matters

Treasurer Roland Albers reports that as of February 6, 2015 the TVS checking account balance is: \$13,178.96. The club is paid up for the year for our rent for the meeting hall and for both observing sites (H2O and Del Valle).

### 4 Upcoming Star Parties: Volunteers Needed

Club Star Party Coordinator Eric Dueltgen requires your assistance in participating in four upcoming star parties. The star parties are:

Sunday, March 1 at Valley Montessori in Livermore.

Wednesday, March 4 at Arroyo Seco school in Livermore. This is in conjunction with their family reading night.

Friday, March 6 at Pleasanton Senior Center for the Pleasanton RADD (Recreational Activities for the Developmentally Disabled).

Saturday, March 21 at St. Isadore's Catholic School in San Ramon.

For the March 6 star party, three telescopes should be adequate. However, for the March 26 event, a large number of scopes will be needed for the big group of students.

If you can be of assistance in sharing the excitement of astronomy with interested minds, please contact Eric to volunteer your assistance (coordinator"at"trivalleystargazer.s.org).

### TVS Yahoo Users Group

The TVS Yahoo User Group is the primary means by which club members communicate with each other. It is also a wonderful forum for exchanging news, photos, observing reports, and so on. Every member is encouraged to join and

be part of the conversations. If you're not a group member already, you can join by going to:

[groups.yahoo.com/neo/groups/trivalleystargazers/info](http://groups.yahoo.com/neo/groups/trivalleystargazers/info)

and clicking on the "Join Group" button. Alternatively, you can send Roland an email request (treasurer"at"trivalleystargazers.org) and he'll send you an invite. To get emails containing recent posts, be sure to edit your membership profile and set Message Delivery to either "Individual Email" or "Daily Digest".

### 2015 TVS Dues are Overdue

Roland encourages TVS members to renew their membership as soon as possible. The renewal process is easier than ever via the club website:

<http://www.trivalleystargazers.org/membership.shtml>

This will save Roland from having to send out nagging email reminders to those whose dues are outstanding.

## Calendar of Events

### February 17, 12:00pm

What: The Anthropocene Epoch in Cosmic Evolution  
Who: David Grinspoon, SSI  
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountain View, CA  
Cost: Free

Informed by comparative planetology and a survey of the major episodes in Earth history, Dr. Grinspoon will offer a taxonomy of planetary catastrophes meant to illuminate the unusual nature of the "Anthropocene", the current epoch of human-driven planetary-scale changes, and reframe our current environmental and technological predicaments as part of a larger narrative of planetary evolution. This saga has now reached the pivotal moment when humans have become a dominant force of planetary change, and geological and human history are becoming irreversibly conjoined. Is this a likely or even inevitable challenge facing other complex life in the universe? Possible implications for exoplanet characterization and SETI will be considered, as well as the choices our civilization faces in seeking to foster a wisely managed Earth.

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

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Header Image: Comet 67P/Churyumov-Gerasimenko outgassing has increased at it is approaching the Sun. This image was taken on February 9 from a range of 105km. Credit: ESA/Rosetta/NAVCAM.



Image Caption: Dave Childree took this image of the Virgo Cluster on January 24, 2015 from H2O using an SBIG STL-11000 with his 18-inch f/4.5 Newtonian telescope. The seeing was excellent and the transparency was above-average. Exposures were 10x3 minutes each using Custom Scientific LRGB filters. From left to right, top to bottom are M84, NGC4388, NGC4387, M86, NGC4402, NGC4413, NGC4438, & NGC4435, plus several fainter galaxies. The data were processed with Maxim DL, PhotoShop, and Photo Ninja.

## February 22, 7:00pm

**What:** First Glance  
**Who:** East Bay Astronomical Society  
**Where:** Chabot Space and Science Center, 10000 Skyline Blvd., Oakland, CA 94619  
**Cost:** Free Members-only, Reservation required: call (510) 336-7392

Each Sunday preceding the 1st quarter moon, the Eastbay Astronomical Society invites you to a special private telescope viewing. Unlike our regular viewing on Friday and Saturday evenings, EAS personalizes the experience by taking viewing

requests, live interaction, and hosting tours and it's exclusively for our members!

See <http://www.chabot.space.org/events.htm> for more information, or call (510) 336-7373.

## February 24, 7:00pm

**What:** Mars and Life - A Special Evening Panel Discussion  
**Who:** Marc Kaufman, Nathalie Cabrol and Ross Beyer  
**Where:** SETI Headquarters, 189 N. Bernardo Ave., Mountain View, CA  
**Cost:** Free

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### **Officers**

**President:**  
 Chuck Grant  
 president@trivalleystargazers.org  
 925-422-7278

**Vice-President:**  
 Rich Combs  
 vice\_president@trivalleystargazers.org

**Treasurer:**  
 Roland Albers  
 treasurer@trivalleystargazers.org

**Secretary:**  
 Jill Evanko  
 secretary@trivalleystargazers.org

### **Volunteer Positions**

**AANC Representative:**  
 unfilled

**Astronomical League Representative:**  
 Dennis Beckley  
 alrep@trivalleystargazers.org

**Historian:**  
 Hilary Jones  
 historian@trivalleystargazers.org

**Loaner Scope Manager:**  
 John Swenson  
 telescopes@trivalleystargazers.org

**Newsletter Editor:**  
 Ken Sperber  
 newsletter@trivalleystargazers.org  
 925-361-7435

### **Observatory Director/**

**Key Master:**  
 Chuck Grant  
 h2o@trivalleystargazers.org

**Program Director:**  
 Rich Combs  
 programs@trivalleystargazers.org

**Publicity Coordinator:**  
 Andy Coutant  
 publicity@trivalleystargazers.org

**Refreshment Coordinator:**  
 Laurie Grefsheim

**Star Party Coordinator:**  
 Eric Dueltgen  
 coordinator@trivalleystargazers.org

**Webmaster:**  
 Hilary Jones  
 webmaster@trivalleystargazers.org

### **Web & E-mail**

www.trivalleystargazers.org  
 info@trivalleystargazers.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 (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 (continued)

While the Curiosity mission to Mars is not designed to test for life past or present, it is very much involved in determining whether Mars could have once supported life. And the answer coming back from Gale Crater is an unequivocal "yes." The Curiosity team determined that at Yellowknife Bay, but is continuing and broadening its search for habitable environments at Mount Sharp. The question now front and center is whether that habitability was local to Gale or may well have been widespread. Adding to the sense of exciting progress is the likely identification of Martian organic material at Gale -- what would be a first if fully confirmed. And as a backdrop to the search for life and life-supporting habitats on Mars is the understanding that if signs of ancient and distinctly Martian life are found, then the case for a universe filled with life increases dramatically.

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

### March 4, 7:00pm

**What:** Sentinel Mission: Finding the Asteroid Headed for Earth  
**Who:** Former Astronaut Ed Lu, Ph.D.  
**Where:** Smithwick Theatre, 12345 El Monte Road, Los Altos Hills, CA 94022  
**Cost:** Free, \$3 parking (\$1 dollar bills or coin required)

Asteroids are the only natural disaster for which we have a technological solution. We are all living with the threat of a three-minute experience that could transform our lives and our planet forever. The Feb. 15, 2013 asteroid impact on Chelyabinsk, Russia sent more than 1,700 people to seek medical attention, damaged more than over 7,200 buildings and cost the city more than \$33 million dollars in property damage.

Scientists have found 10,000 Near-Earth Objects, yet there are an estimated one million in our inner solar system, and the vast majority of the threatening ones are still undiscovered. In this non-technical talk, Dr. Lu will describe the threat, and discuss the Sentinel Mission, an orbiting telescope to detect and track asteroids that cross Earth's orbit.

Dr. Lu is the CEO and co-founder of the Sentinel Mission and was co-founder of the non-profit B612 Foundation that is raising funds for it. A physicist with a doctorate from Stanford, Lu was selected for the NASA astronaut corps in 1994. He flew two Space Shuttle missions, and spent 206 days in space aboard the International Space Station in 2003. He is the recipient of NASA's highest honor, the Distinguished Service Medal, and worked for a time on Google's Advanced Project Team.

For more information see: [http://www.foothill.edu/news/newsfmt.php?sr=2&rec\\_id=3359](http://www.foothill.edu/news/newsfmt.php?sr=2&rec_id=3359) or phone 650-949-7888.

### March 7, 7:30-10:30pm

**What:** Lost in Space: Adult Missions in the Challenger Learning Center  
**Who:** You  
**Where:** Chabot Space and Science Center, 10000 Skyline Blvd., Oakland, CA 94619  
**Cost:** \$30, does not include general admission; Must be 21+ year old; Space limited: Reservations: (510) 336-7373

Just like our public missions for families, but this one is strictly for adult flyers. Bring your friends and join an intrepid team to land on the red planet, construct a probe to send to one of the moons of Mars, and save your crew from calamity. Grab your flight suit, strap on a helmet, and experience the thrill and excitement of a NASA simulated space mission to Mars! Wine, beer, and light snacks will be provided.

See <http://www.chabotspace.org/events.htm> for more information, or call (510) 336-7373.

### March 10, 12:00pm

**What:** Do WIMPs Rule? The LUX and LZ Experiments and the Search for Cosmic Dark Matter  
**Who:** Daniel Akerib, SLAC  
**Where:** SETI Headquarters, 189 N. Bernardo Ave., Mountain View, CA  
**Cost:** Free

Dark Matter remains a profound mystery at the intersection of particle physics, astrophysics, and cosmology. One of the leading candidates, the Weakly Interacting Massive Particle, or WIMP, may be detectable using terrestrial particle detectors. Recent technological advances are enabling very rapid increases in sensitivity in the search for these particles. I will talk about the LUX experiment, a liquid xenon time projection chamber, which currently holds the best upper limit over much of the WIMP mass range. I will also discuss plans for a larger follow up experiment, LZ, which will just begin to measure a background neutrino signal that will set a fundamental limit to our ability to search for WIMP dark matter.

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

### March 17, 12:00pm

**What:** Going to the Ends of the Earth to Glimpse the Beginnings of Time  
**Who:** Brian Keating, UC San Diego  
**Where:** SETI Headquarters, 189 N. Bernardo Ave., Mountain View, CA  
**Cost:** Free

Abstract pending.

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



Image Caption: Roland Albers took this image of Comet Lovejoy from his backyard in Pleasanton. It is the result of combining 35 three-minute exposures of the comet taken on Saturday 1/24/15, with 14 three-minute exposures of the star field taken on Sunday 1/25/15 (after the comet had moved out of the field of view). He used a 4-inch f/7 refracting telescope with a Canon T3i DSLR. He used Deep Sky Stacker to stack the images and Photoshop to precisely combine and position the comet and star field and then to adjust contrast, black point, color cast, etc.

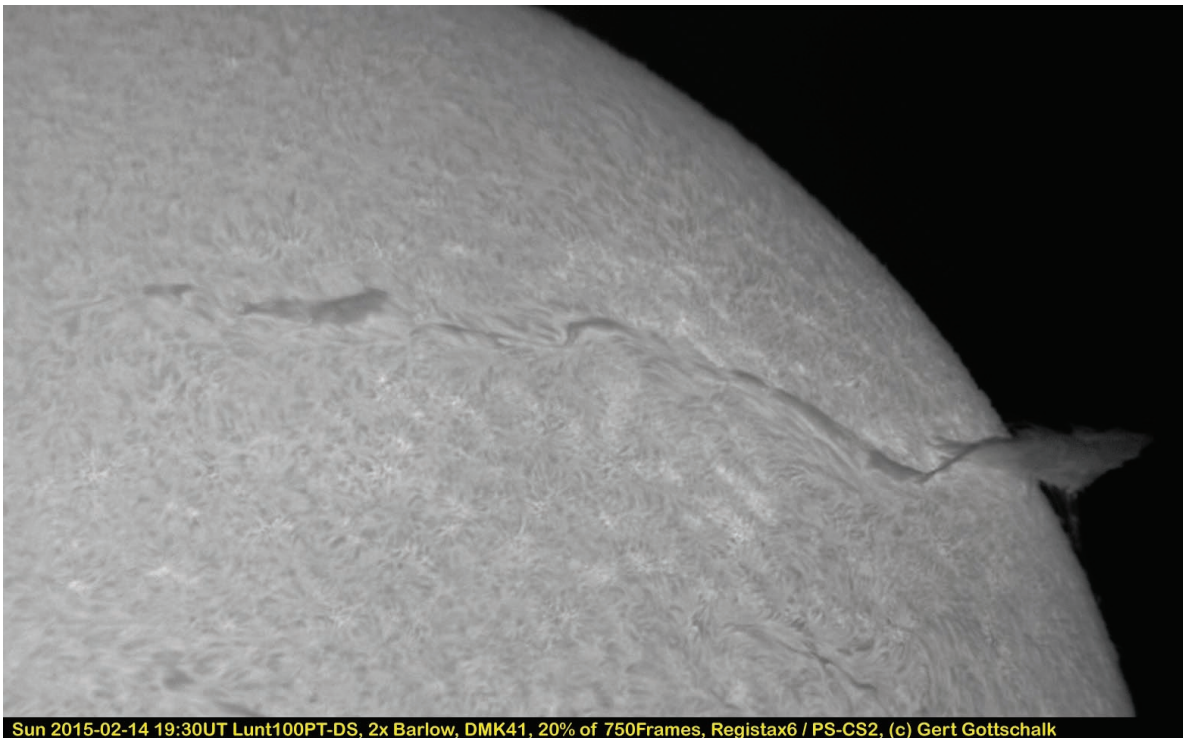


Image Caption: Gert Gottschalk took this solar image on February 14, 2015. It highlights the persistent filament that is now nicely straddling the edge of the disk and extending as a prominence outside of the limb. This gives a nice visualization of the filament being a structure hovering over the solar surface. Gert used a Lunt 100mm pressure tuned H-A telescope with a double stack filter unit, a 2x Barlow and a DMK41 USB B/W camera at 15 frames per sec for 750 frames. The data were processed in Registax6 using the best 20% of the frames, with final assembly in Photoshop CS2. Gert followed the filament over a 90 -minute period and plans to process those into a video animation. Keep an eye on his website for the latest updates: [http://www.trivalleystargazers.org/gert/sun\\_2015/solar\\_campaign\\_2015.html](http://www.trivalleystargazers.org/gert/sun_2015/solar_campaign_2015.html)

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

All times are Pacific Standard Time until 2am Sunday, March 8 when Pacific Daylight Time begins.

### February

- 16 Mon Algol is at minimum for roughly two hours centered on 9:12pm
- 18 Wed **New Moon (3:47pm)**
- 20 Fri Algol is at minimum for roughly two hours centered on 6:08pm
- 21 Sat Thin crescent Moon, Venus, and Mars visible in the west (evening)
- 25 Wed **First-Quarter Moon (9:14am)**
- 25 Wed Aldebaran shines close to the Moon

### March

- 2 Mon Waxing gibbous Moon near Jupiter
- 5 Thu **Full Moon (10:05am)**
- 8 Sun Daylight Savings Time begins at 2am
- 8-23 Sun- Zodiacal light visible in the west (80 minutes after sunset)
- 9 Mon Algol is at minimum for roughly two hours centered on 12:13am
- 11 Wed Algol is at minimum for roughly two hours centered on 9:02pm
- 12 Thu The Moon is ~3 degrees from Saturn and 9 degrees above Antares (before dawn)
- 13 Fri **Last-Quarter Moon (10:48am)**
- 20 Fri **New Moon (2:36am)**
- 20 Fri Spring begins in the Northern Hemisphere (3:45pm)



Last month's TVS meeting may have been attended by more people than any previous TVS meeting. Seventy-nine people, including a large contingent of Mendenhall Middle School students and their teacher, Katie Smiley, turned out to see Dr. Seth Shostak of the SETI Institute talk about "The Search for ET." The student outreach is through the club's Project Astro effort. Prior to Dr. Shostak's presentation, Ro-

land Albers spoke about comets and his imaging of Comet Lovejoy (see his most recent on page on p.5). Rich Combs spoke about the constellation Aries, though which Comet Lovejoy was passing at the time.

Image Caption: Dr. Seth Shostak giving the featured presentation at the January 2015 TVS meeting. Credit: K. Sperber



## Minor Mergers Have Massive Consequences for Black Holes

By Dr. Ethan Siegel

When you think of our sun, the nearest star to our world, you think of an isolated entity, with more than four light years separating it from its next nearest neighbor. But it wasn't always so: billions of years ago, when our sun was first created, it very likely formed in concert with thousands of other stars, when a giant molecular cloud containing perhaps a million times the mass of our solar system collapsed. While the vast majority of stars that the universe forms—some ninety-five percent—are the mass of our sun or smaller, a rare but significant fraction are ultra-massive, containing tens or even hundreds of times the mass our star contains. When these stars run out of fuel in their cores, they explode in a fantastic Type II supernova, where the star's core collapses. In the most massive cases, this forms a black hole.

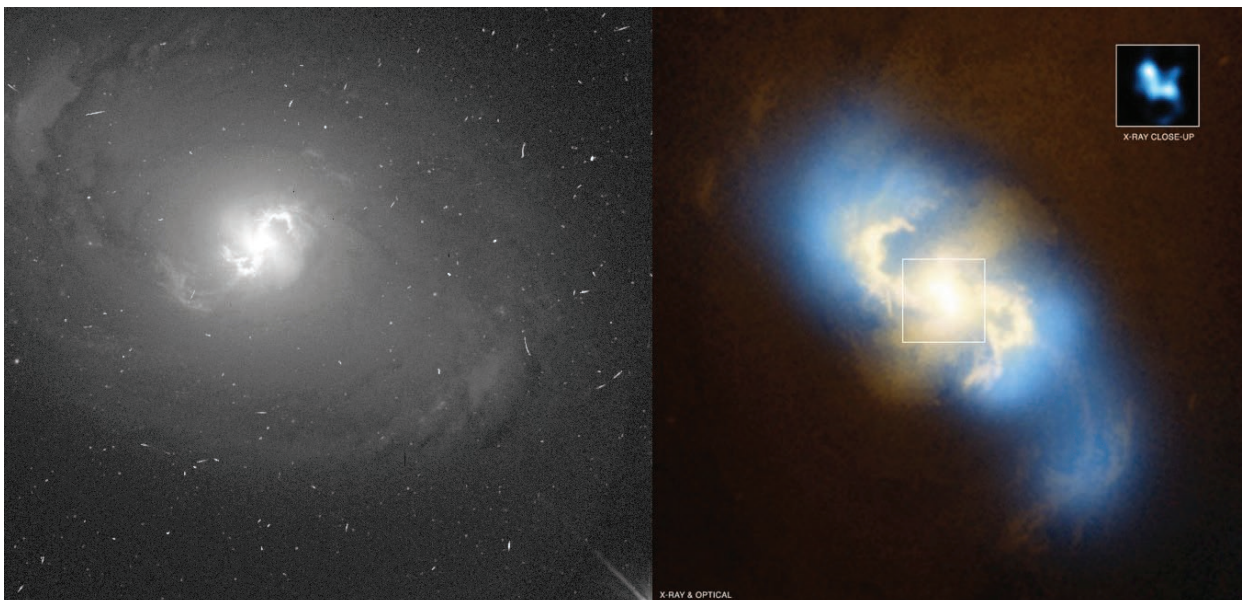
Over time, many generations of stars—and hence, many black holes—form, with the majority eventually migrating towards the centers of their host galaxies and merging together. Our own galaxy, the Milky Way, houses a supermassive black hole that weighs in at about four million solar masses, while our big sister, Andromeda, has one nearly twenty times as massive. But even relatively isolated galaxies didn't simply form from the monolithic collapse of an isolated clump of matter, but by hierarchical mergers of smaller galaxies over tremen-

dous timescales. If galaxies with large amounts of stars all have black holes at their centers, then we should be able to see some fraction of Milky Way-sized galaxies with not just one, but multiple supermassive black holes at their center!

It was only in the early 2000s that NASA's Chandra X-ray Observatory was able to find the first binary supermassive black hole in a galaxy, and that was in an ultra-luminous galaxy with a double core. Many other examples were discovered since, but for a decade they were all in ultra-massive, active galaxies. That all changed in 2011, with the discovery of two active, massive black holes at the center of the regular spiral galaxy NGC 3393, a galaxy that must have undergone only minor mergers no less than a billion years ago, where the black hole pair is separated by only 490 light years! It's only in the cores of active, X-ray emitting galaxies that we can detect binary black holes like this. Examples like NGC 3393 and IC 4970 are not only confirming our picture of galaxy growth and formation, but are teaching us that supermassive relics from ancient, minor mergers might persist as stand-alone entities for longer than we ever thought!

Check out some cool images and artist reconstructions of black holes from Chandra: <http://chandra.harvard.edu/photo/category/blackholes.html>

Kids can learn all about Black Holes from this cool animation at NASA's Space Place: <http://spaceplace.nasa.gov/black-holes>



Images credit: NGC 3393 in the optical (L) by M. Malkan (UCLA), HST, NASA (L); NGC 3393 in the X-ray and optical (R), composite by NASA / CXC / SAO / G. Fabbiano et al. (X-ray) and NASA/STScI (optical).



Tri-Valley Stargazers  
P. O. Box 2476  
Livermore, CA 94551  
[www.trivalleystargazers.org](http://www.trivalleystargazers.org)

## Tri-Valley Stargazers Membership Application

(or apply for membership online: [www.trivalleystargazers.org/membership.shtml](http://www.trivalleystargazers.org/membership.shtml))

### 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 (\$5). Must be a full-time high-school or college student.

\_\_\_\_\_ Regular member (\$30).

\_\_\_\_\_ Patron member (\$70). Patron membership grants use of the club's 17.5" reflector at H2O. You must be a member in good standing for at least one year, hold a key to H2O, and receive board approval.

**Hidden Hill Observatory Access** (optional):

\_\_\_\_\_ 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.

**Magazine Subscriptions** (optional): Discounted subscriptions are available only to new subscribers. All subsequent renewals are handled directly with the magazine publishers.

\_\_\_\_\_ One-year subscription to Sky & Telescope magazine (\$32.95).

\_\_\_\_\_ One-year subscription to Astronomy magazine (\$34).

**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 other than other club members and the Astronomical League without your express permission.

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