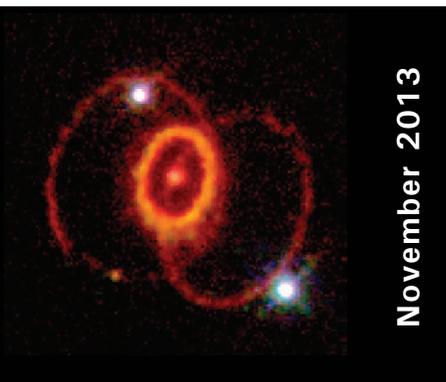


PRIMEFOCUS

Tri-Valley Stargazers



November 2013



Meeting Info

What:

Developing an Educational Star Party

Who:

Norm Sperling

When:

November 15, 2013
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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November Meeting

Developing an Educational Star Party

Norm Sperling

Public and casual star parties are great for hobbyists and the public. But astronomy students have several specific things they're supposed to experience, so educational star parties can be designed to feature those. My students need to see the greatest variety of objects. They need to appreciate that a lot of those are just dim dots, not the showpieces star parties usually concentrate on. They should see the various spectral types ... which happen to all huddle around the Great Winter Oval. They need to appreciate what various telescope parameters result in -- not only aperture, but also focal ratio and focal length. And they need to remember what objects they saw and what instruments they used. See the blog posts linked from <http://www.everythingintheuniverse.com/blog/Telescope-Triplets>.

Norman Sperling has been a planetarium director, a designer and inventor of astronomical instruments, an editor of websites, magazines, and books, and author of hundreds of articles and blog posts. He teaches astronomy for the University of California at Berkeley. He edits the science humor magazine, *The Journal of Irreproducible Results*, www.jir.com, and blogs at www.EverythingInTheUniverse.com. He spends about 7 months a year cruising the US and Canada in his RV: www.GreatScienceTrek.com, www.TouchingTheAges.com.

TVS Elections to be held at this month's meeting

It's that time of the year again! Come to the meeting to cast your vote for the clubs elected officials. Feel free to nominate your fellow club members, or even self-nominate should you be interested in serving.

The unelected position of "Program Director" remains unfilled. This is one of the most important positions, directly impacting the viability of the club. Anyone interested in this or any other club position is encouraged to contact any of the club officers via e-mail or at the monthly meeting.



Caption: Observing at a star party at H2O. The Milky Way is visible despite the light pollution from San Jose. Credit: Karen Harris

News & Notes

2013/2014 TVS Meeting Dates

The following lists the TVS meeting dates for 2013. 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
Nov. 15	Nov. 18	
Dec. 20	Dec. 23	Nov. 29
Jan. 17	Jan. 20	Dec. 27
Feb. 21	Feb. 24	Jan. 31
Mar. 21	Mar. 24	Feb. 28
Apr. 18	Apr. 21	Mar. 28
May 16	May 19	Apr. 25
Jun. 20	Jun. 23	May 30
Jul. 18	Jul. 21	Jun. 27
Aug. 15	Aug. 18	Jul. 25
Sep. 19	Sep. 22	Aug. 29
Oct. 17	Oct. 20	Sep. 26
Nov. 21	Nov. 24	Oct. 31
Dec. 19	Dec. 22	Nov. 28

Money Matters

Treasurer David Feindel indicates that as of September 23, 2013 the TVS account balances are:

Checking \$12,354.97

Book Review By Ken Sperber

Miss Leavitt's Stars By George Johnson

At last month's TVS meeting, Gordon Myers gave a nice presentation about "The Fascinating Universe of Variable Stars." Coincidentally, I was in the process of reading "Miss Leavitt's Stars" by George Johnson (not during the meeting!). Less than 100 years ago the big debate in astronomy was whether the Milky Way encompassed the known universe or whether the Milky Way was but one galaxy among many in a vast expanse. We've all heard of Edwin Hubble, who discovered the expansion of the universe. But, he needed some help... To determine if remote nebulae were part of the Milky Way or external to it, a means of measuring distance was needed. The means to this end was achieved, serendipitously, by Henrietta Swan Leavitt, one of the "computers" on the staff of Edward Pickering at the Harvard College Observatory. The computers were tasked with determining and cataloging star brightnesses from photographic plates. Repeat photos were taken in the search for variable stars. Henrietta Swan Leavitt was tasked with ascertaining the brightnesses of stars in the Magellanic Clouds. With a keen eye and an insightful mind, she made the breakthrough that was needed to begin the

advance cosmology to its present state.

Not only does George Johnson bring Henrietta Swan Leavitt to life, he shines a light on many of the other players. He takes us into the mind-set of Edward Pickering, who employed, tasked, and encouraged Henrietta in her work. We are taken to the debate between Harlow Shapley and Heber Curtis on "The Scale of the Universe" that was initiated by George Ellery Hale. Famous astronomers dot the pages, as the ramifications of Henrietta's discovery are first realized, and the hard work and additional discoveries that they pursue to reconcile Hubble's initial estimates of the size, and therefore age, of the universe with radioactive dating that revealed the Earth to be at least 4 billion years old. Importantly, the book also contrasts the points of view taken by observational astronomer's vs. theoretical astronomer's of the day.

If you want to be taken on a whirlwind tour of the greatest discoveries of early 20th Century astronomy, whose roots extend back to the techniques of 19th Century, this book is for you!

I also strongly recommend reading the Wikipedia webpage article on Miss Leavitt: http://en.wikipedia.org/wiki/Henrietta_Swan_Leavitt as there are numerous interesting photographs, and a link to her 1908 publication on variable stars in the Magellanic Clouds, and a link to her 1912 paper, given by Pickering, that established the Cepheid period-luminosity relationship. That in itself is a worthy document of astronomical history that should be on every budding astronomer's desk.

Calendar of Events

November 16, 7:30pm-8:15pm

What: The Dusty Dozen
Who: Faride Khalaf
Where: Chabot Space and Science Center, Space Cafe, 10000 Skyline Blvd., Oakland, CA 94619
Cost: Free member admission. RSVP required. Space is limited and by reservation only, so call (510) 336-7392.

America and NASA the impossible. We met JFK's challenge to explore Earth's moon in an up-close and personal way. A dozen American astronauts would become humanity's first ambassadors to visit our companion world, Luna. In this presentation, we will be introduced to the "Dusty Dozen," lucky men who risked so much for the reward of skipping along the surface of, and working on, an extraterrestrial world. We will look at the six Apollo lunar missions and meet the gallant astronauts and Command Module Pilots that brought their insights of what may be the most awesome adventure and

Header Image: Supernova 1987A as imaged by the Hubble Space Telescope in 1994. Credit: NASA/ESA

Calendar of Events (continued)

accomplishment of humankind.

See <http://www.chabotspace.org/events.htm> for more information.

November 12, 7:00pm

What: A WISE search for large extraterrestrial civilizations: a complementary approach to traditional SETI

Who: Jason T. Wright, Penn. State University

Where: SETI Headquarters, 189 N. Bernardo Ave., Mountain View, CA

Cost: Free

If alien civilizations exist throughout the universe, many have had billions of years to develop technology, expand their population and energy supplies, and travel across their galaxies. Kardashev classified hypothetical advanced civilizations by the magnitude of their power supply, with Type II civilizations harnessing most of the energy output of their host star, and Type III civilizations using most of the power in their galaxy. As Dyson pointed out in 1960, the waste heat emitted by a such civilizations would easily overwhelm that of their host star or galaxy, distinguishing them from "normal" astrophysical sources. This approach to SETI makes few assumptions about the behavior of alien civilizations, primarily: conservation of energy, the laws of thermodynamics, and that given the age of the Universe aliens have had time to develop very large energy supplies.

The WISE all-sky mid-infrared survey has dramatically improved our ability to detect such civilizations and to distinguish them from "natural" astrophysical sources. I will discuss our team's efforts to identify candidate Type II civilizations in the Milky Way and Type III civilizations throughout the low-

redshift universe. Because the scope and assumptions of this approach are complementary to those of telecommunication SETI, a null result has the potential to rule out broad classes of proposed resolutions to the Fermi-Hart Paradox, particularly those that invoke organization of advanced alien species across the Milky Way.

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

November 19, Noon-1:00pm

What: Sight-seeing in the 21st century -- ices, sand, water, and dust in motion on Mars

Who: Tim Michaels, SETI Institute

Where: SETI Headquarters, 189 N. Bernardo Ave., Mountain View, CA

Cost: Free

Humankind's earnest reconnaissance of Mars, made possible by advances in our technology, has progressed significantly over the past 150 years. Early ideas of vibrant macroscopic life on Mars in the late 19th and early 20th centuries gave way to a perception of a barren desert world whose overall long-term stasis was broken only by dust storms and predictable seasonal ice variations. Spacecraft from Earth first visited Mars in the 1960s and 1970s, and appeared to confirm that view.

Then came the twin Viking landers in the late 1970s, providing humankind with its first glimpses of Mars from a human-type perspective (i.e., at or near the surface, over timescales of minutes, hours, and days). The landers witnessed changes at their locations that from orbit were either easily misinterpreted or not detectable. The late 1990s and the first decade of the 21st century brought orbiting and landed spacecraft with new capabilities, along with more detailed Earth-based computer models, further confirming that many types of ac-

Officers

President:

Chuck Grant
cg@fx4m.com
925-422-7278

Vice-President:

Treasurer:

David Feindel
feindel1@comcast.net

Secretary:

Jill Evanko

Volunteer Positions

Librarian:

Jim Alves
ajaengr@yahoo.com
209-833-9623

Newsletter Editor:

Ken Sperber
sperbs13@yahoo.com
925-361-7435

Program Director:

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

AANC Representative:

Todd Billeci
todd129@yahoo.com
650-593-2665

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)

tive processes are currently at work on Mars. Do we fully understand these processes? No. In some ways there are now more unanswered questions about Mars than there were three decades ago.

This talk will explore our current understanding (including some of my own atmospheric modeling work) of a selection of these phenomena, with emphasis on their human-relatable aspects.

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

December 3, Noon-1:00pm

What: Remote sensing survey of Valles Marineris: insights into magmatic and sedimentary processes on Mars

Who: Jessica Flahaut, Vrije Universiteit, Amsterdam

Where: SETI Headquarters, 189 N. Bernardo Ave., Mountain View, CA

Cost: Free

Valles Marineris is a unique vertical section through the uppermost kilometers of the martian crust; its location, east of Tharsis bulge, and its water-related history are responsible for a great diversity of rock types in this area. High resolution morphological (HiRISE) and mineralogical (CRISM) data from the MRO mission (NASA, 2006) available over the area were investigated. The walls of the canyons, the surrounding plateaus as well as the interior layered deposits were looked at in details as they were formed as the result of different processes. Their differences in aspect and composition were used to propose a chronology of events and a reconstitute the geological history of the area between 4.2 and 2 Gy.

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

December 7, 7:30pm-8:15pm

What: NASA, Alive and Well

Who: Faride Khalaf

Where: Chabot Space and Science Center, Space Cafe, 10000 Skyline Blvd., Oakland, CA 94619

Cost: Free member admission. RSVP required. Space is limited and by reservation only, so call (510) 336-7392.

The National Aeronautics and Space administration (NASA) was formed as a civilian organization of the US federal government in the late 1950s. NASA was tasked exploring space for peaceful purpose. Since the retirement of the Space Shuttle program, the direction of US space travel has been in question. In this presentation we will explore the future of NASA which seems infinite to some.

See <http://www.chabotspace.org/events.htm> for more information.

December 9, 7:30pm

What: The Power of Stars - How Celestial Observations Have Shaped Civilization

Who: Prof. Bryan Penprase, Ponom College

Where: California Academy of Science, 55 Music Concourse Dr., Golden Gate Park, San Francisco, CA

Cost: Academy members \$8, Seniors \$10, General \$12. Reserve a space online or call 1-877-227-1831.

Dr. Penprase will describe the variety of constellations, cosmologies and calendars from cultures around the world and through the centuries. Using a wide variety of works and visualizations drawing from both ancient and modern astronomy, Dr. Penprase presents a visual feast of astronomy, with constellation maps, aerial views of aligned celestial structures, and images of the universe as created by a wide range of cultures. We will learn about the legends and sky watching practices that developed as ancient people took note of the motions of the sun and moon across the sky and on the horizon. From there, Dr. Penprase will give us an overview of constellations from the perspective of a wide variety of cultures, including the ancient Chinese, Egyptian, Hawaiian, Native American Chumash and Navajo tribes, the Inuit culture, and also covers the Southern skies, such as the Aboriginal Australians and the Incan cultures. The wide variety of descriptions of the early universe, the structure of the physical universe from ancient Greek, Egyptian, Chinese, Babylonian, Mayan and other cultures are explained and illustrated with original art. This lecture will provide a unique wide angle lens to the many ways that society understands and describes the stars, and in the process explores how that process reveals universal qualities of humankind.

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

December 10, Noon-1:00pm

What: Scientific Premises and Technological Challenges of Deep Space Round Trip Exploration to Jupiter Trojans and Even Further

Who: Hajime Yano, JAXA

Where: SETI Headquarters, 189 N. Bernardo Ave., Mountain View, CA

Cost: Free

Thanks to recent technological advancement of astronomical observatories, fainter, more distant Jupiter Trojan asteroids have been detected and studied statistically or/and physically in detail than ever while planetary migration hypotheses have made them one of the most crucial witnesses to prove or disprove such competing concepts among the solar system formation theories.

In the past two decades or so, round trip capability has been one of the strategic targets for deep space exploration of Ja-

Calendar of Events (continued)

pan and the original Hayabusa pioneered that path. The Hayabusa-2 will follow it but they are limited within the inner planetary region.

Another strategic target of Japan's exploration technology has been to go to outer planetary region, i.e., the Jovian system and beyond, without using "nuclear" energy sources. Thus the solar power sail technology has been invested and tested from high altitude balloons, sounding rockets, an earth orbiting satellite and a deep space probe (i.e., IKAROS) by aiming to Jupiter Trojans as a final destination, since early 2000's.

This lecture outlines both scientific premises and technological challenges of reaching first and then attempting a round trip exploration to Jupiter Trojans in 2020's and an even more distant target in 2030's-40's. Also potential areas of international collaboration will be discussed through a personal view of the presenter.

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

December 17, Noon-1:00pm

What: Life's Struggle to Survive

Who: John Baez, UC Riverside

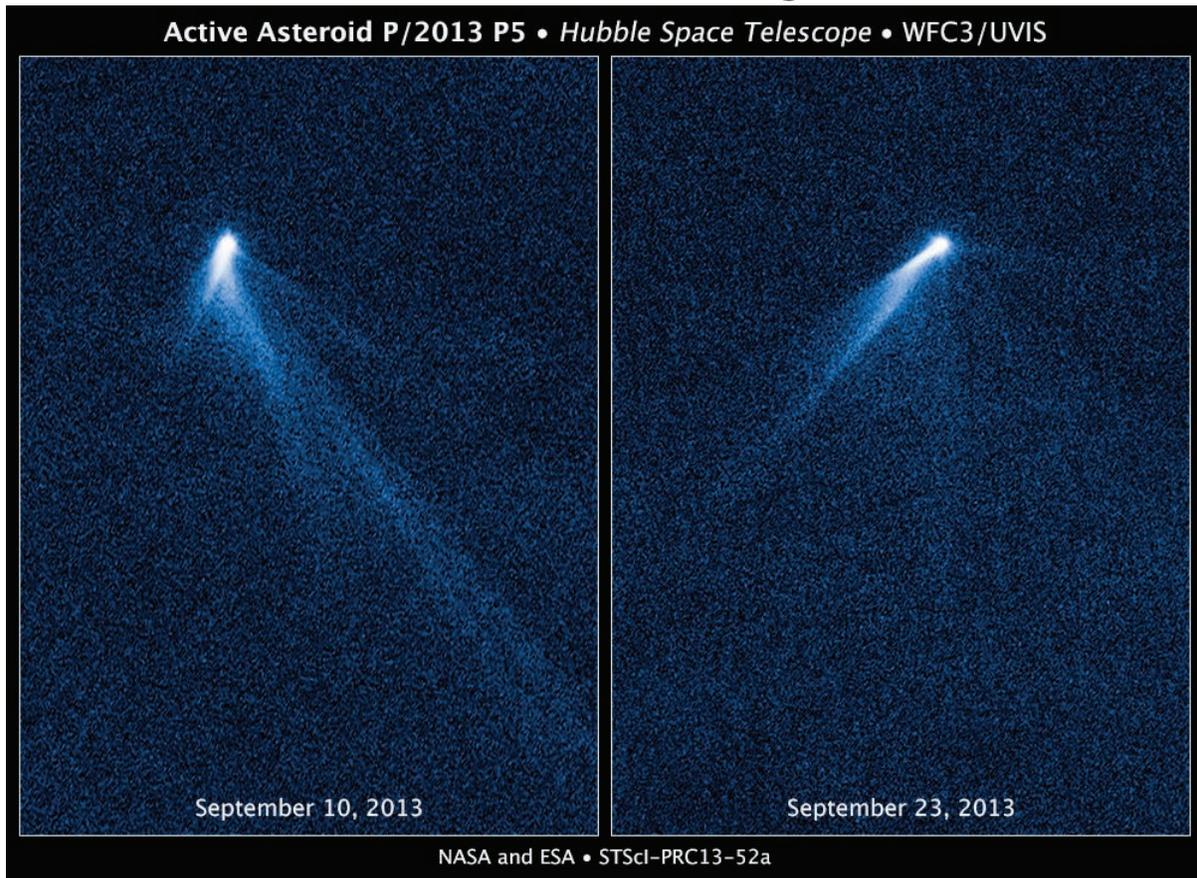
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountain View, CA

Cost: Free

When pondering the number of extraterrestrial civilizations, it is worth noting that even after it got started, the success of life on Earth was not a foregone conclusion. We recount some thrilling episodes from the history of our planet, some well-documented but others merely theorized: our collision with the planet Theia, the oxygen catastrophe, the snowball Earth events, the Permian-Triassic mass extinction event, the asteroid that hit Chicxulub, and more, including the global warming episode we are causing now. All of these hold lessons for what may happen on other planets.

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

Comets vs. Asteroids: Blurring the line



Caption: Asteroid P/2013 P5 spews 6 tails as successive jets come to life. This asteroid was spotted as a "blotchy thing" on an image taken by the PanSTARRS-1 telescope located on Haleakala, Maui, Hawaii. To read more about this strange object, see: <http://www.universetoday.com/106223/freakish-asteroid-has-six-tails-sheds-stuff-into-space/> Image Credit: NASA/ESA

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

All times Pacific Standard Time.

Comet ISON: Finder charts are available in the November and December issues of S&T

November

- 2-15 Sat- Zodiacal Light visible in the east (120-80 minutes before sunrise)
- 9 Sat **First-Quarter Moon (9:57pm)**
- 11-28 Mon- Mercury above the east-southeast horizon (45 minutes before sunrise)
- 17 Sun **Full Moon (7:16am)**
- 17-18 Sun- Comet ISON possibly visible to the unaided eye near Spica (predawn, see p.50 November S&T)
- 25 Mon **Last-Quarter Moon(11:28am)**
- 25-26 Mon- Saturn <1 degree from brighter Mercury. Comet ISON may be visible 30min before sunrise (see p.49 November S&T)
- 29 Fri Spica to lower-left of waning crescent Moon (predawn). The Moon occults Spica in broad daylight for North America. GoTo scope probably needed to find the thin crescent Moon in daylight.

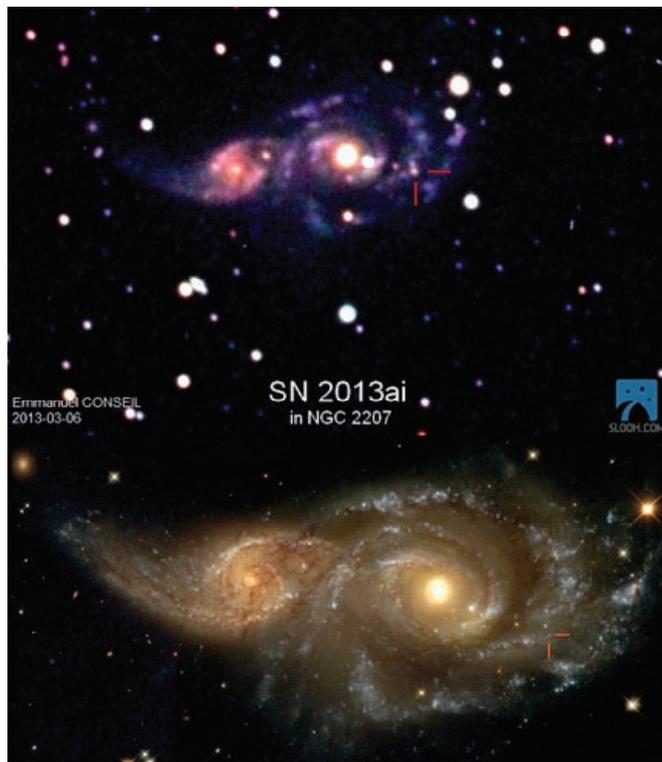
December

- 1 Sun Thin crescent Moon below Saturn and to upper-right of Mercury. Comet ISON, with a long curved tail, may be visible to their left (30-60 minutes before sunrise, see p.31 December S&T)
- 2 Mon **New Moon (4:22pm)**
- 5 Thur Venus to lower-left of waxing crescent Moon (Dusk)
- 9-10 Mon- Jupiter 15 arc minutes from 3.5mag Delta Geminorium
- 9 Mon **First-Quarter Moon (7:12am)**
- 13-14 Fri The Geminid meteor shower peak on this night. Best views predawn after moonset (see p.50 December S&T)
- 15 Sun Aldebaran 2-4 degrees to lower-right of the Moon
- 17 Tue **Full Moon (1:28am)**

How to hunt for your very own supernova!

By Dr. Ethan Siegel

In our day-to-day lives, stars seem like the most fixed and unchanging of all the night sky objects. Shining relentlessly and constantly for billions of years, it's only the long-term motion of these individual nuclear furnaces and our own motion through the cosmos that results in the most minute, barely-perceptible changes.



Caption: SN 2013ai, via its discoverer, Emmanuel Conseil, taken with the Slooh.com robotic telescope just a few days after its emergence in NGC 2207 (top); NASA, ESA and the Hubble Heritage Team (STScI) of the same interacting galaxies prior to the supernova (bottom).

Unless, that is, you're talking about a star reaching the end of its life. A star like our Sun will burn through all the hydrogen in its core after approximately 10 billion years, after which the core contracts and heats up, and the heavier element

helium begins to fuse. About a quarter of all stars are massive enough that they'll reach this giant stage, but the most massive ones -- only about 0.1% of all stars -- will continue to fuse leaner elements past carbon, oxygen, neon, magnesium, silicon, sulphur and all the way up to iron, cobalt, and nickel in their core. For the rare ultra-massive stars that make it this far, their cores become so massive that they're unstable against gravitational collapse. When they run out of fuel, the core implodes.

The in-rushing matter approaches the center of the star, then rebounds and bounces outwards, creating a shockwave that eventually causes what we see as a core-collapse supernova, the most common type of supernova in the Universe! These occur only a few times a century in most galaxies, but because it's the most massive, hottest, shortest-lived stars that create these core-collapse supernovae, we can increase our odds of finding one by watching the most actively star-forming galaxies very closely. Want to maximize your chances of finding one for yourself? Here's how.

Pick a galaxy in the process of a major merger, and get to know it. Learn where the foreground stars are, where the apparent bright spots are, what its distinctive features are. If a supernova occurs, it will appear first as a barely perceptible bright spot that wasn't there before, and it will quickly brighten over a few nights. If you find what appears to be a "new star" in one of these galaxies and it checks out, report it immediately; you just might have discovered a new supernova!

This is one of the few cutting-edge astronomical discoveries well-suited to amateurs; Australian Robert Evans holds the all-time record with 42 (and counting) original supernova discoveries. If you ever find one for yourself, you'll have seen an exploding star whose light traveled millions of light-years across the Universe right to you, and you'll be the very first person who's ever seen it!

Read more about the evolution and ultimate fate of the stars in our universe: <http://science.nasa.gov/astrophysics/focus-areas/how-do-stars-form-and-evolve/>.

While you are out looking for supernovas, kids can have a blast finding constellations using the Space Place star finder: <http://spaceplace.nasa.gov/starfinder/>.

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.