

PRIMEFOCUS

Tri-Valley Stargazers



December 2010



Meeting Info:

What: Holiday Potluck Dinner

Who: TVS Members

When:

December 17, 2010
Doors open at 6:30 p.m.
Dinner at 7:00 p.m.

Where:

Unitarian Universalist
Church in Livermore
1893 N. Vasco Road

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December Meeting



Potluck Dinner

This month is our Holiday/Christmas/Hanukkah/Kwanzaa/Winter Solstice/chant for more daylight/etc. potluck dinner. We'll be opening the doors at 6:30 to set up the tables and chairs, and then the feast will begin at 7pm. TVS will provide the drinks and paper/plasticware. Members are asked to bring a dish to share, and of course bring family and friends to share in the festivities. (Debbie, thanks for the astro-garland image!)

Dues Are Due

TVS' membership year runs from January to December, so now is the time to renew your membership. Our membership rates remain unchanged from last year, as do the subscription rates for Astronomy and Sky & Telescope. We no longer offer the "Regular" membership level since we do not send out printed copies of the newsletter. Rather, at the "Basic" membership level we contact you via email to let you know that a .pdf of the newsletter is available. The renewal form can be found on the back of this newsletter or on our website under the Membership link. Please make our Treasurer's New Year especially wonderful by sending in your renewal today.

What websites do you have morning coffee with?

Maybe you've just got the kids off to school, or have a few minutes before you leave for work; so what websites do you kick your day off with? I have a few websites that I hit the first thing in the morning to satisfy my astro-jones. These include <http://apod.nasa.gov/apod/> the Astronomy Picture of the Day, www.spaceweather.com to find out about our restless sun (sunspots, aurora, and great pictures from the Solar Dynamics Laboratory), and www.universetoday.com and www.space.com, who each put out numerous new articles every day regarding all things astronomical. Send me your favorite astronomical weblinks, and I'll publish them in a future issue of the newsletter. I'm sure there will be new gems for all of us to explore!

News & Notes

2010-2011 TVS Meeting Dates

The following lists the TVS meeting dates for 2010-2011. 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
Dec. 17	Dec. 20	
Jan. 21	Jan. 24	Dec. 31
Feb. 18	Feb. 21	Jan. 29
Mar. 18	Mar. 21	Feb. 25
Apr. 15	Apr. 18	Mar. 25
May 20	May 23	Apr. 29
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 the October 18, 2010 the TVS account balances are:

Checking	\$4,638.17	
CD #1	\$3,762.36	rolled over 8/17/2010
CD #2	\$2,655.68	rolled over 8/27/2010

TVS Election Results

The 2010 club officers have been elected to serve during 2011. 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.

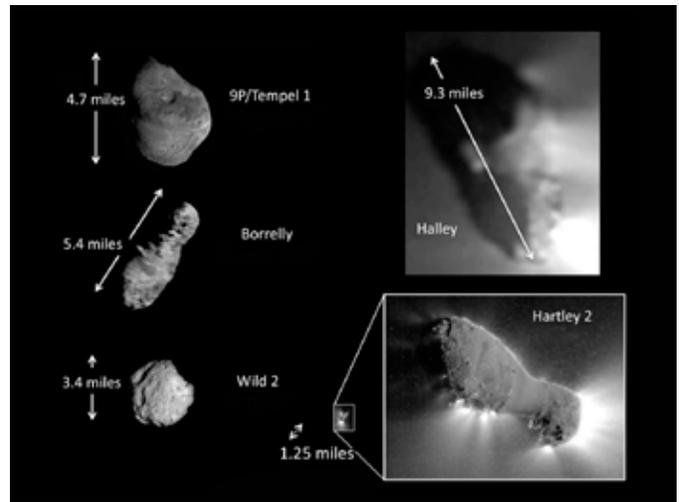
RASC Handbooks and Calendars Available (soon)

David Feindel has indicated that Royal Astronomical Society of Canada (RASC) Handbooks and Calendars are on order; though it is touch and go whether they will be available at this month's meeting. If not, he has offered to meet people in the Livermore-Pleasanton-Dublin area to hand them off. Alternatively, come to the January TVS meeting to make your purchase. The pricing is the same as last year--\$22 for the Handbook, \$15 for the Calendar. Pictures of them are available on the www.rasc.ca website.

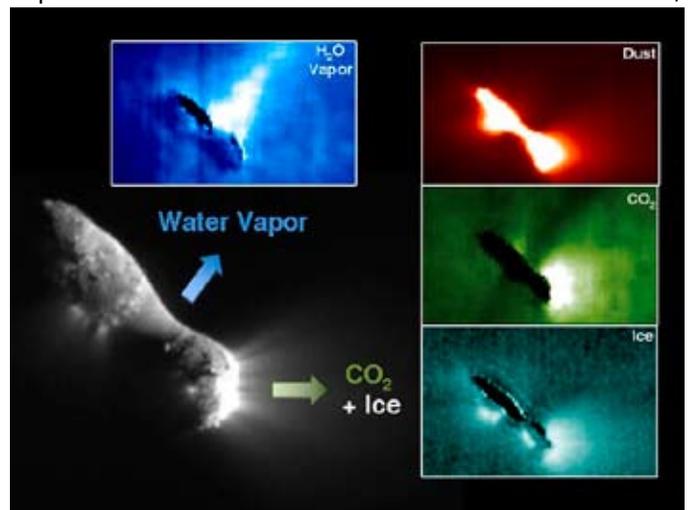
Mission Update by Ken Sperber

The EPOXI mission sounds like some sort of weekend project, but actually it is a cost effective reuse of the Deep

Impact mother craft that released the Comet Tempel 1 impactor in 2005. EPOXI is an acronym for the two-part retasked mission entitled "Extrasolar Planet Observations and Characterization" (EPOCH), and the flyby of Comet Hartley 2, called the "Deep Impact Extended Investigation" (DIXI). One of the benefits of reuse is that the same observing instruments have been used to image two separate comets resulting in a nicely calibrated set of observations.



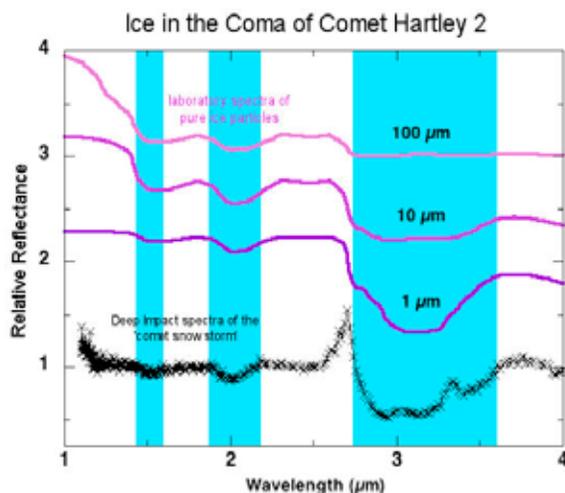
The flyby of Comet Hartley occurred on November 4th, 2010, with closest approach being 435 miles. Of 5 comets that have been visited by spacecraft, Comet Hartley 2 is the smallest, at only 1.25 miles, as seen above. Given its size, Comet Hartley 2 was much more active than expected. Comet Hartley 2 shows a multitude of jets ejecting material off of its surface. Observations using different wavelengths (colors) of light (see below) revealed new processes and mechanisms for the expulsion of material off of a comet surface. Furthermore,



Header Image: Your newsletter editor caught in the act of checking out the 3-D image of Comet Hartley 2 on page 4. Photo credit: Karen Harris.

Mission Update (continued)

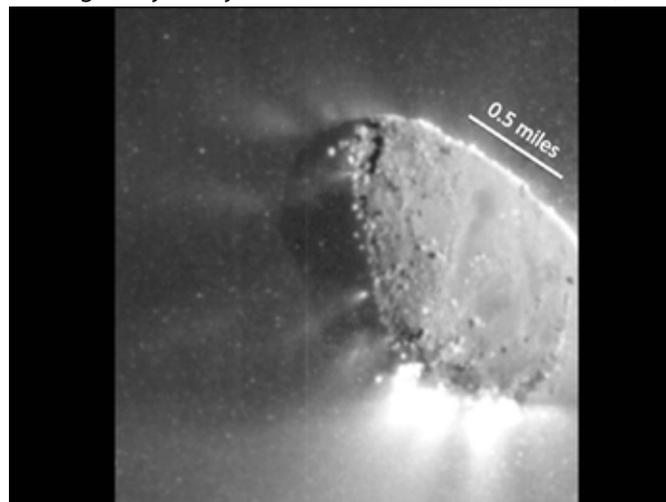
the composition of the material that was ejected was different at different locations on the comet. At the ends of the comet, where the surface has a rough appearance, CO₂, water ice, and dust were predominantly ejected, while over the smoother central region, water vapor ejection dominated. Water vapor ejection, much like that observed on Comet Tempel 1, occurs when the surface is heated by the Sun causing water ice to sublime (turn into a gas from a solid), and carry dust off of the surface as the water vapor is ejected. The ejection via jets of CO₂ gas is a new mechanism not before observed. Here, subsurface pockets of dry ice sublimate quickly due to heating by the Sun, with each heated pocket corresponding to a jet.



The predominant size of the ejected ice particles is approximately 1 micron (1-millionth of a meter). This was determined by comparing spectra of the cloud of ejected comet material with laboratory spectra of ice particles of different sizes, as

seen above. Notice that the depth of the observed dips in the blue-shaded bands is most consistent with the laboratory spectrum for 1 micron sized particle. (Note: the laboratory spectra are vertically offset from the observed spectrum to clearly show the shapes of the individual spectra.) In the observed spectrum the peak at about 2.7 microns is due to water vapor, while the smaller peak at about 3.4 microns is due to hydrocarbons. Longward of 4 microns (not shown) is a larger spectral peak due to CO₂, which measures in excess of 4 units of Relative Reflectance. So despite the fact that the comet spends most of its life in the cold recesses of the solar system, it has a rich combination of chemical compounds. It is likely that the ultraviolet light from the Sun, and possibly cosmic rays, provide the energy needed to drive the chemistry that creates these compounds.

The high resolution camera was able to resolve some of the larger objects ejected off of the comet (see below). The



continued page 4

Officers

President:

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

Vice-President:

unfilled

Treasurer:

David Feindel
feindel1@comcast.net

Secretary:

unfilled

Volunteer Positions

Librarian:

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

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925-361-7435

Program Director:

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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

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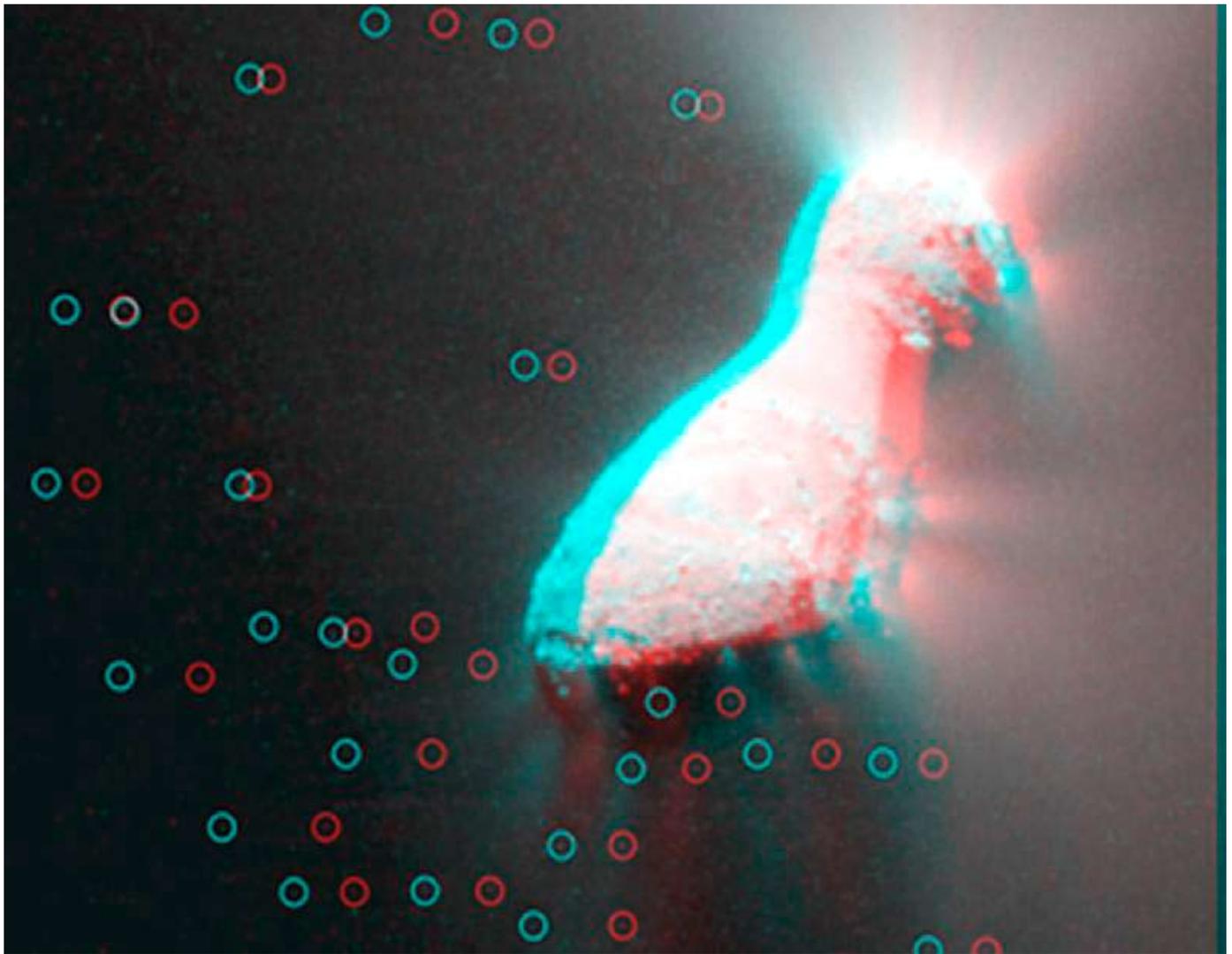
Eyes on the Skies

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.

Mission Update (continued)



sizes are estimated to be golfball to basketball size. These objects, made up of the smaller micron sized ice particles, are believed to be very fragile, having the consistency of high-latitude mountain snow on Earth.

Seen above is a 3-dimensional rendering of the comet and some of the surrounding particles (created by researchers at Brown University). Using 3-d glasses (left lens red, right lens blue), it is amazing to see "into" the scene and see the particles floating in front of, and behind the comet--truly an amazing sight--you almost feel like you're there!

All photos are credit: NASA/JPL-Caltech/UMD unless otherwise indicated. For more information see: <http://epoxi.umd.edu/index.shtml>, http://science.nasa.gov/science-news/science-at-nasa/2010/18nov_cometsnowstorm/, <http://www.universetoday.com/79401/fizzy-comet-hartley-2-is-throwing-snowballs/>.

Calendar of Events

December 15, 12:00 - 1:00 pm

What: Bringing a Chemical Laboratory Named Sam to Mars on the 2011 Curiosity Rover

Who: Paul Mahaffy, Goddard Space Flight Center

Where: New SETI Headquarters, 189 N. Bernardo Ave., Mountainview

Cost: Free

Dr. Mahaffy is the Principle Investigator for the SAM analysis suite on Mars Science Laboratory Rover (Curiosity). An important goal of upcoming missions to Mars is to understand if life could have developed there. The task of the Sample Analysis at Mars (SAM) suite of instruments and the other Curiosity investigations is to move us steadily toward that goal with an assessment of the habitability of our neighboring planet

Calendar of Events (continued)

through a series of chemical and geological measurements. SAM is designed to search for organic compounds and inorganic volatiles and measure isotope ratios. Other instruments on Curiosity will provide elemental analysis and identify minerals. Dr. Mahaffy will discuss how SAM will analyze both atmospheric samples and gases evolved from powdered rocks that may have formed billions of years ago with Curiosity providing access to interesting sites scouted by orbiting cameras and spectrometers.

This lunchtime talk is part of the SETI Institute Colloquium Series. For more info, visit their web site <http://www.seti.org/csc/lectures>, e-mail info@seti.org, or phone 650-961-6633.

January 5, 12:00 - 1:00 pm

What: Near Earth Asteroids as Targets for Human and Robotic Exploration
Who: David Morrison, Director of the Carl Sagan Center for Life in the Universe, SETI Institute
Where: New SETI Headquarters, 189 N. Bernardo Ave., Mountainview
Cost: Free

Near-Earth Asteroids (NEAs) are both enemies (that can collide with our planet) and friends (future targets for human exploration missions). As the Spaceguard Survey nears its goal of finding 90% of NEAs larger than 1 km, public and government interest turns to the much more numerous sub-kilometer NEAs. These small asteroids are the most likely to hit Earth and are also the designated NASA target for astronaut visits in the late 2020s. This talk addresses our knowledge (and ignorance) of the physical properties of the sub-km NEAs and discusses proposed space missions to reconnoiter these targets.

This lunchtime talk is part of the SETI Institute Colloquium Series. For more info, visit their web site <http://www.seti.org/csc/lectures>, e-mail info@seti.org, or phone 650-961-6633.

January 17 6, 7:30 pm

What: TBD
Who: TBD
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

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

January 12, 12:00 - 1:00 pm

What: The Lunar Atmosphere and Dust Environment Explorer (LADEE): New Mission, Longstanding Questions
Who: Rick Elphic, NASA Ames Space Science Division

Where: New SETI Headquarters, 189 N. Bernardo Ave., Mountainview
Cost: Free

Nearly 40 years have passed since the last Apollo missions investigated the mysteries of the lunar atmosphere and the question of levitated lunar dust. The most important questions remain: what is the composition, structure and variability of the tenuous lunar exosphere? What are its origins, transport mechanisms, and loss processes? Is lofted lunar dust the cause of the horizon glow observed by the Surveyor missions and Apollo astronauts? How does such levitated dust arise and move, what is its density, and what is its ultimate fate? The Lunar Atmosphere and Dust Environment Explorer (LADEE) is a small spacecraft mission being developed and led by Ames Research Center. It is equipped with a neutral mass spectrometer, a dust detector and an ultraviolet/visible spectrometer. It's goal: to assess the compositional makeup and variability of the Moon's thin atmosphere, and to establish once and for all if a mysterious dust lofting phenomenon occurs.

This lunchtime talk is part of the SETI Institute Colloquium Series. For more info, visit their web site <http://www.seti.org/csc/lectures>, e-mail info@seti.org, or phone 650-961-6633.

January 18, Tuesday, 7:30 pm

What: New Horizons: NASA's Historic Mission to the Pluto System and Beyond
Who: Alan Stern, Southwest Research Institute
Where: New SETI Headquarters, 189 N. Bernardo Ave., Mountainview
Cost: Free

In 2006 NASA launched a sophisticated robotic explorer to make the first reconnaissance of planet Pluto and its moons, three billion miles from the Sun. That spacecraft is called New Horizons. The principal investigator of New Horizons, Dr. Alan Stern, will describe the mission, it's full objectives, and will describe the new class of planets that Pluto represents.

This lunchtime talk is part of the SETI Institute Colloquium Series. For more info, visit their web site <http://www.seti.org/csc/lectures>, e-mail info@seti.org, or phone 650-961-6633.

What's Up by Ken Sperber (adapted from Sky and Telescope)

All times Pacific Standard, unless otherwise noted.

December

- 13 Mon First-Quarter Moon (5:59am)
- 13-14 Mon- Geminid Meteor Shower peaks
- 18 Sat Conjunction between the Pleiades and the Moon
- 20-21 Mon Total Eclipse of the Moon visible from the US! Totality from 11:41pm to 12:53am, with the partial phases lasting 1+hours before and after totality; Full Moon (12:13am, about mid-eclipse)
- 21 Tue Winter Solstice (3:38pm); longest night of the year
- 25 Sat Algol, an eclipsing binary, is at minimum brightness, magnitude 3.4 for ~2 hours centered at 10:08pm
- 27 Mon Last-Quarter Moon (8:18pm)
- 30-1 Thu- Waning crescent Moon and Venus in conjunction

January

- 1-11 Sat- Look for Mercury about 10 degrees above the eastern horizon about 30 minutes before sunrise
- 4 Tue New Moon; partial solar eclipse visible from Europe, and parts of Africa, and Asia (1:03am)
- 9 Sun Waxing crescent Moon in conjunction with Jupiter; Callisto and Europa transit Jupiter (7:49-8:13pm)
- 12 Wed First-Quarter Moon (3:31am)
- 17 Mon Algol, an eclipsing binary, is at minimum brightness, magnitude 3.4 for ~2 hours centered at 8:43pm
- 19 Wed Full Moon (1:21pm)



Blue Rings around Red Galaxies

by Dr. Tony Phillips

Beautiful flat rings around the planet Saturn are one thing—but flat rings around entire galaxies?

That is the astonishing discovery that two astronomers, Samir Salim of Indiana University at Bloomington and R. Michael Rich of UCLA described in the May 10, 2010, issue of *The Astrophysical Journal Letters*.

“For most of the twentieth century, astronomers observing at visible wavelengths saw that galaxies looked either ‘red and dead’ or ‘blue and new,’” explained Salim. Reddish galaxies were featureless, shaped mostly like balls or lentils; bluish ones were magnificent spirals or irregular galaxies.

Elliptical galaxies looked red, astronomers reasoned, because they had mostly old red giant stars near the end of their life cycles, and little gas from which new stars could form. Spiral and irregular galaxies looked blue, however, because they were rich in gas and dust that were active nurseries birthing hot, massive, bluish stars.

At least, that’s how galaxies appear in visible light.

As early as the 1970s, though, the first space-borne telescopes sensitive to ultraviolet radiation (UV) revealed something mysterious: a few red elliptical galaxies emitted “a surprising ultraviolet excess,” said Rich. The observations suggested that some old red galaxies might not be as “dead” as previously supposed.

To investigate, Salim and Rich used NASA’s Galaxy Evolution Explorer satellite to identify 30 red elliptical galaxies that also emitted the strongest UV. Then they captured a long, detailed picture of each galaxy using the Hubble Space Telescope.

“Hubble revealed the answer,” says Salim. The UV radiation was emitted by enormous, flat bluish rings that completely surrounded each reddish galaxy, reminiscent of the rings of Saturn. In some cases, the bluish rings even showed a faint spiral structure!

Because the bluish UV rings looked like star-forming spiral arms and lay mostly beyond the red stars at the centers of the elliptical galaxies “we concluded that the bluish rings must be made of hot young stars,” Salim continued. “But if new stars are still being formed, that means the red-and-dead galaxies must have acquired some new gas to make them.”

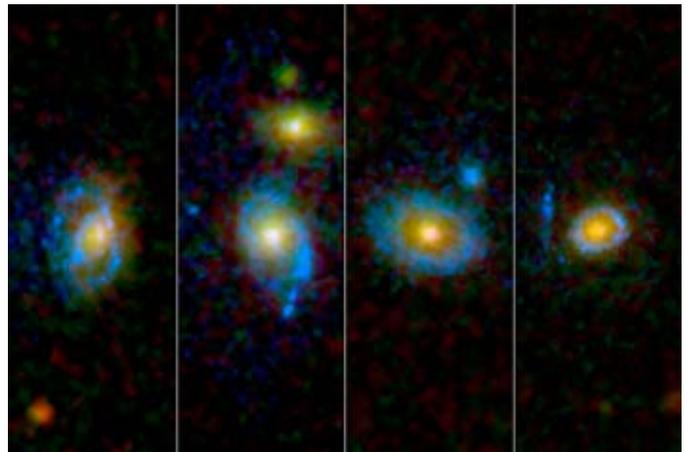
How does a galaxy “acquire some gas?” Salim speculates that it was an act of theft. Sometimes galaxies have close encounters. If a gas-rich irregular galaxy passed close to a gas-poor elliptical galaxy, the gravity of the elliptical galaxy could steal some gas.

Further studies by Galaxy Evolution Explorer, Hubble and other telescopes are expected to reveal more about the process. One thing is certain, says Rich: “The evolution of galaxies is even more surprising and beautiful than we imagined.”

The press release is available at <http://www.galex.caltech.edu/newsroom/glx2010-03f.html>. The full published article is “Star Formation Signatures in Optically Quiescent Early-Type Galaxies” by Samir Salim and R. Michael Rich, *The Astrophysical Journal Letters* 714: L290–L294, 2010 May 10.

Point the kids to the Photon Pile-up Game at <http://spaceplace.nasa.gov/en/kids/galex/photon>, where they can have fun learning about the particle nature of light.

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



The Galaxy Evolution Explorer UV space telescope helped to identify red elliptical galaxies that also emitted the strongest UV. These are detailed, long-exposure Hubble Space Telescope images of four of these galaxies that capture the UV-emitting rings and arcs indicative of new star formation.

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.