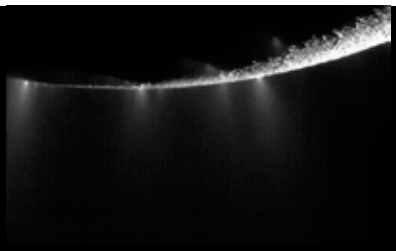
PRIMEFOCUS

Tri-Valley Stargazers



April 2010

Meeting Info
What:
Fascinating Objects in Our Solar System

Who:
Prof. Imke de Pater

When:
April 16, 2010
Doors open at 7:00 p.m.
Lecture at 7:30 p.m.

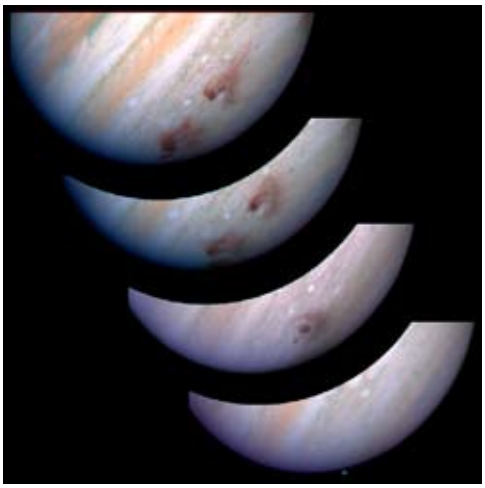
Where:
Unitarian Universalist Church in Livermore
1893 N. Vasco Road

Inside

April Meeting

Fascinating Objects in Our Solar System

Prof. Imke de Pater



Shoemaker-Levy 9 impacts scar Jupiter in 1994. Credit: NASA, Hubble Image, Space Science Institute

Our Solar System is comprised of bodies varying in size from the giant planet Jupiter, 12 times larger than our Earth, down to bodies less than a few kilometers in size, and further down to microscopically small dust grains. The planets and their satellites are now known to us as individual worlds, some of which show similarities to Earth (e.g., Titan, Mars), whereas others exhibit such extreme volcanism that even the largest volcanoes on Earth are dwarfed in comparison (Io, Enceladus). The giant planets are surrounded by rings, systems which are unique to each planet. In these systems we observe details that help us understand the physical processes in the early solar nebula that led to planet formation 4.5 billion years ago, which are still now operational in disks around other stars. Once in a while comets approach the Sun and exhibit fantastic displays. Remote observations and in situ analysis of cometary gases and dust grains help us understand the early epoch of planet formation in our Solar System. In the TVS talk she will give a quick tour of some of these objects; a large fraction of the time will be focused on the recent 2009 impact on Jupiter.

Imke de Pater is a professor in the Department of Astronomy at UC Berkeley, and a world-renowned planetary scientist. She is an authority on modeling and mapping the planets of our solar system, and led a worldwide campaign to observe the impact of comet Shoemaker-Levy 9 with Jupiter in 1994. A frequent user of the huge Keck telescopes in Hawaii, she has discovered methane drizzle on Saturn's moon Titan, modeled Jupiter's magnetic fields, and revealed the dynamic behavior of Neptune's skies. Her graduate-level textbook, "Planetary Sciences", co-authored with Jack J. Lissauer, was the winner of the 2007 Chambliss Award for Astronomical Writing from the American Astronomical Society.

News & Notes

2010 TVS Meeting Dates

The following lists the TVS meeting dates for 2010. 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 21	May 24	April 30
June 18	June 21	May 28
July 16	July 19	June 25
Aug. 20	Aug. 23	
Sept. 17	Sept. 20	
Oct. 15	Oct. 18	
Nov. 19	Nov. 22	
Dec. 17	Dec. 20	

Money Matters

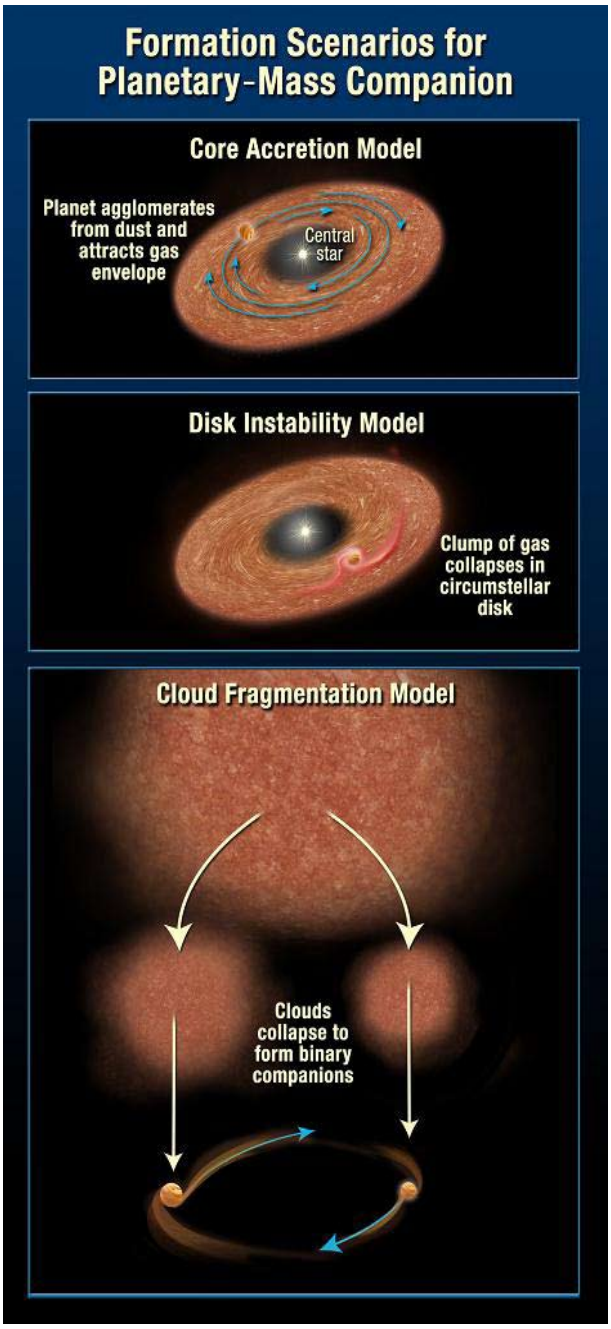
Treasurer David Feindel indicates that as of the February 20, 2010 the TVS account balances are:

Checking	$5,862.37	
CD #1	$3,760.50	rolled over 2/17/2010
CD #2	$2,653.02	rolled over 11/27/09

Journal Club by Ken Sperber

The leading theory of planet formation, the core accreation model, has been turned on its head in an article to be published in The Astrophysical Journal. For the article entitled "Discovery of a Planetary-Mass Companion to a Brown Dwarf in Taurus," K. Todorov, K. L. Luhman, and K. K. McLeod used the Hubble Space Telescope and the Gemini North Telescope to image a 5-10 Jupiter mass planet that is orbiting 2.25 billion miles from the primary brown dwarf star. Given the approximate one million year age of the star system, formation of a body of this size is surprising since the core accreation model predicts formation should take 5-10 million years. The two alternative formation mechanisms that operate on the one million year time scale are the "Disk Instability Model" and the "Cloud Fragmentation Model," the latter of which is the process by which stars form. While the system exhibits an excess emission of infrared radiation, consistent with the presence of circumstellar disk, it is not believed that there was enough gas and dust in the disk to have been the source material for a Jupiter-class planet. Thus, for the first time, evidence indicates that cloud fragmentation can form objects of <10 Jupiter masses.

For more informaion see: http://www.universetoday.com/2010/04/06/mystery-object-found-orbiting-brown-dwarf/



Schematic of the three mechanisms by which planet formation is hypothesized to occur. Credit NASA, ESA, and A. Feild (STScI).

Newsletter header image: Enceladus, imaged by Cassini, November 21, 2009

Enceladus is a 504 km sized moon that orbits about 238,000km from the center of Saturn. In this composite image over 30 jets are seen. The jets are predominantly water ice escaping from fractures in the moons crust. Tidal flexure is believed to be the source of the internal heat that gives rise to the melt water. For more information see: http://photojournal.jpl.nasa.gov/catalog/PIA11688

Image Credit: NASA/JPL/Space Science Institute

Calendar of Events

April 12, 7:30pm

What: The Brightest, Dimmest, Soonest, and Longest: Fascinating New Phenomena in the World of Supernovae
Who: Dr. David Pooley, University of Wisconsin-Madison
Where: California Academy of Science, Golden Gate Park, San Francisco
Cost: Reservations: Adults $12, Seniors $10, Academy members $6. Seating is limited. Purchase advanced tickets online or call 800-794-7576

Supernovae, the explosions of massive stars, have been recorded and studied for thousands of years, but they remained mysterious until the era of modern astronomy in the past century. New search techniques have led to the discovery of the brightest supernovae ever seen, including one that has stayed bright longer than any other known supernova and which may be indicative of a never-before-seen type of explosion that only the most massive stars experience. Dr. Pooley will briefly review the general phenomena of supernovae and then discuss these new, state-of-the-art observations.

April 17, 11am-4pm

What: Earth Day
Who: You
Where: Chabot Space & Science Center
Cost: Free with General Admission

Celebrate Earth Day at Chabot learning how to protect the Earth's environment with innovative and fun activities. Race model solar cars, see demonstrations of worm composting, vacuum chambers, environmentally friendly dissolvable packaging, and glitter globe Earth model building.

The Chabot Space & Science Center, which is locoated at 10000 Skyline Boulevard, Oakland, California.

April 17, 8pm

What: Emmy Noether and the Fabric of Reality
Who: Ransom W. Stephens, Ph.D.
Where: Mt. Tamalpais State Park, Cushing Memorial Amphitheater, more commonly known as the Mountain Theater, Rock Spring parking area
Cost: Free

Noether's Theorem ties the laws of nature – from Newton's laws to thermodynamics to charge conservation – directly to the geometry of space and time, the very fabric of reality.

April 21, 12:00 - 1:00 pm

What: Titan: Outer-Planet Moon of Mystery
Who: Jeff Moore, Space Science Division, NASA Ames Research Center
Where: SETI in Mountain View
Cost: Free

Details of this talk are unavailable.

This lunchtime talk is part of the SETI Institute Colloquium Series. Location is 515 N. Whisman Road, Mountain View, CA 94043. For more info, visit their web site http://www.seti.org/csc/lectures, e-mail info@seti.org, or phone 650-961-6633.

April 24, 11am

What: NASA Webcast: Celebrating Women
Who: You

continued page 4

Officers

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925-422-7278

Vice-President:
unfilled

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Mentor:
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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.

Where: Chabot Space & Science Center
Cost: Free with General Admission

Speak with NASA representatives in a live webcast, with hands-on demos and other fun activities as we celebrate contributions of women in space and science.

The Chabot Space & Science Center, which is locoated at 10000 Skyline Boulevard, Oakland, California.

April 28, 12:00 - 1:00 pm

What: PAHs and the Diffuse Interstellar Bands: From the Laboratory to Space
Who: Farid Salama, NASA Ames Space Science Division
Where: SETI in Mountain View
Cost: Free

Details of this talk are unavailable.

This lunchtime talk is part of the SETI Institute Colloquium Series. Location is 515 N. Whisman Road, Mountain View, CA 94043. For more info, visit their web site http://www.seti.org/csc/lectures, e-mail info@seti.org, or phone 650-961-6633.

May 5, 12:00 - 1:00 pm

What: Modeling the Effects of the Interstellar Medium on Engineered Signals of Extraterrestrial Origin
Who: Dr. Samantha Blair, SETI Institute
Where: SETI in Mountain View
Cost: Free

Dr. Blair will discuss the impairments that can be imposed on signals of technological origin traveling through the interstellar medium (ISM). The ISM contains ionized regions where fluctuations in the electron density have a significant effect on signals propagating through the medium. Techniques developed by pulsar researchers over the last 2-3 decades were used to characterize the impact of these effects on engineered as opposed to natural signals like pulsars, and in particular, seek insights into the types of signals to expect based on their susceptibility to ISM propagation impairments.

This lunchtime talk is part of the SETI Institute Colloquium Series. Location is 515 N. Whisman Road, Mountain View, CA 94043. For more info, visit their web site http://www.seti.org/csc/lectures, e-mail info@seti.org, or phone 650-961-6633.

May 12, 12:00 - 1:00 pm

What: Kepler: Are There Any Good Worlds Out There?
Who: Jon Jenkins, SETI Institute
Where: SETI in Mountain View
Cost: Free

The Kepler Mission began its science observations just one year ago on March 12, 2009, initiating NASA's first search for Earth-like planets. Initial results and light curves from Kepler are simply breath-taking, and they reveal as much about the instrument as they do about the stars Kepler observes. I will discuss how much we've learned over the past year about the instrument and the stars and how we are modifying the Science Pipeline to reveal small Earth-like planets.

This lunchtime talk is part of the SETI Institute Colloquium Series. Location is 515 N. Whisman Road, Mountain View, CA 94043. For more info, visit their web site http://www.seti.org/csc/lectures, e-mail info@seti.org, or phone 650-961-6633.

May 15, http://scienceatcal.berkeley.edu/lectures

What: What Makes Water Wet? The Latest Word on the Most Important Molecule in the Universe
Who: Prof. Richard Saykally
Where: UC Berkeley, Genetics and Plant Biology Building, Room 100
Cost: Limited hourly pay parking on and nearby campus

Details of this talk are unavailable.

May 19, 12:00 - 1:00 pm

What: Latest results from the Mars Phoenix Lander Mi croscope
Who: John Marshall, SETI Institute
Where: SETI in Mountain View
Cost: Free

Dr. John Marshall was a member of the Mars Phoenix Lander team that successfully landed in the north polar region of Mars last year. He will describe the data gathered by the microscope instrument which examined soil and ice from the landing site of the robot. Dr. Marshall will present the implications for geological and biological history of the Vastitas Borealis formation.

This lunchtime talk is part of the SETI Institute Colloquium Series. Location is 515 N. Whisman Road, Mountain View, CA 94043. For more info, visit their web site http://www.seti.org/csc/lectures, e-mail info@seti.org, or phone 650-961-6633.

May 22, 8:30pm

What: Galileo, Telescopes and the Beginning of Modern Science
Who: John Dillon, Randall Museum-San Francisco
Where: Mt. Tamalpais State Park, Cushing Memorial Amphitheater, more commonly known as the Mountain Theater, Rock Spring parking area
Cost: Free

Review of the history of science and an exploration of the subtle, complex relationship between Galileo, telescopes, Science and the Church.

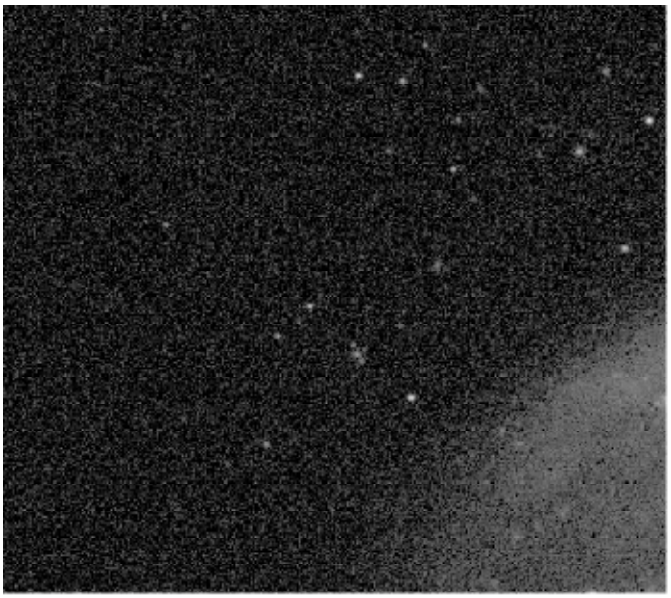
SimCCD

A program to simulate the operation of a CCD camera

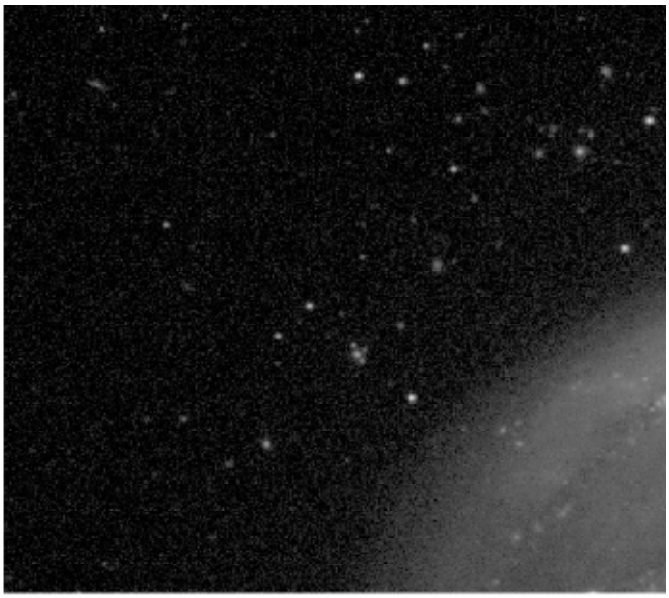
by Hilary Jones

One of the first things a newcomer to astrophotography may do is take test pictures to see how important the sky darkness is, how important long exposures are, and so on. These tests can take a long time and may end up being inconclusive if the conditions vary between one set of tests and another. To solve these problems, I wrote a program called SimCCD. It lets you pick from one of several CCD cameras and telescopes, and then run a simulation to see how the equipment performs when changes are made to the sky brightness, exposure time, camera temperature, number of images, etc. The simulation takes into account most of the physical phenomena that can affect image quality, such as readout noise, shot noise from the sky and target, dark field current, bias frames, flat fielding, etc.

The following pictures show simulations of M51 done using both short and long exposure times. Even though the total exposure time is the same, using a single long exposure produces a much better image.



60 60-second exposures
22 mag/sq"



1 3600-second exposure
22 mag/sq"

People interested in trying SimCCD can get more information from Hilary Jones' web site at http://www.darklights.org/simccd.

What's Up by Ken Sperber

All times Pacific Daylight unless otherwise noted.

April

1-15	Thur-	Mercury is visible to lower-right of Venus at dusk.
1-15	Thur-	Zodiacal light visible in the west, extending from Venus to the Pleiades.
6	Tue	Last-Quarter Moon (2:37am)
13-20	Tue-	Mars and the Beehive Cluster (M44) are within 2 degrees of each other. A good binocular sight!
14	Wed	New Moon (5:29am)
21	Wed	First-Quarter Moon (11:20am)
21/22	Wed-	The Lyrid Meteor shower peaks on the night of the 21st and the morning of the 22nd. At its peak it ususally produces about 20 meteors per hour, with dusty trails that tend to linger for several seconds. The best viewing will be after midnight, with the radiant located in the constellation Lyra.
28	Wed	Full Moon (5:18am)

May

5	Wed	Last-Quarter Moon (9:15pm)
5/6	Wed-	The Eta Aquarid Meteor shower peaks on the night of the 5th and the morning of the 6th. At its peak it usually produces about 10 meteors per hour. The best viewing will be after midnight, with the radiant located in the constellation Aquarius.
13	Thur	New Moon (6:04pm)
15-16	Sat-	Crescent Moon and Venus in conjunction.
20	Thur	First-Quarter Moon (4:43pm)
27	Thur	Full Moon (4:07pm) is within 1-2 degrees of Antares.

Deadly Planets

by Patrick L. Barry and Dr. Tony Phillips

About 900 light years from here is a rocky planet not much bigger than Earth. It goes around its star once every hundred days, a trifle fast, but not too different from a standard Earth-year. At least two and possibly three other planets circle the same star, forming a complete solar system.

Interested? Don't be. Going there would be the last thing you ever do.

The star is a pulsar, PSR 1257+12, the seething-hot core of a supernova that exploded millions of years ago. Its planets are bathed not in gentle, life-giving sunshine but instead a blistering torrent of X-rays and high-energy particles.

"It would be like trying to live next to Chernobyl," says Charles Beichman, a scientist at JPL and director of the Michelson Science Center at Caltech.

Our own Sun emits small amounts of pulsar-like X-rays and high energy particles, but the amount of such radiation coming from a pulsar is "orders of magnitude more," he says. Even for a planet orbiting as far out as the Earth, this radiation could blow away the planet's atmosphere, and even vaporize sand right off the planet's surface.

Astronomer Alex Wolszczan discovered planets around PSR 1257+12 in the 1990s using Puerto Rico's giant Arecibo radio telescope. At first, no one believed worlds could form around pulsars—it was too bizarre. Supernovas were supposed to destroy planets, not create them. Where did these worlds come from?

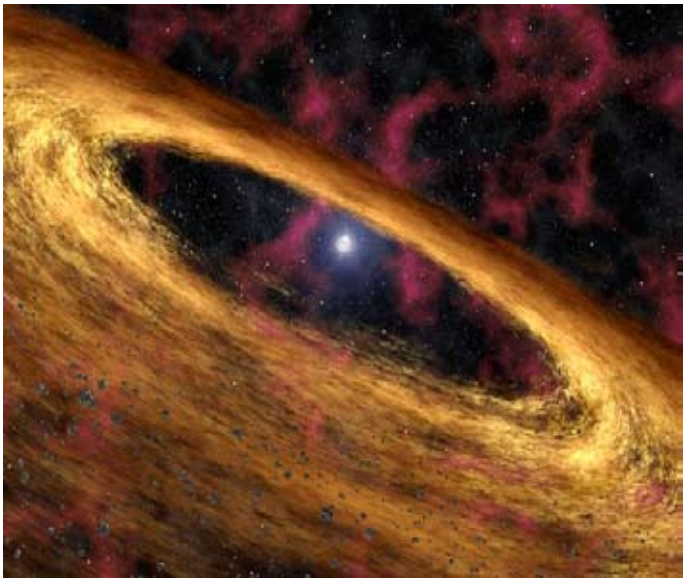
NASA's Spitzer Space Telescope may have found the solution. In 2005, a group of astronomers led by Deepto Chakrabarty of MIT pointed the infrared telescope toward pulsar 4U 0142+61. Data revealed a disk of gas and dust surrounding the central star, probably wreckage from the supernova. It was just the sort of disk that could coalesce to form planets!

As deadly as pulsar planets are, they might also be hauntingly beautiful. The vaporized matter rising from the planets' surfaces could be ionized by the incoming radiation, creating colorful auroras across the sky. And though the pulsar would only appear as a tiny dot in the sky (the pulsar itself is only 20-40 km across), it would be enshrouded in a hazy glow of light emitted by radiation particles as they curve in the pulsar's strong magnetic field.

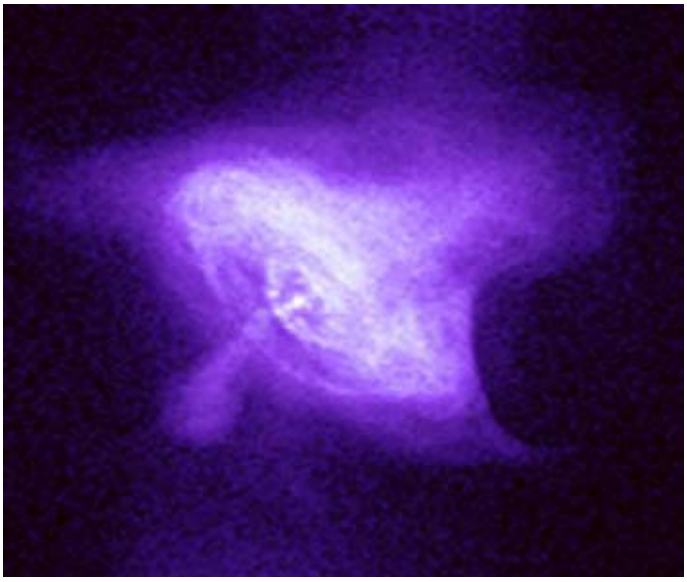
Wasted beauty? Maybe. Beichman points out the positive: "It's an awful place to try and form planets, but if you can do it there, you can do it anywhere."

Find more news and images from Spitzer at http://www.spitzer.caltech.edu/. In addition, The Space Place Web site features several games related to Spitzer and infrared astronomy, as well as a storybook about a girl who creamed of finding another Earth. Go to http://tiny.cc/lucy208.

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



Artist's concept of a pulsar and surrounding disk of rubble called a "fallback" disk, out of which new planets could form.



The pulsar at the center of M1, the Crab Nebula, rotates 30 times per second.. Observers in China and Japan recorded this supernova explosion in 1054. Credit: NASA Chandra X-Ray Observatory.

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.
_____ $40 Regular. You will receive a paper version of Prime Focus in the mail.
_____ $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.