

The Stargazer

October 2008

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See EAS website at:

EAS BUSINESS...

NEXT EAS MEETING – SATURDAY OCTOBER 25TH 7:00 PM AT AURORA ASTRO PRODUCTS STORE AT SILVER LAKE.

★★ Saturday October 25th 7:00 pm MEETING ★★
The speaker will be Lynne Jones, of UW Astronomy, talking about the Large Synoptic Survey Telescope (LSST) project - <http://www.lsst.org> The Large Synoptic Survey Telescope is planned as a revolutionary facility which will produce an unprecedented wide-field astronomical survey of our universe using an 8.4-meter ground-based telescope. The LSST leverages innovative technology edge in all subsystems: the [camera](#) (3200 Megapixels, the world's largest digital camera), [telescope](#) (simultaneous casting of the primary and tertiary [mirrors](#); two aspheric optical surfaces on one substrate), and [data management](#) (30 terabytes of data nightly, nearly instant alerts issued for objects that change in position or brightness).

(It may be helpful for some folks to bring a folding chair to the meeting.)

Map/Directions to Aurora Astro Products store location - http://www.skyvalleyscopes.com/aurora_astro_products_silver_lak.htm
Silver Lake Plaza, 11419 19th AVE. SE, Everett, WA 98208

If you are traveling northbound on I-5:
 Take exit #186/128th St. and go east - to the right on 128th St. continue until you come to Murphy's Corner/Intersection with Highway 527/19th Ave SE/Old Bothell- Everett Highway (all one in the same) and turn left/north. Follow until you see Silver Lake Plaza (red brick construction) on your right with the lake is on your left.

If you are traveling southbound on I-5:
 Take exit 187/ Everett Mall Way and at the top of the exit's hill turn right following signs for Highway 527. At the light turn right following the signs for Highway 527. Then stay on Highway 527/19th Ave SE/Old Bothell- Everett Highway until you have Silver Lake on your right and the Silver Lake Plaza on your left. You may also continue down I-5 until exit 186 and turn left onto 128th then follow previous directions.
 If you have a problem you can always call (425) 337-4384

★ STAR PARTY INFO ★

Next EAS Star Party: November 4 - Ron Tam's home.

EAS member Ron Tam has offered a flexible opportunity to EAS members to come to his home north of Snohomish for observing on clear weekend evenings and for EAS starparties. Anyone wishing to do so needs to contact him in advance and confirm available dates, and let him know if plans change. "Our place is open for star parties any Saturday except weekends of the Full Moon. People can call to get weather conditions or to confirm that there is a star party. Our phone number is (360) 568-5152. They can e-mail me too (tam1951@verizon.net) but I don't check my email daily. They can email me for directions if they never have been out here." Listed below are proposed dates for **planned EAS star parties** at my [Ron Tam's] place, depending upon the weather, of course. Call Ron about spur-of-the-moment observing.

Upcoming tentative EAS star party schedule: (also see the regional star parties listed in the 'Astro Calendar for 2008') .

Please also join the EAS mail list, and send mail to the mail list everett_astronomy@topica.com to coordinate spur-of-the-moment observing get-togethers, on nights when the sky clears. We try to hold informal close-in star parties each month during the spring, summer, and fall months on a weekend near the New moon at a member's property or a local park. (call Jim Bielaga at (425) 337-4384 for info or check the EAS website.) Members contact Jim Bielaga for scope borrowing.

DARK MOON PERIODS THIS YEAR

New Moon	1 st Qtr	3 rd Qtr	EAS Star Party at Ron's
Jan 8 th	Jan 15 th	Jan 29 th	--
Feb 6 th	Feb 13 th	Feb 28 th	--
Mar 7 th	Mar 14 th	Mar 29 th	Sat Mar 08, Sat Mar 29
Apr 5 th	Apr 12 th	Apr 28 th	Saturday April 05
May 5 th	May 11 th	May 27 th	Saturday May 03
Jun 3 rd	Jun 10 th	Jun 26 th	Saturday Jun 07
Jul 2 nd	Jul 9 th	Jul 25 th	Saturday Jul 05

Aug 1 st , 30 th	Aug 8 th	Aug 23 rd	Saturday Aug 23
Sep 29 th	Sep 7 th	Sep 21 st	Saturday Sep 20
Oct 28 th	Oct 7 th	Oct 21 st	Saturday Oct 04
Nov 27 th	Nov 5 th	Nov 19 th	Saturday Nov 01
Dec 27 th	Dec 5 th	Dec 19 th	--

Other Western US Star Parties This Season...

Oct 30-Nov 02 - **Nightfall 2008** - Palm Canyon Resort, Borrego Springs, CA <http://www.rtmcastronomyexpo.org/nightfall.htm>

EAS MEMBER NEWS

Sidewalk Astronomy

We are looking for volunteers who could do a series of Sidewalk Astronomy sessions this spring and summer, at a local park or public venue. For safety, moral support, and effectiveness, this should be done in teams of at least two people with telescopes. Special events like eclipse or comets especially draw the interest of the public.

School and Community Group Astronomy Outreach

We often have requests for members of the EAS to come and help with an 'astronomy night' event from local schools, scout groups, senior homes, or similar groups. Usually this would be in the form of a star party at their gathering, or perhaps a short slide show or night sky talk. Providing education and support to the community about interest astronomy is one of the main missions of the EAS. Please let club president know if you are interested and available to be on list of volunteers to handle these requests, so that we can say YES when people ask. A star party night can be a rewarding event for all involved. **Please email Mark Folkerts with your interest (or suggestions).**

Attention EAS Members – 10% Discount for all Everett Astronomical Society Members at Aurora Astro Products

"Show your club membership card at Jim Bielaga's new astronomy store 'Aurora Astro Products' and receive a 10% discount on all purchases. This is an exclusive discount to E.A.S. members only.

I am proud to be able to offer this discount to Everett club members, and thanks for the support you have shown me on opening my new store. Also I have made great friends and learned a lot being a club member since 1991.

- Clear Skies, Jim Bielaga"

>> Members – please look at your EAS membership card to see when your membership dues are payable. If you are more than three months past due, the club will officially assume that you no longer wish to be a member, and remove you from the membership rolls. <<

Count the Stars to Measure Sky Darkness this month:

http://www.windows.ucar.edu/citizen_science/starcount/



Aurora Astro

Aurora Astro Products

"Your Northern Light in the Astronomy Business"
Over 37 product dealerships, and growing

11419 19th Avenue SE #A102

Everett, WA 98208

www.auroraastro.com

425-337-4384

425-337-4758 fax

New hours:

Monday, Thursday, Friday – 9:00 am to 6:00 pm

Tuesday/Wednesday – Noon to 8:00 pm

Saturday – 10:00 am to 5:00 pm

Also, those who have subscriptions to Sky and Telescope can now pay their own subscription as long as they are EAS members in good standing. Members will now be able to renew directly via mail or phone and still obtain the club discount. The subscribers may mail in the renewal notices with their payment, or renew via phone at (800) 253-0245. Payment at the time of renewal is required. Once a year, Sky and Telescope will check with the EAS club treasurer to see that the subscribers are still members in good standing to qualify for the discount. New members will continue to subscribe through the club treasurer.

\$\$ - FINANCIAL HEALTH - \$\$

The club maintains a \$750+ balance. We try to keep approximately a \$500 balance to allow for contingencies.

CLUB SCOPES

SCOPE

10-INCH WARD DOBSONIAN

10-INCH SONOTUBE DOBSONIAN

8-INCH DOBSONIAN

EAS members: contact VP James Bielaga at (425) 337-4384 or jamesbielaga@aol.com to borrow a scope.

LOAN STATUS

AVAILABLE

AVAILABLE

AVAILABLE

Does Anyone know about the history of the EAS ???

The Northwest Region of the Astronomical League (NWRAL) is putting together a new website and needs the following information from each club of the NWRAL. The EAS is looking for any information from members about the early history. Please contact Mark Folkerts if you have any info that could be of help. NWRAL would like a brief history of the club

- Club established date (approx 1986 ?)
- Who started the club (Terry Bacon, et. al.)
- When club joined the Astronomical League.

ASTRO CALENDAR FOR 2008

October 2008

Oct 04 – EAS monthly suburban star party – Ron Tam's place

Oct 08 - Draconids meteor shower peak

Oct 17 - Epsilon-Geminids meteor shower peak

Oct 21 - Orionids Meteor Shower Peak

Oct 25 – EAS Meeting 7:00 pm Aurora Astro Products store

Oct 27 - Asteroid 4 Vesta Closest Approach To Earth (1.539 AU)

November 2008**Nov 01 – EAS monthly suburban star party – Ron Tam's place**

Nov 03 - Taurids meteor Shower Peak

Nov 17 - Leonids meteor Shower Peak

Nov 22 – EAS Meeting 7:00 pm Aurora Astro Products store**December 2008**

Dec 01 - Conjunction of Moon, Venus, and Jupiter (3 Degree Triangle)

Dec 01 - Moon Occults Venus

Dec 13 - Geminids meteor shower peak

Dec 21 - Winter Solstice, 12:04 UT

Dec 22 - Ursids meteor shower peak

Dec 29 - Moon Occults Jupiter

UW Astronomy Speakers Colloquium Schedule

Astronomy Department weekly colloquium meets Thursdays at 4:00 pm in PAB A102 - the classroom part of the Physics/Astronomy Building complex.

<http://www.astro.washington.edu/pages/colloquium.html>

ON THE AIRWAVES - KSER 90.7 - 'IT'S OVER YOUR HEAD'

"Our group of radio script writers now consists of EAS and SAS members Jim Ehrmin, Greg Donohue, and Ted Vosk, who are now regularly writing and helping to produce our **astronomy radio show, "It's Over Your Head"** on radio station **KSER, FM 90.7**. The five-minute segment is broadcast **every Wednesday morning at approximately 8:20 A.M.** and gives a weekly look at what's up in the sky over Snohomish County, with other information. If you are a listener to the program, show your support by giving the program director of KSER a call!" Web page with lots of archives and other info is available at <http://www.celestialnorth.org/radio/index.php> and podcasts at <http://www.celestialnorth.org/radio/index.php>

KPLU 88.5 FM National Public Radio has daily broadcasts of "Star Date" by the McDonald Observatory of the University of Texas at Austin, Monday through Friday at about 6:05 pm. The short 2 minute radio show deals with current topics of interest in astronomy. The University of Washington TV broadcasts programs from NASA at 12:00 AM Monday through Friday, 12:30 AM Saturday, and 1:30 AM Sunday on the Channel 27 cable station.

EAS MEMBERSHIP BENEFITS & INFORMATION**EAS Benefits -**

Membership in the **Everett Astronomical Society (EAS)** includes invitations to all of the club meetings and star parties, plus the monthly newsletter, **The Stargazer**. Currently, a 10% discount is also being offered to EAS members for purchases at Aurora Astro Products in Everett

Magazine Discounts –

In addition you will be able to subscribe to **Sky and Telescope** for \$7 off the normal subscription rate, contact the treasurer (Carol Gore) for more information. <http://everettastro.org/application.htm> (When renewing your subscription to **Sky & Telescope** you should send your **S&T renewal form along with a check made out to Everett Astronomical Society to the EAS address**. The EAS treasurer Carol Gore will renew your **Sky and Telescope** subscription for you. **Astronomy** magazine offers a similar opportunity to club members.)

Membership in the Astronomical League -

EAS is a member of the **Astronomical League** and you will receive the Astronomical League's quarterly newsletter magazine, **The Reflector**.

EAS Club Telescope Borrowing -

Being a member also allows you the use of the club's telescopes, including an award winning 10 inch Dobsonian mount reflector, a second 10" dob, or and 8" Dobsonian. Contact Jim Bielaga (425) 337-4384 to borrow a telescope.

10% Discount on Purchases at 'Aurora Astro Products' in Everett -

EAS members are currently offered a 10% discount for all purchases of any telescopes, accessories, or other items at Aurora Astro Products, when they show their EAS membership card.

EAS Library -

Membership will give you access to all the material in the lending library. The library, which is maintained by Mike Locke, consists of VCR tapes, DVDs, many books, magazines, and software titles. The EAS has a library of books, videotapes, and software for members to borrow. We always value any items you would like to donate to this library. You can contact a club officer or **Librarian Mike Locke**, phone (425) 259-5995, email lockemi at comcast.net, to borrow or donate any materials. See list here: http://everettastro.org/eas_library.htm

Joining or Renewing with the EAS -

EAS dues are \$25 / year per family. Funds obtained from membership dues allows the EAS to publish the Stargazer newsletter, pay Astronomical League dues, pay insurance, host a web site, and maintain our library. If it has been a year since you paid your dues, please re-subscribe to keep the club financially solvent, and to continue to receive membership benefits. <http://everettastro.org/application.htm>

Send your annual dues renewals to the**Everett Astronomical Society****P.O. Box 12746, Everett, WA 98206.****OBSERVER'S INFORMATION...****LUNAR FACTS**

Oct 21	Last Quarter Moon
Oct 28	New Moon
Nov 06	First Quarter Moon
Nov 13	Full Moon
Nov 19	Last Quarter Moon
Nov 27	New Moon
Dec 05	First Quarter Moon
Dec 12	Full Moon
Dec 19	Last Quarter Moon
Dec 27	New Moon
Jan 04	First Quarter Moon
Jan 11	Full Moon

Digital Lunar Orbiter Photographic Atlas of the Moon

The Lunar and Planetary Institute has created a digital version of the Lunar Orbiter Photographic Atlas of the Moon, and Consolidated Lunar Atlas available online at:

<http://www.lpi.usra.edu/research/cla/menu.html>

http://www.lpi.usra.edu/research/lunar_orbiter

UP IN THE SKY -- THE PLANETS (AND PLUTO)

Object	Rises	Sets	Con	Diam.	Mag
Sun	07:44 am	18:02	Vir	30'	-27.5
Mercury	06:04 am	17:35	Vir	06"	-0.2
Venus	11:04 am	19:30	Oph	13"	-4.0
Mars	08:52 am	19:29	Lib	04"	+1.5
Jupiter	13:46	22:13	Sag	37"	-2.1
Saturn	03:40 am	16:41	Leo	16"	+1.0
Uranus	16:31	03:55am	Aqr	04"	+5.8
Neptune	15:30	01:26 am	Cap	02"	+7.9
Pluto	12:05	21:28	Sag	--	+14.0

(times listed are in local time for Everett PDT)

Observing Jupiter's Moons – Java tool

<http://skytonight.com/observing/objects/javascript/jupiter>

Transit times for Jupiter's Great Red Spot in 2008

<http://skytonight.com/observing/objects/planets/3304091.html>

NOAA SUN CALCULATOR

Need to know exactly what time the sun will set on Sept. 26, 2065? Or when it rose in 565 BC? How about the length of daylight a week from Tuesday in Albuquerque, N.M.? Just go to NOAA's solar calculator, now available on the Web. <http://www.srb.noaa.gov/highlights/sunrise/gen.html>

INTERNATIONAL SPACE STATION – VISIBLE SEATTLE PASSES

ISS **Visibility** – **Heavens** **Above:**
<http://www.heavens-above.com/PassSummary.asp?lat=47.979&lng=-122.201&alt=0&loc=Everett&TZ=PST&satid=25544>

CONSTELLATIONS OF THE MONTH - PHOENIX

PHOENIX: Phoenix borders on the constellations of Eridanus, Fornax, Grus, Sculptor, and Tucana. The abbreviation for this constellation is "Phe", and the possessive form is Phoenicis. There are no established asterisms within its borders. Phoenix ranks 64th in overall brightness among the constellations, but 37th in size; it takes up approximately 469.32 square degrees (or 1.138% of the sky). Phoenix contains two known meteor showers: the July Phoenicids (July 14th) and the December Phoenicids (December 5th), and no Messier objects. Phoenix is completely visible from latitudes South of +32 degrees, and completely invisible from latitudes North of +50 degrees. It has 27 stars brighter than magnitude 5.5, and its central point is at RA=00h54m, Dec.= -49 degrees. The solar conjunction date of Phoenix is April 5th, and its midnight culmination date is October 4th. Phoenix is one of 11 constellations invented by Pieter Dirksz Keyser and Frederick de Houtman, during the years 1595-1597. Some sources state that this is in one of Johann Bayer's constellations, outlined in the year 1603.

Representing the mythological bird that rose from its own ashes, Phoenix is dominated by its brightest star: magnitude +2.4 Alpha (also known as Ankaa). Beta Phoenicis is a triple star system, with magnitude +4 A and B components separated by 1.4 arc seconds. The third component (with a magnitude of +11.5) is found 57.5 arc seconds distant. Zeta Phoenicis is also a triple star system, with its A and B components too close to split with anything less than a 10-inch (25 centimeter) telescope. Component A is magnitude +4; component B is magnitude +7, and these are separated by less than one arc second. Component C is magnitude +8 and is 6.4 arc seconds distant. The brightest star is also itself an eclipsing binary; its magnitude ranges from +3.9 to +4.4 in a period of 1.67 days.

Phoenix contains one galaxy of note: NGC 625, an elongated oval of light (brighter along the central axis). It is a barred spiral lying two degrees south of Gamma Phoenicis. It has a condensed and bright nuclear area 30" across, surrounded by a 3.0' x 1.3' diameter haze of greenish hue.

Phoenix also contains the unusual Cepheid variable star SX Phoenicis, about 8 degrees west of Ankaa. Its magnitude range is 6.8 to 7.5 (it must be carefully compared with surrounding stars to accurately determine its brightness), and its period is only 0.05 days (just 1.2 hours!). With careful observation, you can see this star change noticeably during a single observing session.

YOUNG ASTRONOMER'S CORNER

It's time for some questions and answers again!!!

Q: Do we have a real picture of our Galaxy (the Milky Way)?

A: No, we don't have an actual picture of our Galaxy from a distance. Because we live inside the Milky Way, we would have to travel thousands of light-years away from it to "get it all in" the picture (so to speak.....just like you would have to move away from your car or house to "get it all in" the picture). Unfortunately, human beings cannot even travel a few million miles to the next planet, let alone thousands of light-years (one light-year equals about 95,000,000,000,000 kilometers or 57,000,000,000 miles!!). Even spacecraft that are on the boundaries of the outer Solar System (like the Voyager craft) could only "look" at their home solar system or a little bit beyond, let alone "getting all in" the vast number of stars (and solar systems) that make up the Milky Way Galaxy.

Q. How many galaxies are there in the universe?

A: Over 100 billion! There are even more galaxies in the Universe than there are stars in our night sky. We can see only three galaxies from Earth without a telescope: the Andromeda galaxy and the two Magellanic clouds in the Southern Hemisphere; all the others are too faint without the assistance of a telescope. Astronomers have photographed "only" thousands of these (over 100 billion) distant galaxies, *each* of which contains *billions* of stars!!

Q: Are all galaxies shaped like the Milky Way... that is, like a spiral or "pinwheel"?

A: No: there are many other galaxy shapes in the Universe. Elliptical shaped galaxies are huge balls of stars without spiral or pinwheel structure; these can range from almost perfect circle or sphere shapes to more oval shapes. Irregular galaxies don't have any specific pattern: the Milky Way's two companion galaxies (the Large and Small Magellanic Clouds) are examples of irregular galaxies. Peculiar galaxies are stranger still: they may have some spiral or elliptical structure, but they may also have been recently colliding with another galaxy (leading to some very odd appearances), or have large amounts of energy coming from them (such as very active star-forming "Starburst" galaxies). Other galaxies included in the list of peculiar galaxies are dwarf galaxies, ring galaxies, and even "spiral" galaxies with very weird looking "spiral" arms – or perhaps even only one spiral arm!!!

ASTRONOMY & TELESCOPE LINGO

Astronomy Lingo: GREEN FLASH: Also a meteorological phenomenon, the green flash is a flash of green light which may be seen near the upper rim of a rising or setting sun. When the sun is near the horizon, its light penetrates a thicker section of atmosphere (with more particles in the atmosphere to refract light); this thicker part of the atmosphere refracts sunlight, with purple and blue light bending the most, and red the least. Because of this refraction or bending, more blue light should appear along the top rim of the sun. However, because the atmosphere also selectively scatters blue light, very little of this wavelength reaches us, and we see green light (or the green flash) instead. Under certain atmospheric conditions (such as when the surface air is hot or when an upper level inversion exists), the green flash is magnified by the atmosphere, making the flash momentarily visible. The green flash usually lasts about a second, but can last longer in polar regions of Earth's atmosphere, where the sun slowly changes in elevation. Indeed, it has been documented in one of Admiral Byrd's southern expeditions that the green flash was observed for a total of 35 minutes (!!) one September, as the sun very slowly rose above the horizon, marking the end of the long winter!

TELESCOPE / EQUIPMENT “LINGO”: SPILLOVER: The part of the system noise (i.e., receiver noise; antenna/feeder thermal loss noise; galactic synchrotron emission noise from a radio source; and ground and atmospheric thermal emission noise) of a radio telescope using a dish antenna, that results from pick-up by the feed (i.e., the secondary antenna), from directions that do not intercept the reflecting surface of the dish.

PLANETARY FOCUS

Planetary Focus last published in September, and will return in the near future.

ASTRONOMY “FUN FACTS”

★★ The temperature of lightning is hotter than the surface of the Sun: lightning is about 30,000 degrees Kelvin compared to the Sun's photosphere temperature of 5,000 degrees Kelvin. If we were to travel to and visit the Sun (it is not possible, and you wouldn't survive), you would first have to pass through the even hotter Sun's corona: it's temperature is 15,000,000 degrees Kelvin, 500 times the temperature of lightning!!

★★ Two of the planets, when seen through telescopes, go through phases like the Moon: i.e., they go from crescent to full, just like our Moon: these are Mercury and Venus. Because these two planets have orbital paths closer to the Sun than does Earth, they appear fully illuminated when they are beyond the Sun in their orbits; only crescent rims of the illuminated portions are seen however when their orbits bring them closer to Earth (i.e., when their orbits bring them between them to the Earth side of the Sun).

★★ Astronomers call the average distance between the Sun and the Earth – 93,000,000 million miles – an astronomical unit. Thus, Earth is one (1) astronomical unit from the Sun. The distance from the Sun to the its nearest stellar neighbor – Proxima Centauri – is 4.3 light years, or 267,000 astronomical units!! (And... at a scale of 1 AU equals 1 inch, then 1 light year is approximately 1 mile, so with a model having Earth orbiting 1 inch from the Sun, Proxima would be about 4.3 miles (272,000 inches) away !)

★★ Both Ganymede (Jupiter's largest moon) and Titan (Saturn's largest) are themselves larger than the planet Mercury, as well as the (former??) planet Pluto!!

★★ A part of the Sun's radiation continues to shine on the earth at night, even when the Sun is on the other side of the planet. Neutrinos, which are produced deep in the Sun's core from nuclear reactions, can travel through anything without being impeded, including the Earth itself; that is, they can shine 'up' at us during the night!!

“MIRROR IMAGES”

“MIRROR” IMAGES : Because we live in the Northern Hemisphere, we often tend to focus (in both observing and reading) on celestial objects in this hemisphere. The point of this column is to inform club members about similar objects in the Southern Hemisphere (to the ones we are already familiar with in the Northern Hemisphere). The general class of object will first be defined, and then a representative object from each hemisphere will be described. **Note: “MIRROR” IMAGES” is strictly the name of the new column, and is not intended to imply that there is optical mirror symmetry between the two objects.**

RV TAURI STARS: A small group of very luminous pulsating variables; these are primarily G and K stars with some F stars

included as well. RV Tauri stars are yellow supergiants with extended atmospheres of gas that emit infrared radiation; these atmospheres may have possibly been driven off (or 'extended') by the pulsations themselves. RV Tauri stars have characteristic light curves with alternating shallow and deep minima, and periods ranging from 20 to 145 days. These stars are classified as semi-regular variables, because the luminosity fluctuations can be significantly perturbed in shape and period (for example), being most pronounced for longer-period stars.

RV Tauri stars can be discerned from other similar semi-regular yellow stars by variations in their color indices: RV Tauri stars' color indices mimic the light curves of these other similar yellow stars, but go through a maximum only a short time before the luminosity minimum. A smaller group of RV Tauri stars also have double periodicity: DF Cygni is an example. DF Cygni has two separate oscillations in luminosity: one is a rapid 50-day oscillation, and this is superimposed on a much slower 780-day oscillation with a significantly greater amplitude.

NORTHERN HEMISPHERE EXAMPLE: RV TAURI.

SOUTHERN HEMISPHERE EXAMPLE(S): R SCUTI; R SAGITAE.

ASTRONOMICAL NOTES -- ON & OFF THE WEB...

FERMI SPACE TELESCOPE DISCOVERS FIRST GAMMA-RAY-ONLY PULSAR

About three times a second, a 10,000-year-old stellar corpse sweeps a beam of gamma-rays toward Earth. Discovered by Fermi Gamma-ray Space Telescope, the object, called a pulsar, is the first one known that only "blinks" in gamma rays. *"This is the first example of a new class of pulsars that will give us fundamental insights into how these collapsed stars work,"* said Peter Michelson, principal investigator for Fermi's Large Area Telescope.

The gamma-ray-only pulsar lies within a supernova remnant known as CTA 1, which is located about 4,600 light-years away in the constellation Cepheus. Its lighthouse-like beam sweeps Earth's way every 316.86 milliseconds. The pulsar, which formed about 10,000 years ago, emits 1,000 times the energy of our sun.

A pulsar is a rapidly spinning neutron star, the crushed core left behind when a massive sun explodes. Astronomers have cataloged nearly 1,800 pulsars. Although most were found through their pulses at radio wavelengths, some of these objects also beam energy in other forms, including visible light and X-rays. However, the source in CTA 1 only pulses at gamma-ray energies. *"We think the region that emits the pulsed gamma rays is broader than that responsible for pulses of lower-energy radiation,"* explained team member Alice Harding. *"The radio beam probably never swings toward Earth, so we never see it. But the wider gamma-ray beam does sweep our way."*

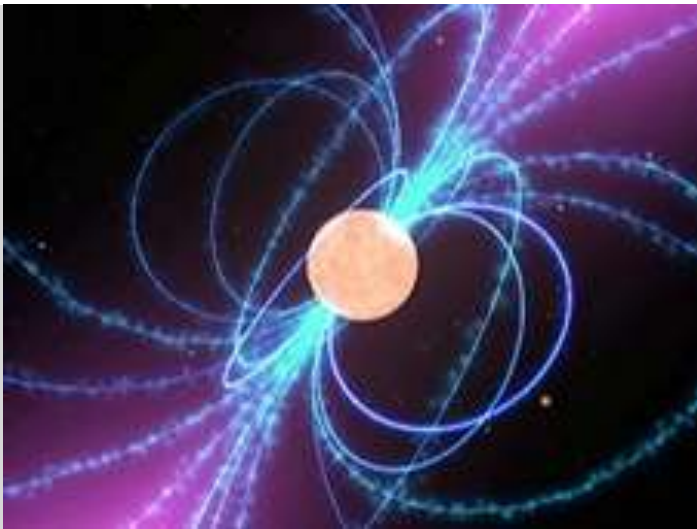
Scientists think CTA 1 is only the first of a large population of similar objects. *"The Large Area Telescope provides us with a unique probe of the galaxy's pulsar population, revealing objects we would not otherwise even know exist,"* says Fermi project scientist Steve Ritz, also at Goddard.

The pulsar in CTA 1 is not located at the center of the remnant's expanding gaseous shell. Supernova explosions can be asymmetrical, often imparting a "kick" that sends the neutron star careening through space. Based on the remnant's age and the pulsar's distance from its center, astronomers believe the neutron star is moving at about a million miles per hour -- a typical speed.

Fermi's Large Area Telescope scans the entire sky every three hours and detects photons with energies ranging from 20 million to more than 300 billion times the energy of visible light. The instrument sees about one gamma ray every minute from CTA 1, enough for scientists to piece together the neutron star's pulsing behavior, its rotation period, and the rate at which it is slowing down.

A pulsar's beams arise because neutron stars possess intense magnetic fields and rotate rapidly. Charged particles stream outward from the star's magnetic poles at nearly the speed of light to create the gamma-ray beams Fermi sees. Because the beams are powered by the neutron star's rotation, they gradually slow the pulsar's spin. In the case of CTA 1, the rotation period is increasing by about one second every 87,000 years.

"This observation shows the power of the Large Area Telescope," Michelson said. "It is so sensitive that we can now discover new types of objects just by observing their gamma-ray emissions."



A paper about the new pulsar appears in the Oct. 16 edition of Science Express. For images and animations associated with this release, visit: <http://www.nasa.gov/fermi>

SPITZER REVEALS PUZZLING STRUCTURES INSIDE COMET HOLMES

When comet Holmes unexpectedly erupted in 2007, professional and amateur astronomers around the world turned their telescopes toward the spectacular event. Their quest was to find out why the comet had suddenly exploded. Observations taken of the comet after the explosion by Spitzer Space Telescope deepened the mystery, showing oddly behaving streamers in the shell of dust surrounding the nucleus of the comet. The data also offer a rare look at the material liberated from within the nucleus, and confirm previous findings from Stardust and Deep Impact missions. "The data we got from Spitzer do not look like anything we typically see when looking at comets," said Bill Reach. Reach is lead investigator of the Spitzer observations. "The comet Holmes explosion gave us a rare glimpse at the inside of a comet nucleus."

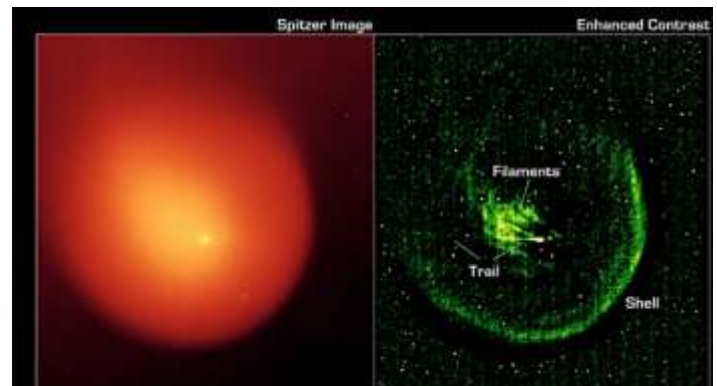
Every six years, comet 17P/Holmes speeds away from Jupiter and heads inward toward the sun, traveling the same route typically without incident. However, twice in the last 116 years, in November 1892 and October 2007, comet Holmes exploded as it approached the asteroid belt, and brightened a million-fold overnight. In an attempt to understand these odd occurrences, astronomers pointed Spitzer Space Telescope at the comet in

November 2007 and March 2008. By using Spitzer's infrared spectrograph instrument, Reach was able to gain valuable insights into the composition of Holmes' solid interior. Like a prism spreading visible-light into a rainbow, the spectrograph breaks up infrared light from the comet into its component parts, revealing the fingerprints of various chemicals.

In November of 2007, Reach noticed a lot of fine silicate dust, or crystallized grains smaller than sand, like crushed gems. He noted that this particular observation revealed materials similar to those seen around other comets where grains have been treated violently, including Deep Impact mission, which smashed a projectile into comet Tempel, the Stardust mission, which swept particles from comet Wild 2 into a collector at 13,000 miles per hour (21,000 kilometers per hour), and the outburst of comet Hale-Bopp in 1995. "Comet dust is very sensitive, meaning that the grains are very easily destroyed", said Reach. "We think the fine silicates are produced in these violent events by the destruction of larger particles originating inside the comet nucleus."

When Spitzer observed the same portion of the comet again in March 2008, the fine-grained silicate dust was gone and only larger particles were present. "The March observation tells us that there is a very small window for studying composition of comet dust after a violent event like comet Holmes' outburst," said Reach.

Comet Holmes not only has unusual dusty components, it also does not look like a typical comet. According to Jeremie Vaubaillon, a colleague of Reach's, pictures snapped from the ground shortly after the outburst revealed streamers in the shell of dust surrounding the comet. Scientists suspect they were produced after the explosion by fragments escaping the comet's nucleus.



In November 2007, the streamers pointed away from the sun, which seemed natural because scientists believed that radiation from the sun was pushing these fragments straight back. However, when Spitzer imaged the same streamers in March 2008, they were surprised to find them still pointing in the same direction as five months before, even though the comet had moved and sunlight was arriving from a different location. "We have never seen anything like this in a comet before. The extended shape still needs to be fully understood," said Vaubaillon. He notes that the shell surrounding the comet also acts peculiarly. The shape of the shell did not change as expected from November 2007 to March 2008. Vaubaillon said this is because the dust grains seen in March 2008 are relatively large, approximately one millimeter in size, and thus harder to move.

"If the shell was comprised of smaller dust grains, it would have changed as the orientation of the sun changes with time," said

Vaubillon. *"This Spitzer image is very unique. No other telescope has seen comet Holmes in this much detail, five months after the explosion."* *"Like people, all comets are a little different. We've been studying comets for hundreds of years â 116 years in the case of comet Holmes â but still do not really understand them,"* said Reach. *"However, with the Spitzer observations and data from other telescopes, we are getting closer."*

TIDES HAVE MAJOR IMPACT ON PLANET HABITABILITY

Astronomers searching for rocky planets that could support life in other solar systems should look outside, as well as within, the so-called "habitable zone," scientists say.

Planets too close to their stars are roasted. Planets too far from their stars are frozen. In between, research models show, there's a habitable zone where planet temperatures approximate Earth's. Any rocky planets in this just-right Goldilocks zone could be awash in liquid water, a requisite for life as we know it, theorists say.

New research by Brian Jackson, Rory Barnes and Richard Greenberg of Lunar and Planetary Laboratory shows that tides can play a major role in heating terrestrial planets, creating hellish conditions on rocky alien worlds that otherwise might be livable. And just the other way, tidal heat can also create conditions favorable to life on planets that would otherwise be unlivable. Jackson presented the research titled *"Tidal Heating of Extrasolar Terrestrial-scale Planets and Constraints on Habitability."*

Our own solar system is something of an anomaly, in that its planets move in relatively quiescent, circular orbits around the sun. Most extrasolar planets found to date have highly elongated orbits. During each orbit, the planet is stretched most by tides when it is near the star, and less when the planet is farther from its star. The resulting friction generates internal heat, which drives the planet's geophysical processes.

If the recently discovered "super-Earths" - extrasolar planets only 2- to 10 times as massive as Earth - are indeed terrestrial, tidal heating may be great enough to melt them, or at least produce volcanism on par with Jupiter's moon, Io, *"dimming their prospects for habitability,"* Jackson said. So some of the recently discovered super-Earths may be more like "super-Ios," he said. The Io moon is the most volcanically active body in our solar system. *"Tidal heating scales with planet mass, so we expect that most easily detectable super-Earths will be dominated by volcanic activity,"* Jackson said. *"That's one of our first conclusions from this work, that the first Earth-like planets found are probably going to be strongly heated and have big volcanoes. Even if Earth-like planets are found within the habitable zone, they may not be habitable because they will be overwhelmed by this tidal heating."*

Tidal heating may also create habitable conditions on planets that otherwise are too small or too cold to support life, Jackson said. Tidal heating can enhance outgassing of volatiles that contribute or replenish a planet's atmosphere through volcanism. Tidal heating also can generate sub-surface liquid oceans on water-rich rocky planets that would otherwise be frozen, just as tidal heating is believed to warm a sub-surface liquid water ocean on Jupiter's moon Europa.

Also, tidal heating can drive plate tectonics, a mechanism that checks excessive carbon dioxide from accumulating in a planetary atmosphere, producing the kind of deadly greenhouse atmosphere found on Venus. *"Our study shows that tidal heating could produce enough heat to drive plate tectonics for billions of years, long enough for life to appear and flourish,"* Jackson said.

KECK TELESCOPE (WITH AO) AND "COSMIC LENS" RESOLVE NATURE AND FATE OF EARLY STAR-FORMING GALAXY

Astronomers have provided unique insight into the nature of a young star-forming galaxy as it appeared only two billion years after the Big Bang and determined how the galaxy may eventually evolve to become a system like our own Milky Way.

The team made their observations by coupling two techniques, gravitational lensing--which makes use of an effect first predicted by Albert Einstein in which the gravitational field of massive objects, such as foreground galaxies, bends light rays from objects located a distance behind, thus magnifying the appearance of distant sources--and laser-assisted guide star (LGS) adaptive optics (AO) on the 10-meter Keck Telescope in Hawaii. Adaptive optics corrects the blurring effects of Earth's atmosphere by real-time monitoring of the signal from a natural guide star or an artificial guide star. Gravitational lensing enlarged the distant galaxy in angular size by a factor of about 8 in each direction. Together with the enhanced resolution using adaptive optics, this allowed the team to determine the internal velocity structure of the remote galaxy, located 11 billion light-years from Earth, and hence its likely future evolution.

The researchers found that the distant galaxy, which is typical in many respects to others at that epoch, shows clear signs of orderly rotation. The finding, in association with observations conducted at millimeter wavelengths, which are sensitive to cold molecular gas (an indicator of galactic rotation), suggests that the source is in the early stages of assembling a spiral disk with a central nucleus similar to those seen in spiral galaxies at the present day.

Using the Hubble Space Telescope, the team located a distinctive galaxy dubbed the "Cosmic Eye" because its form is distorted into a ring-shaped structure by the gravitational field of a foreground galaxy. *"Gravity has effectively provided us with an additional zoom lens, enabling us to study this distant galaxy on scales approaching only a few hundred light-years. This is 10 times finer sampling than hitherto possible,"* explains postdoctoral researcher Dan Stark, the leader of the study. *"As a result, we can see, for the first time, that a typical-sized young galaxy is spinning and slowly evolving into a spiral galaxy much like our own Milky Way,"* he says.

The research provides a demonstration of the likely power of the future Thirty Meter Telescope (TMT), the first of a new generation of large telescopes designed to exploit AO. When completed in the latter half of the next decade, TMT's large aperture and improved optics will produce images with an angular resolution three times better than the 10-meter Keck and 12 times better than the Hubble Space Telescope, at similar wavelengths. Because of the significant improvement in angular resolution provided by AO, the TMT will be able to study the internal properties of small distant galaxies, seen as they were when the universe was young.

Likewise, the Atacama Large Millimeter Array (ALMA), a large interferometer being completed in Chile, will provide a major step forward in mapping the extremely faint emission from cold hydrogen gas--the principal component of young, distant galaxies and a clear marker of cold molecular gas--compared to the coarser capabilities of present facilities. In their recent research, the Caltech-led team has provided a glimpse of what can be done with the superior performance expected of TMT and ALMA.

The key spectroscopic observations were made with the OSIRIS instrument, developed specifically for the Keck AO system by astrophysicist James Larkin and collaborators. Stark and his

coworkers used the OSIRIS instrument to map the velocity across the source in fine detail, allowing them to demonstrate that it has a primitive rotating disk.

To aid in their analysis, the researchers combined data from the Keck Observatory with data taken at millimeter wavelengths by the Plateau de Bure Interferometer (PdBI), located in the French Alps. This PdBI instrument is sensitive to the distribution of cold gas that has yet to collapse to form stars. These observations give a hint of what will soon be routine with the ALMA interferometer.

"Remarkably, the cold gas traced by our millimeter observations shares the rotation shown by the young stars seen in the Keck observations. The distribution of gas seen with our amazing resolution indicates we are witnessing the gradual buildup of a spiral disk with a central nuclear component," explains co-investigator Mark Swinbank, who was involved in both the Keck and PdBI observations.

This work demonstrates how important angular resolution has become in ensuring progress in extragalactic astronomy. This will be the key gain of both the TMT and ALMA facilities.

"For decades, astronomers were content to build bigger telescopes, arguing that light-gathering power was the primary measure of a telescope's ability," explains Richard S. Ellis, a coauthor on the study. *"However, adaptive optics and interferometry are now providing ground-based astronomers with the additional gain of angular resolution. The combination of a large aperture and exquisite resolution is very effective for studying the internal properties of distant and faint sources seen as they were when the universe was young. This is the exciting future we can expect with TMT and ALMA, and, thanks to the magnification of a gravitational lens, we have an early demonstration here in this study,"* he says. The Thirty Meter Telescope is currently in a detailed design and development. <http://www.tmt.org> <http://www.alma.nrao.edu> : <https://www.keckobservatory.org>

WORLDS IN COLLISION

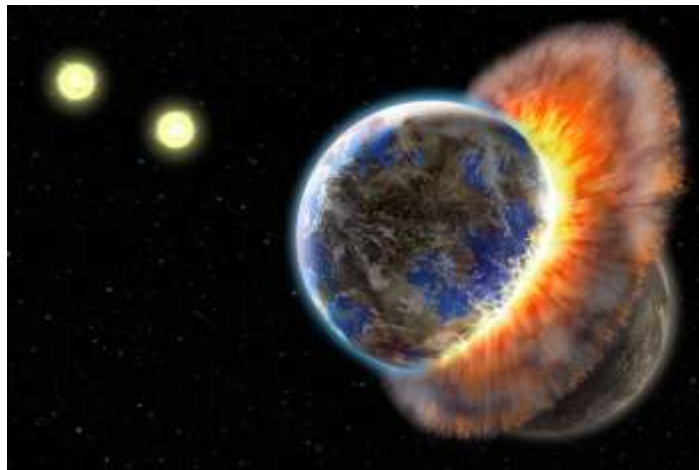
Astronomers have discovered dusty remains of two terrestrial planets. Two terrestrial planets orbiting a mature sun-like star some 300 light-years from Earth recently suffered a violent collision, astronomers will report in December.

"It's as if Earth and Venus collided with each other," said Benjamin Zuckerman, a co-author on the paper. *"Astronomers have never seen anything like this before. Apparently, major catastrophic collisions can take place in a fully mature planetary system." "If any life was present on either planet, the massive collision would have wiped out everything in a matter of minutes - the ultimate extinction event,"* said co-author Gregory Henry. *"A massive disk of infrared-emitting dust circling the star provides silent testimony to this sad fate."*

Zuckerman, Henry and Michael Muno were studying a star known as BD+20 307, which is surrounded by a shocking 1 million times more dust than is orbiting our sun. The star is located in the constellation Aries. The astronomers gathered X-ray data using the orbiting Chandra X-ray Observatory and brightness data from one of the automated telescopes in southern Arizona, hoping to measure the age of the star.

"We expected to find that BD+20 307 was relatively young, a few hundred million years old at most, with the massive dust ring signaling the final stages in the formation of the star's planetary system," Muno said.

Those expectations were shown to be premature, however, when astronomer Alycia Weinberger announced that BD+20 307 is actually a close binary star - two stars orbiting around their common center of mass.



Artist's conception of the planetary collision in the BD +20 307 binary system (Acknowledgement: artist Lynette Cook)

"That discovery radically revised the interpretation of the data and transformed the star into a unique and intriguing system," said astronomer Francis Fekel who, along with Michael Williamson, was asked to provide additional spectroscopic data from an automated telescope in Arizona to assist in comprehending this exceptional binary system. The new spectroscopic data confirmed that BD+20 307 is composed of two stars, both very similar in mass, temperature and size to our own sun. They orbit about their common center of mass every 3.42 days.

"The patterns of element abundances in the stars show that they are much older than a few hundred million years, as originally thought," Fekel said. *"Instead, the binary system appears to have an age of several billion years, comparable to our solar system."*

"The planetary collision in BD+20 307 was not observed directly but rather was inferred from the extraordinary quantity of dust particles that orbit the binary pair at about the same distance as Earth and Venus are from our sun," Henry said. *"If this dust does indeed point to the presence of terrestrial planets, then this represents the first known example of planets of any mass in orbit around a close binary star."*

Zuckerman and colleagues first reported in July 2005 that BD+20 307, then still thought to be a single star, was surrounded by more warm orbiting dust than any other sun-like star known to astronomers. The dust is orbiting the binary system very closely, where Earth-like planets are most likely to be and where dust typically cannot survive long. Small dust particles get pushed away by stellar radiation, while larger pieces get reduced to dust in collisions within the disk and are then whisked away. Thus, the dust-forming collision near BD+20 307 must have taken place rather recently, probably within the past few hundred thousand years and perhaps much more recently, the astronomers said.

"This poses two very interesting questions," Fekel said. *"How do planetary orbits become destabilized in such an old, mature system, and could such a collision happen in our own solar system?"*

"The stability of planetary orbits in our own solar system has been considered for nearly two decades by astronomer Jacques Laskar

in France and, more recently, by Konstantin Batygin and Greg Laughlin in the U.S.A.," Henry noted. "Their computer models predict planetary motions into the distant future and they find a small probability for collisions of Mercury with Earth or Venus sometime in the next billion years or more. The small probability of this happening may be related to the rarity of very dusty planetary systems like BD+20 307."

"There is no question, however," Zuckerman said, "that major collisions have occurred in our solar system's past. Many astronomers believe our moon was formed from the grazing collision of two planetary embryos - the young Earth and a body about the size of Mars - a crash that created tremendous debris, some of which condensed to form the moon and some of which went into orbit around the young sun. By contrast with the massive crash in the BD+20 307 system, the collision of an asteroid with Earth 65 million years ago, the most favored explanation for the final demise of the dinosaurs, was a mere pipsqueak."

In their 1932 novel "When Worlds Collide," science fiction writers Philip Wylie and Edwin Balmer envisioned the destruction of Earth by a collision with a planet of a passing star. The 1951 classic movie based on the novel began a long line of adventure stories of space rocks apocalyptically plowing into Earth. "But," Zuckerman noted, "there is no evidence near BD+20 307 of any such passing star."

http://schwab.tsuniv.edu/news/BD+20_307/pressrelease.html
<http://newsroom.ucla.edu/portal/ucla/worlds-in-collision-astronomers-63891.aspx>

SCIENTIST PROPOSES EXPLANATION FOR PUZZLING PROPERTY OF NIGHT-SHINING CLOUDS AT THE EDGE OF SPACE

An explanation for a strange property of noctilucent clouds--thin, wispy clouds hovering at the edge of space at 85 km altitude--has been proposed by an experimental plasma physicist at Caltech, possibly laying to rest a decades-long mystery.

Noctilucent clouds, also known as night-shining clouds, were first described in 1885, two years after the massive eruption of Krakatoa, a volcanic island in Indonesia, sent up a plume of ash and debris up to 80 km into Earth's atmosphere. The eruption affected global climate and weather for years and may have produced the first noctilucent clouds.

The effects of Krakatoa eventually faded, but the unusual electric blue clouds remain, nestled into a thin layer of Earth's mesosphere, the upper atmosphere region where pressure is 10,000 times less than at sea level. The clouds, which are visible during the deep twilight, are most often observed during the summer months at latitudes from 50 to 70 degrees north and south--although in recent years they have been seen as far south as Utah and Colorado. Noctilucent clouds are a summertime phenomenon because, curiously, the atmosphere at 85 km altitude is coldest in summer, promoting the formation of the ice grains that make up the clouds.

"The incidence of noctilucent clouds seems to be increasing, perhaps because of global warming," says Paul M. Bellan, a professor of applied physics.

Twenty-five years ago, researchers at Poker Flat, Alaska, discovered that the clouds were highly reflective to radar. This unusual property has long puzzled scientists. Bellan now has an explanation: the ice grains in noctilucent clouds are coated with a thin film of metal, made of sodium and iron. The metal film causes radar waves to reflect off ripples in the cloud in a manner analogous to how X-rays reflect from a crystal lattice.

Sodium and iron atoms collect in the upper atmosphere after being blasted off incoming micro-meteors. These metal atoms settle into a thin layer of vapor that sits just above the altitude at which noctilucent clouds occur. Astronomers recently have been using the sodium layer to create laser-illuminated artificial guide stars for adaptive optics telescopes that remove the distorting affects of atmospheric turbulence to produce clearer celestial images.

Measurements of the density of sodium and iron atomic vapor layers show that the metal vapor is depleted by over 80 percent when noctilucent clouds are present. "Noctilucent clouds have been shown to act very much like a flycatcher for sodium and iron atoms," Bellan says. Indeed, in laboratory experiments, other researchers have found that at the frigid temperatures (-123 degrees Celsius) within noctilucent clouds, atoms in sodium vapor quickly become deposited on the surface of ice to form a metallic film.

"If you have metal-coated ice grains in noctilucent clouds, the radar reflectivity can become enormous" he says. "This reflectivity is not the sum of reflections from individual ice grains, which would not produce a very large reflection. Instead, what happens is that ripples in the cloud of metal-coated ice grains reflect in unison and reinforce each other, somewhat like an army marching in step across a bridge causes the bridge to vibrate."

CARBON-RICH MOLECULES IN METEORS IDENTIFIED AS THE 'ORIGIN OF LIFE'

Tons, perhaps tens of tons, of carbon molecules in dust particles and meteorites fall on Earth daily. Meteorites are especially valuable to astronomers because they provide relatively big chunks of carbon molecules that are easily analyzed in the laboratory. In the past few years, researchers have noticed that most meteorite carbon are molecules called polycyclic aromatic hydrocarbons (PAHs), which are very stable compounds and are survivors. PAHs are the most common carbon-rich compound in the universe. They are found in everything from distant galaxies to charbroiled hamburgers and engine soot. When they are first formed, or found in space, their structures resemble pieces of chicken wire, fused six-sided rings. However, when found in meteorites, these aromatic rings are carrying extra hydrogen or oxygen.

Scientists performed laboratory experiments that explain the process by which these meteoritic hydrocarbons attract the extra hydrogen and oxygen. They are very similar to the molecules identified as evidence of alien microbes in an earlier Science paper (McKay et al 1996). "Our findings are important because it is the first time anybody explained these carbon-rich molecules found in meteorites. They are similar to the molecules that make-up living things" said Max Bernstein, a space scientist at Ames.

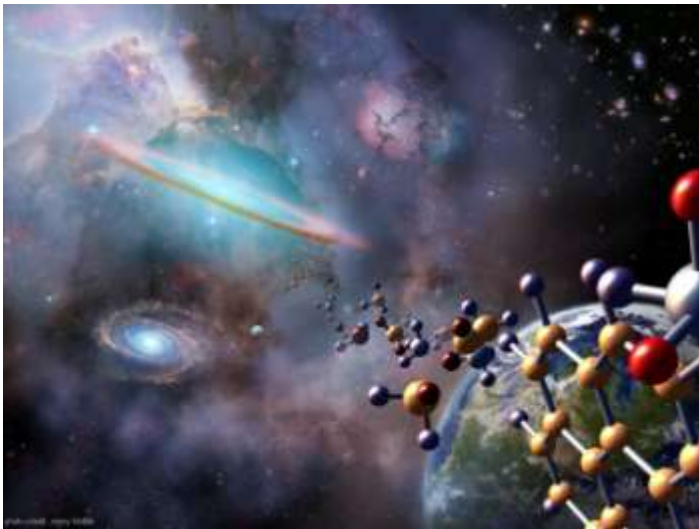
As it happened, their findings were judged significant enough to be award-winning. Published in Science (1999) by Bernstein and fellow scientists Scott Sanford and Louis Allamandola, their paper won the 2008 H. Julian Allen Award at Ames Research Center. It takes a long time for scientific papers to win awards. "As scientists, we like to quantify things. Scientific papers are judged by the number of times they are cited in other scientific papers. Other scientists need to say that I couldn't have written my paper without your paper. Often it takes a few years," Bernstein explained.

These carbon-rich molecules are produced by carbon-rich, dying, giant red stars. When they are first formed, astronomers observe them as normal PAHs. However, when they are seen in meteorites billions of years later, they almost always have oxygen

or heavy hydrogen attached to them. (Heavy hydrogen carries an extra neutron, and is called a deuterium isotope.) Something happened to change them, say scientists. To study the process by which these carbon compounds change, the Ames Astrochemistry Laboratory studied PAHs in water ices that were exposed to ultraviolet radiation under space-like conditions. Scientists reproduced conditions including an incredibly high vacuum, extremely low temperatures (- 340 degrees Fahrenheit), and harsh radiation. When the extremely cold temperature was reached, these PAHs were exposed to ultraviolet radiation, and they changed. The experiment successfully reproduced the hydrocarbons found in meteorites. For the first time, scientists were able to show how hydrogen was exchanged for deuterium, or heavy hydrogen. "It turns out, you only need water ice and radiation to change these molecules," said Bernstein.

Using infrared spectroscopy, the research team proved that the laboratory-produced hydrocarbons were the same hydrocarbons found in meteorites and observed through telescopes. Scientists observed the chemical reaction in a stainless steel chamber as it was happening. The laboratory sample reflected the same infrared colors as the hydrocarbons seen by astronomers using telescopes. Because the techniques used were the same, the results were directly comparable. "We were seeing the same molecules from telescopes as were reproduced in the laboratory," said Sandford.

Once the molecular-size laboratory sample was retrieved, it was taken to Richard Zare's laboratory at Stanford, where researchers weighed the individual molecules. Findings showed that ices, modified by radiation, created new molecules. These molecules, called quinones, received considerable attention by the astrobiology community because they are common to all life forms. They are potentially significant for the "origin of life" or the habitability of planets. How does a planet become habitable?



"Molecules from space helped to make the Earth the pleasant place that it is today," said Allamandola, founder of the Ames Astrochemistry Laboratory. "Our findings were new because we showed how these molecules formed. It was already known that these molecules were in meteorites and delivered to the planets," said Bernstein. "We now understand why these life-like carbon compounds are raining down on the Earth and other planets. Knowing this will help us search for life on other worlds by distinguishing these molecules from biomarkers," said Bernstein.

http://www.nasa.gov/centers/ames/research/2008/Origins_of_life_research.html
<http://www.sciencemag.org/cgi/content/full/283/5405/1135>
<http://www.sciencemag.org/cgi/content/abstract/273/5277/924>

ULYSSES REVEALS GLOBAL SOLAR WIND PLASMA WIND OUTPUT AT 50-YEAR LOW

Data from the Ulysses spacecraft, show the sun has reduced its output of solar wind to the lowest levels since accurate readings became available. The sun's current state could reduce the natural shielding that envelops our solar system. "The sun's million mile-per-hour solar wind inflates a protective bubble, or heliosphere, around the solar system. It influences how things work here on Earth and even out at the boundary of our solar system where it meets the galaxy," said Dave McComas, Ulysses' solar wind instrument principal investigator. "Ulysses data indicate the solar wind's global pressure is the lowest we have seen since the beginning of the space age."

The sun's solar wind plasma is a stream of charged particles ejected from the sun's upper atmosphere. The solar wind interacts with every planet in our solar system. It also defines the border between our solar system and interstellar space. This border, called the heliopause, surrounds our solar system where the solar wind's strength is no longer great enough to push back the wind of other stars. The region around the heliopause also acts as a shield for our solar system, warding off a significant portion of the cosmic rays outside the galaxy. "Galactic cosmic rays carry with them radiation from other parts of our galaxy," said Ed Smith, Ulysses project scientist "With the solar wind at an all-time low, there is an excellent chance the heliosphere will diminish in size and strength. If that occurs, more galactic cosmic rays will make it into the inner part of our solar system."

Galactic cosmic rays are of great interest to NASA. Cosmic rays are linked to engineering decisions for unmanned interplanetary spacecraft and exposure limits for astronauts traveling beyond low-Earth orbit.

In 2007, Ulysses made its third rapid scan of the solar wind and magnetic field from the sun's south to north pole. When the results were compared with observations from the previous solar cycle, the strength of the solar wind pressure and the magnetic field embedded in the solar wind were found to have decreased by 20 percent. The field strength near the spacecraft has decreased by 36 percent. "The sun cycles between periods of great activity and lesser activity," Smith said. "Right now, we are in a period of minimal activity that has stretched on longer than anyone anticipated."

Ulysses was the first mission to survey the space environment over the sun's poles. Data Ulysses has returned have forever changed the way scientists view our star and its effects. The venerable spacecraft has lasted more than 18 years, or almost four times its expected mission lifetime.

The Ulysses spacecraft was carried into Earth orbit aboard space shuttle Discovery in Oct. 1990. From Earth orbit it was propelled toward Jupiter, passing the planet on Feb. 8, 1992. Jupiter's immense gravity bent the spacecraft's flight path downward and away from the plane of the planets' orbits. This placed Ulysses into a final orbit around the sun that would take it over its north and south poles.

SCIENTISTS DEBATE PLANET DEFINITION, AND AGREE TO DISAGREE

Two years ago the International Astronomical Union (IAU) elected to define the term planet, restricting it to the eight largest bodies orbiting the Sun, and deleting Pluto from the list. The demotion of Pluto sparked considerable public controversy. Numerous planetary scientists and astronomers protested the IAU's

definition as not useful, while numerous other planetary scientists and astronomers supported the outcome.

Recognizing the need for further scientific debate on planet definition, more than 100 scientists and educators representing a wide range of viewpoints on the issue converged for three days on the Applied Physics Laboratory of Johns Hopkins University (APL) for "The Great Planet Debate: Science as Process" conference <http://gpd.jhuapl.edu/> last month. The conference was sponsored by NASA, APL, the Planetary Science Institute, The Planetary Society, and the American Astronautical Society.



Different positions were advocated, ranging from reworking the IAU definition (but yielding the same outcome of eight planets), replacing it with a geophysical-based definition (that would increase the number of planets well beyond eight), and rescinding the definition for planet altogether and focusing on defining subcategories for serving different purposes. No consensus was reached. A sample of the opinions expressed by conference participants follows:

"I was impressed with two things that came out of The Great Planet Debate meeting: first, that no one liked the IAU's definition of planethood, and second, that there are strongly divergent scientific opinions about what a planet is, with those who study orbits and those who study planets themselves seeing the matter very differently." said planetary scientist Alan Stern, currently a visiting scholar at the Lunar and Planetary Institute. *"My view is that the dynamically based definitions are deeply flawed because they do not take into account any physical properties of the body in question, and give ridiculous results, for example classifying identical large objects in different orbits differently - so that even Earths are not always planets, which is crazy,"* Stern concluded.

"Gravity forces large bodies to be round, whereas small bodies can be quite oddly shaped. But the proposed 'geophysical' definition of planethood based upon roundness uses a poor criterion because there is no good dividing line. Indeed, there are likely to be more intermediate solar system objects that are in the fuzzy 'roundish' area than there are objects that are clearly round. In contrast, the eight planets recognized by the IAU are significantly different from the numerous small objects that are classified as 'minor planets' (asteroids) in terms of both physical properties and their effects on bodies orbiting nearby," said Jack Lissauer, planetary scientist at Ames Research Center.

"We all have a conceptual image of a planet. Therefore, we need a term that encompasses all objects that orbit the Sun or other stars," said Larry Lebofsky, Senior Education Specialist at the

Planetary Science Institute. *"The debate is a great teaching moment. Whether dwarf planets are grouped together with the classical planets is not as important as the process by which scientists arrived at their conclusions. Scientists look at the same information in different ways; there may be more than one 'answer'. Facts change. What we know now may not be what we know in two or three years. Learning to think critically and understanding how scientists organize facts to develop theories are lessons that will serve students for a lifetime."*

"The word 'planet' has a deep cultural context that cannot be decided by vote of a subset of astronomers meeting in a room somewhere, especially when that debate is rushed and the vote close", said William McKinnon, a professor of Earth and Planetary Sciences, and an IAU member. *"The IAU should reopen the issue to electronic debate by the entire astronomical community. I am sure the outcome in that case, whatever it turns out to be, or even if it is concluded that no universal definition is necessary, would be more satisfactory to all parties,"* he said.

"I believe the IAU definition correctly recognized the utility of a dynamical criterion, but that it needs clarification, not abandonment. In particular, 'clearing' the neighborhood should be replaced by the concept of 'dynamical dominance'," said Steven Soter.

Jay Pasachoff, who is spending this year studying Pluto's atmosphere, says, *"I have long tried, in my textbooks, to reflect consensus rather than trying to legislate new terminology. I think that the IAU should have limited their decision to the administrative assignment of naming responsibility and not tried to make decisions for the general public. If third-grade students eventually decide that Eris, Makemake, Haumea, and their successors are too many to learn about, then a new consensus may emerge. In the meantime, let's let scientific discovery continue to take its course and let us hope to excite new generations of students with the new information that emerges."*

"I think the IAU made a mistake getting into the business of defining a widely used word, 'planet', and sowing confusion thereby. Scientifically, the useful discussion would be about categories of planets (e.g., gaseous planets, rocky planets, dwarf planets, icy planets, free-floating planets, etc., and an individual celestial body may fall into more than one category). This approach would address the main practical problem of nomenclature without confusing the public about 'planet' itself," said Renu Malhotra.

Neil deGrasse Tyson, astrophysicist with the American Museum of Natural History and panelist for the Great Planet Debate commented, *"The word 'planet' has surely outlived its usefulness. The time has come for us to create a fresh and sensible classification scheme from the ground up -- one that applies to all objects of our own solar system, yet is flexible enough to embrace newly discovered objects elsewhere in the galaxy. Other fields, such as biology, and even subfields of astrophysics that study stars and galaxies, have strong needs to classify objects and have solved this problem long ago. It's time for the community of planetary scientists to do the same. We should not 'agree to disagree, we should 'agree to converge'."*

"It was a mistake for the IAU to dictate a definition when there is no consensus among planetary scientists. It is also counter-productive to focus only on the planets in our solar system, ignoring some 300 exoplanets," said David Morrison of Ames Research Center. *"The IAU definition of planet should be withdrawn or ignored." "Historically, 'planets' are just objects that orbit the Sun. Even asteroids are called 'minor planets' By the IAU. The controversy caused by the IAU officially declaring the*

term to be restricted to eight objects in our solar system was unnecessary, but a natural consequence of one group of people trying to impose their views on everyone else," said Mark Sykes, Director of the Planetary Science Institute. "Ultimately, over the years, the process of science is not guided by imprimatur and ensures that the most generally useful perspective will prevail." The debate continues.

<http://www.psi.edu/press/archive/20080919planetdebate/>

FIRST PICTURE OF LIKELY PLANET AROUND SUN-LIKE STAR

Astronomers have unveiled what is likely the first picture of a planet around a normal star similar to the Sun.

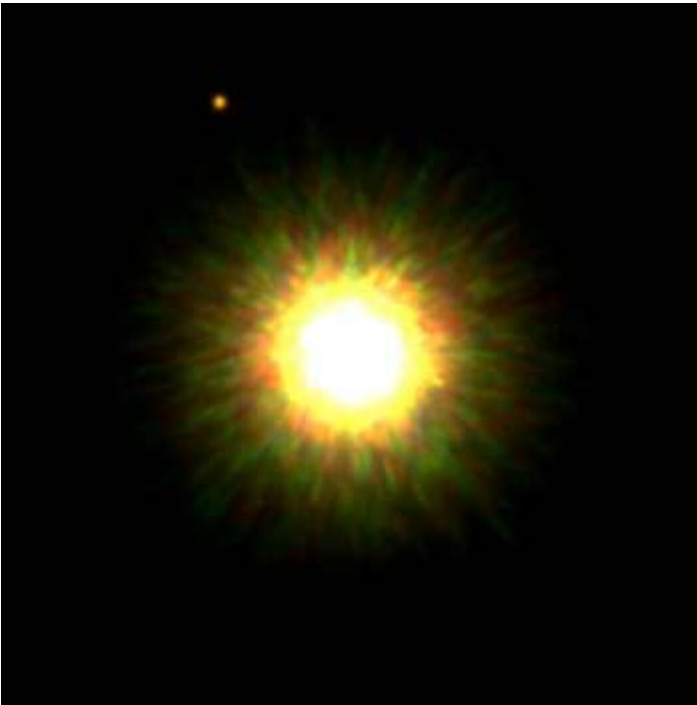


Photo credit: "Gemini Observatory/AURA"

Three scientists used the Gemini North telescope on Mauna Kea in Hawai'i to take images of the young star 1RXS J160929.1-210524 (which lies about 500 light-years from Earth) and a candidate companion of that star. They also obtained spectra to confirm the nature of the companion, which has a mass about eight times that of Jupiter, and lies roughly 330 times the Earth-Sun distance away from its star. (For comparison, the most distant planet in our solar system, Neptune, orbits the Sun at only about 30 times the Earth-Sun distance.)

The parent star is similar in mass to the Sun, but is much younger. "This is the first time we have directly seen a planetary mass object in a likely orbit around a star like our Sun," said David Lafreniere, lead author of a paper describing the observation. "If we confirm that this object is indeed gravitationally tied to the star, it will be a major step forward."

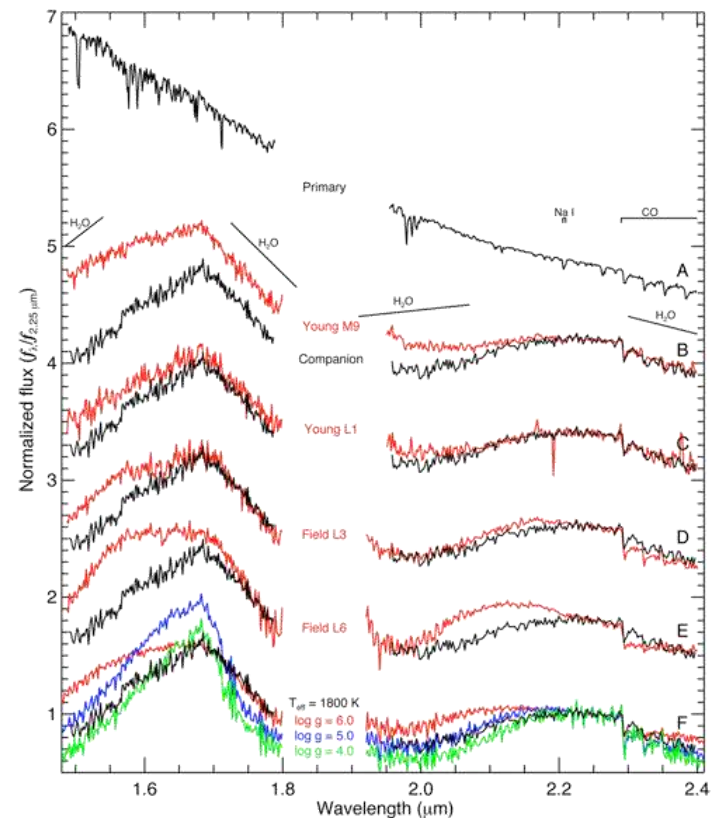
Until now, the only planet-like bodies that have been directly imaged outside of the solar system are either free-floating in space (i.e. not found around a star), or orbit brown dwarfs, which are dim and make it easier to detect planetary-mass companions.

The existence of a planetary-mass companion so far from its parent star comes as a surprise, and poses a challenge to theoretical models of star and planet formation. "This discovery is yet another reminder of the truly remarkable diversity of worlds out there, and it's a strong hint that nature may have more than

one mechanism for producing planetary mass companions to normal stars," said Ray Jayawardhana, team member and author of a forthcoming book on extrasolar planets entitled 'Worlds Beyond'.

The team's Gemini observations took advantage of adaptive optics technology to dramatically reduce distortions caused by turbulence in Earth's atmosphere. The near-infrared images and spectra of the suspected planetary object indicate that it is too cool to be a star or even a more massive brown dwarf, and that it is young. Taken together, such findings confirm that it is a very young, very low-mass object at roughly the same distance from Earth as the star. Even though the likelihood of a chance alignment between such an object and a similarly young star is rather small, it will take up to two years to verify that the star and its likely planet are moving through space together. "Of course it would be premature to say that the object is definitely orbiting this star, but the evidence is extremely compelling. This will be a very intensely studied object for the next few years!" said Lafreniere.

Team member Marten van Kerkwijk described the group's search method. "We targeted young stars so that any planetary mass object they hosted would not have had time to cool, and thus would still be relatively bright," he said. "This is one reason we were able to see it at all." The Jupiter-sized body has an estimated temperature of about 1800 Kelvin (about 1500 C), much hotter than our own Jupiter, which has a temperature of about 160 Kelvin (-110 C), and its likely host is a young star of type K7 with an estimated mass of about 85% that of the Sun. For more characteristics of the star and planet see this table from the paper, <http://www.gemini.edu/node/11127>



http://www.gemini.edu/images/stories/press_release/pr2008-6/fig2.gif

Near-infrared spectra of 1RSX J160929.1-210524 and its candidate companion. The primary's spectrum (row A) is as expected for a temperature of about 4000 K (spectral type K7). The candidate companion's spectrum (black curves repeated in

rows B - F) is compared with the spectra of two young brown dwarfs (red curves on rows B - C; spectral types M9 and L1) and two older, cooler brown dwarfs (red curves on rows D - E; L3 and L6. The 'triangular' shape of the left part of the companion's spectrum is in much better agreement with the two young brown dwarfs, indicating the candidate companion has low gravity; in turn, this implies it has not yet fully contracted and thus is still young. The companion spectrum and those of all comparison objects have been normalized to be the same on the right-hand side. The fact that, compared to the young brown dwarfs, the candidate companion is slightly fainter in the left-hand part ****indicates that it is cooler****, more like the field L3 brown dwarf. The comparison with models (row F) confirms that the companion has low gravity, and thus is young. <http://arxiv.org/abs/0809.1424>
http://www.gemini.edu/images/stories/press_release/pr2008-6/fig1_fullres.jpg

ASTRONOMERS DISCOVER UPPER LIMIT FOR MASS OF GIANT BLACK HOLES

There appears to be an upper limit to how big the universe's most massive black holes can get, according to new research. This limit is 10 billion times the mass of the Sun or about one percent of the total mass of the giant galaxies in which these black holes are found.

Once considered rare and exotic objects, black holes are now known to exist throughout the universe, with the most massive found at the centers of the largest galaxies. These "ultra-massive" black holes have been shown to have masses upwards of one billion times that of our own Sun. Now, Ezequiel Treister, and Priyamvada Natarajan, an associate professor of astronomy and physics, have shown that even the biggest of these gravitational monsters can't keep growing forever. Instead, they appear to curb their own growth -- once they accumulate about 10 billion times the mass of the Sun. These ultra-massive black holes, found at the centers of giant elliptical galaxies in huge galaxy clusters, are the biggest in the known universe. Even the large black hole at the center of our own Milky Way galaxy is thousands of times less massive than these behemoths. But these gigantic black holes, which accumulate mass by sucking in matter from neighboring gas, dust and stars, seem unable to grow beyond this limit regardless of where -- and when -- they appear in the universe. *"It's not just happening today,"* said Natarajan. *"They shut off at every epoch in the universe."*

The study represents the first time an upper mass limit has been derived for black holes. Natarajan and Treister used existing optical and X-ray data of these ultra-massive black holes to show that, in order for those various observations to be consistent, the black holes must essentially shut off at some point in their evolution. *"Getting a complete observational census of black holes from X-ray data, using the deepest observations with the Chandra Observatory, was an important piece in this puzzle,"* said Treister. Several groups have suggested possible growth control mechanisms. One possible explanation, derived by Natarajan in earlier work, is that the black holes might eventually reach the point when they radiate so much energy as they consume their surroundings that they end up interfering with the very gas supply that feeds them, which may also interrupt star formation in the vicinity.



http://www.ifa.hawaii.edu/info/press-releases/Treister9-08/fig1_web.jpg

Image of the giant elliptical galaxy ESO 325-G004 taken by the Hubble Space Telescope using the Advanced Camera for Surveys. This giant galaxy, with a mass of about 100 billion solar masses, is located in the center of the galaxy cluster Abell S0740, 450 million light-years away from us in the Centaurus constellation. Giant elliptical galaxies, typically found in the centers of galaxy clusters, like ESO 325-G004 are the hosts of ultra-massive black holes with masses larger than five billion solar masses. Acknowledgment: J. Blakeslee (Washington State University)

The new findings have implications for the future study of galaxy formation, since many of the largest galaxies in the universe appear to co-evolve along with the black holes at their centers. *"Evidence has been mounting for the key role that black holes play in the process of galaxy formation,"* said Natarajan. *"But it now appears that they are likely the prima donnas of this space opera."* http://www.sc.eso.org/~etreiste/UMBHs/more_info.html

<http://arxiv.org/abs/0808.2813>

SURFACE WATER MAY HAVE EXISTED FAR LONGER ON SOME PARTS OF MARS

Water may have played a role in shaping parts of the Martian landscape a billion years longer than previous studies have shown, according to a research team led by Catherine Weitz. Their research presents strong evidence that sustained and large-scale processes associated with precipitation and flowing water likely occurred on the plains surrounding Valles Marineris during the Hesperian Epoch, 3 to 3.7 billion years ago. Valles Marineris is a huge canyon system that runs nearly a quarter of the way around the planet at its equator.

According to many studies, runoff from precipitation ceased by the end of the Noachian Epoch, which spanned the first billion years of Martian history. But after studying images of light-toned layered deposits on the plains surrounding Valles Marineris,

Weitz and her co-authors concluded that equatorial regions may have remained wet for a much longer period. Scientists have studied the light-toned layered deposits inside Valles Marineris since the Mariner flybys in the early 1970s, but the HiRISE camera flying aboard the Mars Reconnaissance Orbiter has now given them an unparalleled, close-up view of the planet's features. HiRISE can resolve objects as small as three feet in diameter.

Weitz was one of the first researchers to question whether the light-toned layered deposits on the plains surrounding Valles Marineris were different from those inside Valles Marineris. Two years ago, she began aiming the camera to photograph these layered deposits. *"What we found was that these light-toned layered deposits on the plains are very different from those within Valles Marineris,"* Weitz said. *"There are a lot of variations in brightness, color, and erosional properties that we don't see for light-toned deposits inside Valles Marineris. This suggests that the processes that created the deposits outside Valles Marineris were different from those operating inside."*

Weitz found light-toned layered deposits associated with valley systems and inverted channels in two locations near Valles Marineris. Inverted channels form on Earth when sediment is deposited in streambeds over time. When the streams dry up, the surrounding, softer terrain erodes away, leaving the harder, cemented sediments in the former streambeds standing above the surrounding terrain. Weitz and her colleagues also have found valley systems that probably were created by running water in two other areas of light-toned layered deposits adjacent to Valles Marineris.

All of these phenomena point toward what geologists call fluvial processes those associated with running water. In addition, the CRISM spectrometer on the Mars Reconnaissance Orbiter, identified minerals in the light-toned layered deposits that often form in the presence of liquid water on Earth. However, other explanations for the layered deposits and mineralogy cannot be ruled out, Weitz said. These could involve explosive volcanism, wind deposition, and other geological processes. *"But the fact that these deposits are so distinct from other light-toned layered deposits in their characteristics and in their association with valleys and inverted channels suggests a fluvial origin,"* she said.

"This was a big surprise because no one thought we'd be seeing these extensive fluvial systems in the plains all around Valles Marineris that were formed during the Hesperian Era," Weitz said. *"Everyone thought that by then the climate had pretty much dried out." "What we're seeing tells us that this light-toned layering on the plains was associated with fluvial activity that wasn't occurring just in little pockets over very brief episodes, but rather on a much larger scale for sustained time periods,"* she added. *"For some reason, there was precipitation around Valles Marineris that allowed these systems to form out on the plains."*

VALLEY NETWORKS ON MARS FORMED DURING LONG PERIOD OF EPISODIC FLOODING

A new study suggests that ancient features on the surface of Mars called valley networks were carved by recurrent floods during a long period when the Martian climate may have been much like that of some arid or semiarid regions on Earth. An alternative theory that the valleys were carved by catastrophic flooding over a relatively short time is not supported by the new results.

Often cited as evidence that Mars once had a warm environment with liquid water on the surface, valley networks are distinctive features of the Martian landscape. In the new study, researchers

used sophisticated computer models to simulate the processes that formed these features. *"Our results argue for liquid water being stable at the surface of Mars for prolonged periods in the past,"* said Charles Barnhart, a graduate student in Earth and planetary sciences. *"For several decades, scientists worked to determine whether or not there had ever been precipitation on Mars. Only in the last 10 years has NASA acquired high-resolution topographic data that cinched the case for massive ancient erosion from precipitation and runoff,"* Moore said.

Scientists estimate that the valley networks on Mars were carved out more than 3.5 billion years ago. Studies based on climate models have suggested that catastrophic events such as asteroid impacts could have created warm, wet conditions on Mars, causing massive deluges and flooding for periods of hundreds to thousands of years.

But the new study shows that those conditions would result in features not seen in the Martian landscape, because water would accumulate inside craters and overflow, carving exit breaches that cut through the crater walls, Barnhart said. *"Our research finds that these catastrophic anomalies would be so humid and wet there would be breaching of the craters, which we don't see on Mars,"* he said. *"The precipitation needs to be seasonal or periodic, so that there are periods of evaporation and infiltration. Otherwise the craters overflow."*

The researchers used a landform evolution model to simulate how the surface of Mars would evolve under different climate conditions. They ran more than 70 simulations under varied conditions and performed statistical analyses to determine which yielded the best match to the observed topography of Martian valleys. The results suggest that valley networks formed on Mars during a semiarid to arid climate that persisted for tens of thousands to hundreds of thousands of years. Episodic flooding alternated with long dry periods when water could evaporate or soak into the ground. Rainfall may have been seasonal, or wet intervals may have occurred over longer cycles. But conditions that allowed for the presence of liquid water on the surface of Mars must have lasted for at least 10,000 years, Barnhart said. "Precipitation on Mars lasted a long time--it wasn't a brief interval of massive deluges," he said.

http://www.ucsc.edu/news_events/text.asp?pid=2395

THE CASE OF THE MISSING GAMMA-RAY BURSTS

Gamma-ray bursts are by far the brightest and most powerful explosions in the Universe, second only to the Big Bang itself. So it might seem a bit surprising that a group of them has gone missing. A single gamma-ray burst (GRB) can easily outshine an entire galaxy containing hundreds of billions of stars. Powerful telescopes can see them from clear across the universe. And because the deeper you look into space, the farther back in time you see, astronomers should be able to see GRBs from the time when the very first stars were forming after the Big Bang.

Yet they don't. Gamma-ray bursts from that early epoch seem to be missing, and astronomers are wondering where they are. *"This is one of the biggest questions in the gamma-ray business,"* says astrophysicist Neil Gehrels. Gehrels recently joined about a hundred of his colleagues from 25 countries for the 6th Huntsville Gamma-ray Burst Symposium. Missing gamma-ray bursts are one of the top mysteries on the agenda.

Until recently, experts were grappling with an even more fundamental question about GRBs: what the heck are they? Astronomers had observed these astonishing bursts since the 1960s, but nobody could imagine an event powerful enough to create them. The answer eventually came from Stan Woosley, a

theoretical astrophysicist. He suggested that when young, supermassive stars with low metal content collapse under their own weight to form black holes, the stars' rotation funnels the explosive energy into two streamlined jets that shoot out from the stars' poles, like the axis of a gyro. We only see the burst if one of these two jets happens to be pointed toward Earth. The concentration of energy into narrow jets is why GRBs that we do observe appear so remarkably bright. Note: Woosley's "collapsar model" explains the common long gamma-ray burst, explosions lasting 2 seconds or more. The cause of another class of shorter-lived GRBs is still a mystery, but that's another story.

The first waves of star formation after the Big Bang should have produced plenty of metal-poor supermassive stars ripe for collapse. If true, GRBs from that epoch should be abundant. So where are they? One possibility is they're not missing at all. *"Part of the problem is that burst profiles get stretched out by the expansion of the Universe, so it is harder to recognize them as bursts in the first place,"* explains astrophysicist Lynn Cominsky. *"The bursts could be happening, but we're not noticing them."*

Another trouble is the afterglow—the fading debris that tells so much about a burst, including its distance. *"Afterglows from the most distant GRBs may be too red shifted to be seen by current generations of telescopes,"* she notes. "Red shift" is how much the wavelength of light is stretched when it travels to us across the expanding Universe. The farther away a thing is, the more its light is stretched, and the greater the red shift. Until recently, the largest red shift ever measured for a GRB was 6.3. Then, last month, Gehrels and colleagues using the Swift satellite found one with a red shift of 6.7 or 12.8 billion light years away. So far, that's the record. *"Gamma-ray bursts are predicted in the red shift range 10 to 20, but so far no one has seen anything beyond 6.7,"* says Cominsky. The luminous afterglow of such distant bursts would be red shifted all the way into the infrared. *"There's a huge effort right now to try to get those infrared observations,"* Gehrels says, but in the meantime it's difficult to verify whether a candidate 7+ GRB is truly that far away. As infrared telescopes improve, scientists should eventually be able to measure the distance to GRBs with red shifts greater than 7 — if they exist. And that's a big IF. What if the missing GRBs really are missing? *"That would teach us something very interesting about the Universe,"* says Gehrels

**** NOMINATIONS / VOLUNTEERS NEEDED FOR EAS OFFICES ****

The EAS continues to exist due to the willingness of members of the club to volunteer and contribute to the club. Thank you very much to those (some below) who are or have been actively volunteering and helping keep the club going. Some of the people in the current roles have been doing so for a long time, so others in the club need to step up and make a contribution, as we cannot ask the same people to keep doing the same jobs year after year. Without new volunteers, the club suffers. There are people have been part of the club for many years, and have yet to volunteer to help out in a formal role. If you have not volunteered for a role in supporting the club, you need to consider doing so. It is not difficult, it does not require special skills, it can be fun and rewarding, and the vitality of the EAS depends on it ! I urge you in the strongest possible way to please volunteer and find a way to help. Please bring a name of volunteer or nomination to the October or November EAS meeting.

Offices and Volunteer Roles in the EAS:

President: (current incumbent **Mark Folkerts**) – Run the monthly EAS meetings, and introduce speakers, call EAS board meetings.

Vice-President: (current incumbent **James Bielaga**) – Run EAS meetings if president is absent. Also store/maintain, and loan out the club telescopes.

Treasurer: (current incumbent, **Carol Gore**) – Collect club dues, pay club expenses, maintain club checking account bookkeeping, pickup and respond to mail sent to club.

Librarian: (current incumbent, **Mike Locke**) – Maintain the collections of books, tapes, videos, and software that has been donated to the club, and make available to members.

Stargazer Newsletter Editor(s): (current incumbents **Mark Folkerts** and **Bill O'Neil**) – gather events and news and write articles to publish monthly newsletter.

Webmaster: (current incumbent, **Cody Gibson**) – design, update and support EAS website presence.

ALCOR: (current incumbent **Joanne Green**) – Coordinate with the Astronomical League about EAS club membership info, announce AL ballots, review AL observing awards and distribute awards to members, administer sales of AL products to club.

Programs chairperson: (currently **vacant**, acting incumbent, **Mark Folkerts**) – Contact potential speakers and schedule them to come and speak to the EAS, send them directions and thank them for their contribution. Identify videos or other programs.

Publicity / Astronomy-Day coordinator: (current incumbent **David Brodeur**) – Make reservations for venue (library), notify websites about EAS astronomy day events, create press releases and notify news organizations about EAS events, and promote new membership growth in the EAS.

Star Party Host / coordinator: (currently **Ron Tam**) – Graciously offering the opportunity to members to view the sky from their darker suburban/rural property location.

Outreach chairperson: (currently **vacant**) - Coordinate requests from public for EAS member volunteers to conduct star parties or presentations at visits to schools, senior centers, scout meetings, etc.

Sidewalk astronomy committee: (currently **vacant**). – Plan and conduct urban/suburban sidewalk astronomy events to allow passers-by to experience astronomy. Needs 2-3 people for each event, and to schedule events.

Secretary: (currently **vacant**) – Keep notes and photos of EAS meetings and events and speaker presentations, and publish them in the StarGazer newsletter, and send info to Night Sky Network.

Other volunteers? Find a way to help and contribute. Come up with a new idea to promote the EAS and astronomy in your community. Come to Astronomy Day or a star party and share your interest in the sky...

FROM THE EDITOR'S TERMINAL

The Stargazer is your newsletter and therefore it should be a cooperative project. Ads, announcements, suggestions, and literary works should be received by the editor at least two weeks prior to the next upcoming scheduled EAS meeting.

If you wish to contribute an article or suggestions to *The Stargazer* please contact Mark Folkerts by email or by telephone (425) 486-9733 or co-editor Bill O'Neil, at (774) 253-0747.

The Star Gazer
P.O. Box 12746
Everett, WA 98206

In October's StarGazer:

- **** **ASTRO CALENDAR - UPCOMING ASTRONOMY EVENTS FOR 2008**
- **** **OBSERVER'S INFORMATION - SUN, MOON, AND PLANET VISIBILITY**
- **** **CONSTELLATIONS OF THE MONTH**
- **** **YOUNG ASTRONOMER'S CORNER**
- **** **ASTRONOMY "FUN FACTS"**
- **** **ASTRONOMY & TELESCOPE LINGO**
- **** **FERMI TELESCOPE DISCOVERS FIRST GAMMA-RAY-ONLY PULSAR**
- **** **SPITZER GETS SNEAK PEEK INSIDE COMET HOLMES**
- **** **TIDES HAVE MAJOR IMPACT ON PLANET HABITABILITY**
- **** **KECK & "COSMIC LENS" RESOLVE NATURE AND FATE OF EARLY STAR-FORMING GALAXY**
- **** **WORLDS IN COLLISION**
- **** **EXPLANATION FOR PUZZLING PROPERTY OF NIGHT-SHINING CLOUDS AT THE EDGE OF SPACE**
- **** **NASA IDENTIFIES CARBON-RICH MOLECULES IN METEORS AS THE 'ORIGIN OF LIFE'**
- **** **SCIENTISTS DEBATE PLANET DEFINITION, AND AGREE TO DISAGREE**
- **** **SURFACE WATER MAY HAVE EXISTED FAR LONGER ON SOME PARTS OF MARS**
- **** **FIRST PICTURE OF LIKELY PLANET AROUND SUN-LIKE STAR**
- **** **ASTRONOMERS DISCOVER UPPER LIMIT FOR MASS OF GIANT BLACK HOLES**
- **** **VALLEY NETWORKS ON MARS FORMED DURING LONG PERIOD OF EPISODIC FLOODING**
- **** **THE CASE OF THE MISSING GAMMA-RAY BURSTS**

The next EAS Meeting is 7:00 P.M. Saturday October 25th at the 'Aurora Astro Products' store location at Silver Lake.