

The Stargazer

August 2009

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The Stargazer
P.O. Box 12746
Everett, WA 98206

See EAS website at:
<http://everettastro.org>

EAS BUSINESS...

NEXT EAS MEETING – SAT. AUGUST 29TH - AT AURORA ASTRO STORE AT SILVER LAKE .

★★ Saturday August 29th ★★ The meeting program will be from EAS member Dr. David Cornell, with a couple of presentations: "See -- What you can't see -- The Scope", a short DVD presentation about the Principia College Observatory telescope. (It stimulated community interest in visiting the telescope during its open times, and was prepared by telescope manger at Principia College, in Elsayh, Illinois). And... "The Coverup -- Observing the occultation of 32 Lyncis by asteroid 372 Palma", from a presentation by Tom Fuller, Cathy Hooper, and David Cornell in 2007. Also Mark will have a recap of recent star TMSP and Brooks Memorial state park star parties. **Attending members will be eligible for a monthly door prize.**

The meeting will be at the Aurora Astro Products store in Silver Lake area (directions below) located at Silver Lake Plaza [11419 19th Avenue SE #A102, Everett, WA 98208](#).

Map / Directions to store location – click the address link above:

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 ★

★ Scheduled EAS Star Parties at Ron Tam's: ★

Saturday September 19
 Saturday October 17
 Saturday November 14

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.

Please also join the EAS mail list, and then send mail to the mail list at 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.

Other Western US Star Parties This Season

SEPTEMBER -

Sep 10-12 2009 - White Sands Star Party, Alamogordo/White Sands, NM <http://www.zianet.com/wssp/>

Sep 17-18 2009 - OAS Camp Delany Fall Star Party, Sun Lakes SP - <http://www.olympicastronomicalsociety.com/Documents/FALLCAMPDELANYSign-UpForm.pdf>

Sep 18-19 - Orion Nebula 2009 Star Party, Table Mt. (Ellensburg) WA <http://www.seattleastro.org/orionnebsp.shtml>

Sep 17-19 2009 - CalStar2009, Lake San Antonio Park CA <http://www.sjaa.net/calstar/> - <http://www.sjaa.net/>

Sep 18-19 2009 - Craters of the Moon Star Party 2009, Craters of the Moon Nat. Monument, ID <http://ifaastro.org/web/index.php>
<http://www.boiseastro.org/>

Sep 19-20-28 2009 - Alberta Star Party 2009, Starland Recreation Area Campground near Drumheller, Alberta, CA
<http://www.astronomycalgary.com/events/info/155>
<http://calgary.rasc.ca/asp2009.htm>

OCTOBER -

Oct 14-17 2009 - The Enchanted Skies Star Party 2009, Socorro NM - <http://enchantedskies.org/>

NOVEMBER -

Nov 12-15 2009 - Nightfall 2009, Palm Canyon Resort, Borrego Springs, CA <http://www.rtmcastronomyexpo.org/nightfall.htm>

Nov 14 2009 - Night Under the Stars 2009, Alamo Lake, AZ - <http://azstateparks.com/Parks/ALLA/events.html>

OTHER -

Oct 16-17 - All Arizona Star Party, Farnsworth Ranch, south of Arizona City, AZ - <http://www.eastvalleyastronomy.org/aasp.htm>

Other Star parties:
<http://www.cloudynights.com/ubbthreads/showflat.php/Cat/0/Number/2858373/Main/2858366>

EAS MEMBER NEWS

The Planetarium -- August 2009 From OC Space - the Newsletter of Orange County Space Society -By EAS member John W Goerger

Something appeared on Jupiter, viewable through amateur astronomers telescopes, reminiscent of the Shoemaker/Levy-9 impacts of July 1994. On July 19th 2009, Anthony Wesley, an Australian who is an amateur astronomer discovered a dark structure in the southern part of the planet. His instrument was a 14.5 inch Newtonian telescope. By the 27th the dark structure was estimated to be the size of the Pacific Ocean and is expanding because of Jupiter's south polar winds of ~55 mph. The size of the impactor was estimated to be about the length of two American football fields. Additionally, the energy released by the impactor into Jupiter's atmosphere has been estimated around 2,000 megatons (one megaton is equal to 1 million tons of TNT), according to Don Yeomans of NASA's Near-Earth Object Office at JPL.

As of yet, no definitive answer as to whether it was a comet, or an asteroid. Ironically on the 13th of August 2009 NASA reported it was unable to complete a task assigned to it by Congress 2005 (no funds has been allocated for this mandate); NASA was to discover 90% of all Near-Earth Objects, 140 meters or greater in diameter by 2010. According, the amount will be only 15%!

Given the lack of funds NASA will not be able to land U.S. Astronauts on the moon by 2020 without de-orbiting the ISS by 2016! This and other negative reports are coming from President Obama's Human Space Flight Committee. This is due in large part because Obama's Administration, and the Democratic-controlled Congress, has not increased NASA's Budget to allow it fulfill its mandate of establishing a permanent U.S. Manned Presence on the Moon! They are killing our manned space program! It was 39-yrs ago on Sept 3rd NASA cancelled the last two planned lunar landings (a harbinger of things to come?).

Fall happens on Sept 22. Jupiter's' at a -2.8 on the 1st east of a Gibbous Moon and will be 47" by the 15th. Mars rises after midnight, glowing at a 0.9 and 7" across. Venus rises less than 3hrs before sunrise glaring at a -3.9. Mercury's at a 0.7.

Other Member News...

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. 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. A star party night can be a rewarding event for all involved. **Please email Mark Folkerts with your interest (or suggestions).**

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. 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.

Other volunteers? Find a way to help and contribute. Come up with a new idea to promote the EAS and astronomy in your community.

EAS MEMBERSHIP BENEFITS & INFORMATION

EAS Benefits -

Membership in the Everett Astronomical Society (EAS) includes invitations to all of the club meetings and star parties, and entitles members to the monthly newsletter, *The Stargazer*. Also, a 10% discount is also being offered to EAS members for purchases at Aurora Astro Products in Everett. Only members may vote in EAS elections, or be eligible for EAS drawings.

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, 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, **located at Aurora Astro Products store.** 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, or **contact Jim Bielaga at Aurora Astro.** See library items 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.**

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.

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

ASTRO CALENDAR FOR 2009

August 2009

Aug 17 - Neptune At Opposition
 Aug 24 - Mercury At Its Greatest Eastern Elongation (27 Degrees)
 Aug 25 - Northern Iota Aquarids Meteor Shower Peak
 Aug 29 – EAS Meeting at Aurora Astro

September 2009

Sep 04 - Saturn's Rings Edge-on From Earth
 Sep 12 – EAS Meeting at Aurora Astro – 6:00 PM
 Sep 17 - Uranus At Opposition
 Sep 17-18 OAS Camp Delany Fall Star Party
 Sep 18-19 Orion Nebula 2009 Star Party
 Sep 19 – EAS Star Party at Ron Tam's place
 Sep 22 - Autumnal Equinox (21:18 UT)
 Sep 26-27 - Pacific Astronomy & Telescope Show - Pasadena Conv. Ctr.

October 2009

Oct 09 - Draconids Meteor Shower Peak
 Oct 17 – EAS Star Party at Ron Tam's place
 Oct 21 - Orionids Meteor Shower Peak
 Oct 24 – EAS Meeting at Aurora Astro – 6:00 PM

November 2009

Nov 14 – EAS Star Party at Ron Tam's place
 Nov 21 – EAS Meeting at Aurora Astro – 6:00 PM

December 2009

Dec 12 or 19 – EAS Holiday Meeting at Alf's on Broadway – 6:00 PM

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>

'IT'S OVER YOUR HEAD' – ASTRONOMY PODCASTS

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.

OBSERVER'S INFORMATION...

LUNAR FACTS

Aug 27	First Quarter Moon
Sep 04	Full Moon
Sep 12	Last Quarter Moon
Sep 18	New Moon
Sep 26	First Quarter Moon
Oct 04	Full Moon

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

"Mention your EAS club membership at Jim Bielaga's astronomy store 'Aurora Astro Products' and receive a 10% discount on all purchases. This is an exclusive discount to current 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. <<**



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425-337-4384

425-337-4758 fax

Hours:

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

Tuesday/Wednesday – Noon to 6:00 pm .

Saturday – 10:00 am to 5:00 pm .

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

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

CLUB SCOPES

SCOPE

13-INCH THIN-MIRROR DOB
 10-INCH WARD DOBSONIAN
 10-INCH SONOTUBE DOBSONIAN
 8-INCH DOBSONIAN

LOAN STATUS

FINISHING REHABILITATION
 AVAILABLE
 AVAILABLE
 AVAILABLE

Oct 11	Last Quarter Moon
Oct 18	New Moon
Oct 26	First Quarter Moon
Nov 02	Full Moon
Nov 09	Last Quarter Moon
Nov 16	New Moon

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

Object	Rises	Sets	Con	Diam.	Mag
Sun	06:24 am	19:55	Leo	30'	-27.5
Mercury	08:58 am	20:28	Vir	08"	+0.4
Venus	03:26 am	18:35	Can	13"	-4.0
Mars	00:50 am	16:46	Gem	06"	+1.0
Jupiter	19:16	05:01 am	Cap	49"	-2.8
Saturn	07:49 am	20:36	Leo	16"	+1.1
Uranus	20:28 am	08:14 am	Psc	04"	+5.7
Neptune	19:23	05:29 am	Cap	02"	+7.8
Pluto	15:18	01:22 am	Sag	--	+14.0

(times listed are in local time for Everett PDT)

Mercury and Saturn are visible low in the west after sunset. **Jupiter, Uranus, and Neptune** are well placed for observation throughout the night. **Pluto** is visible in the evening sky with a large scope. **Mars, and Venus** are visible in the morning sky.

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

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.srrb.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 –

LACERTA: (The Lizard). With a midnight culmination date of August 28th, Lacerta (pronounced "luh-sir'-tuh") is well-placed for summer viewing. Lacerta borders on the constellations of Andromeda, Cassiopeia, Cepheus, Cygnus, and Pegasus, and contains no asterisms. Lacerta ranks 13th in overall brightness among the constellations, but 68th in size; it takes up approximately 201 square degrees of the sky (0.487%). Lacerta contains no known meteor showers and no Messier objects. This constellation is completely visible from latitudes North of -33 degrees, and completely invisible from latitudes South of -55 degrees.

It has 23 stars brighter than magnitude 5.5, and its central point is at RA=22h25m, Dec.= +46 degrees. The solar conjunction date of Lacerta is February 27th.

Lacerta is one of the seven constellations still in use invented by Johannes Hevelius; it was included in a 1690 star atlas accompanying his stellar catalogue. While Lacerta has no meteor showers or Messier objects, it does contain one very important object to astronomy. BL Lacertae (BL Lac) is a very distant, extremely compact, and violently variable extragalactic object resembling a quasar in both size and energy output, and is the prototype for similar objects in the sky. BL Lac objects are different from quasars however, in that they appear to be related to distant elliptical galaxies (and indeed most appear to lie within elliptical host galaxies), and because there are no lines (neither emission or absorption) in their spectra (although some may demonstrate very weak emission lines during periods of faint luminosity). Lack of emission or absorption lines hampers distance measurements. However, surrounding nebulosity does contain weak absorption lines, making it possible to measure a redshift. BL Lac objects are a form of active galaxy, and about 100 of them are known. BL Lac objects are most easily identified from X-ray and radio surveys (most known ones are strong radio sources), but the peak of their emission lies in the infrared (similar to quasars). BL Lac objects demonstrate intense magnetic fields, which rapidly vary in both strength and direction; these objects are also violently variable in luminosity at all wavelengths, and can flare up to five magnitudes brighter in a matter of only a few weeks. BL Lac objects are most prevalent in the low-redshift universe; as a result, their space distribution appears very different from other active galaxies, including quasars.

SAGITTA: (The Arrow). With a midnight culmination date of July 16th, Sagitta (pronounced "suh-gee'-tah") is well-placed for summer viewing. It contains no asterisms, but the stars of the constellation do trace out an arrow in the sky, situated approximately between the constellations of Aquila and Cygnus, its point pointing roughly towards the dolphin that is the constellation Delphinus. Besides Aquila and Delphinus (it does not officially border Cygnus), Sagitta also officially borders on the constellations of Vulpecula and Hercules.

Sagitta ranks 18th in overall brightness among the constellations, but 86th in size; it takes up approximately 80 square degrees of the sky (0.194%). It contains no known meteor showers, but does contain one Messier object: M-71. Sagitta is completely visible from latitudes North of -69 degrees, and completely invisible from latitudes South of -74 degrees. It has 8 stars greater than magnitude 5.5, and its central point is at RA=19h37m, Dec.= +18.5 degrees. The solar conjunction date of Sagitta is January 15th. Sagitta is one of only two constellations whose abbreviation (Sge) contains a letter ('e') not found in the name of the constellation (the other constellation with this minor distinction is Hydrus). The famous legend of Sagitta the Arrow commemorates the magic arrow of Hercules, which was used to kill Jupiter's pet eagle Aquila. Aquila had been inflicting repeated attacks on the chained Prometheus (who had stolen fire for use by earthly mortals without Jupiter's permission). Hercules sympathized with Prometheus and his rationale for stealing fire for use by mortals, and thus wanted to protect Prometheus from the repeated peckings and barrages of Aquila. He used his magic arrow (Sagitta) to kill Aquila in order to spare Prometheus these repeated attacks.

M-71 (NGC-6838) is a globular cluster with a total magnitude of 8.3, visible as a very loose bright cluster of over 100 stars, 7' across in a 12-inch telescope. Most of the component stars appear to be of 11th and 12th magnitude. M-71 lies midway between the 4th magnitude stars

of Gamma and Delta Sagittae. Astronomers thought for many years that rather than being a globular, M-71 was actually a very rich open cluster; most astronomers now believe that it is indeed a globular, but an unusually loose one, not as compact and without the strong central stellar condensation typical of normal globular clusters. Other objects of interest within the constellation of Sagitta include Harvard 20, an open cluster less than one degree SW of M-71, and three planetary nebulae suitable for amateur telescopes: NGC-6879, IC-4997, and NGC-6886. Sagitta also contains some unusual stars, notably WZ-Sagittae, FG-Sagittae, and V-Sagittae. WZ-Sagittae is a recurring nova, which last had an outburst in 1978; this resulted in its normal 15th magnitude brightening to 7th magnitude; it is expected to have another outburst around the year 2010. FG Sagittae is an unusual variable star, which progressively brightened (to about magnitude 9.5 from 13.7) for 75 years until the early 1970's, and currently appears to be surrounded by a slender nebulosity. V-Sagittae is an erratic variable star which varies irregularly between magnitudes 9.5 and 13.9 with overlapping periods of variability; this leads astronomers to believe that it may have been a nova at one time, or may indeed soon become one.

Try to enjoy the beautiful and very interesting wonders of Sagitta this summer star party season.

YOUNG ASTRONOMER'S CORNER

Since it officially remains Star Party season, this month the Young Astronomer's Corner will repeat a very timely topic in amateur astronomy: Star Parties!!

If you can go to an official Star Party this summer with family or friends, such as the Orion Nebula Star Party at Table Mountain in Ellensburg, you should. And less formal Star Parties given year-round and locally by amateur astronomers are also lots of fun. It is a wonderful experience to look at the beautiful night skies, and to meet lots of great people and perhaps make new friends.

Your experience can be even more enjoyable if you follow a few certain practices that are tried and true in amateur astronomy circles, to help make your experience the most enjoyable and rewarding it can be. Some of these suggestions may even be star party rules that must be followed in courtesy to other observers (these rules will be noted as such). So if you follow these rules and specific practices, you're sure to have a great time at the next Star Party you attend:

Star Parties: Hints for More Enjoyable Stargazing (and Outdoor Pursuits in General) !!!

★★ Dress warmly, or at least be prepared to do so. If the evening starts out warm, it may not end up that way!

★★ The warmest clothes include polypropylene worn directly against the skin; other warm clothes include those made of wool. Layered cotton clothing can also keep you warm, but you will tend to need more layering. Additionally, if cotton materials get wet, they do not transport moisture away from the body (like polypropylene and wool), but are rather more likely to chill you.

★★ Most body heat is radiated from the head, so make sure you have a good hat that also covers the ears. Good gloves are important as well. Polypropylene glove liners make excellent astronomy gloves because they are not bulky: it is thus easier to use equipment and read charts, etc....

★★ An excellent all-purpose piece of clothing for use in observing is a hooded-sweatshirt. A hooded sweatshirt can cut down on chilling winds entering down your neck: it essentially serves two purposes: it

cuts down on the aforementioned wind effects, and it serves to contain body heat radiating from the head.

★★ Always wear warm socks. Socks that wick moisture away from the skin (such as wool or polypropylene) are excellent. Extra pairs for layering can come in handy too.

★★ A good windbreaker jacket (with an integral hood) is an excellent way to conserve body heat and minimize chill, and can be the outermost clothing in any necessary layering.

★★ Eat well and drink plenty of fluids to avoid dehydration. Good nutrition (including carrots which can improve night vision as a source of Vitamin A) and hydration can help to maintain alertness, body warmth, and help to battle fatigue. Most areas allow camp stoves, but open fires are prohibited. Alcohol and nicotine can interfere with the conservation of body heat. Also – and importantly – tobacco use can be very annoying to your fellow astronomers, as the majority are non-smokers. Further, some people have medical conditions which can be aggravated by cigarette smoke. If you must smoke, please smoke far enough away from people and delicate optical instruments which can pick up smoke film residues. So always be courteous to your fellow astronomers - and good to your own body - by not smoking!

★★ Always follow established STAR PARTY etiquette (which is usually published): red flashlights only at night, and extra batteries can be helpful. If you must listen to music, bring headsets, as your taste in music may be different than your neighbors. Follow STAR PARTY rules about pets: most allow them, but they must be leashed. ALWAYS ask another astronomer if it is OK to look through their scope before you do: some may be taking pictures, or they may not want to be disturbed at that particular time. Many if not most astronomers are very friendly and helpful – and love to have people look through their scopes – but be sure to ask first!

★★ STAR PARTIES are frequently held in remote areas. Always let someone know where you are and what your expected time of return will be: this is especially true if you go off on your own. In that respect, it is ALWAYS better to go in two's with a friend or fellow astronomer. If you have any allergies or other medical conditions, be sure to take your allergy and/or other medicines (including bee sting antidote and heart and asthma medicines, for example) with you: you will generally be at least an hour away from medical attention.

★★ You can enjoy a STAR PARTY without a telescope. *IT IS NOT NECESSARY TO SPEND LOTS OF MONEY TO ENJOY THE NIGHT SKY.* A lawn chair and a blanket, perhaps with a pair of binoculars and a basic night sky book or map of your choice, can result in countless hours of enjoyment and learning about astronomy without spending a lot of money or time in preparation. Going to an official STAR PARTY is a great way to learn and meet new people with varying levels of astronomy knowledge. NEVER be intimidated because you think someone may know more about the subject than you do: everybody starts somewhere!!!... and most astronomers love to answer questions about the night sky and astronomy equipment!!

★★ Finally, respect for your fellow astronomers by following the simple rules above, and respect for the environment while you are there (never leave trash; stay away from fragile areas of grass and wilderness), will also make your star party experience much more enjoyable. See you at an upcoming STAR PARTY!!

ASTRONOMY AND TELESCOPE "LINGO"

ASTRONOMY LINGO: POLAR CAPS: Regions of ice that form around the northern and southern poles of a planet or planetary satellite.

Earth's caps consist of water ice and snow, while the caps of Mars are composed of both water and frozen carbon dioxide. The southern polar cap of Neptune's largest moon Triton is pink, and is thought to be due to nitrogen snow and ice. Polar caps may also show seasonal variations.

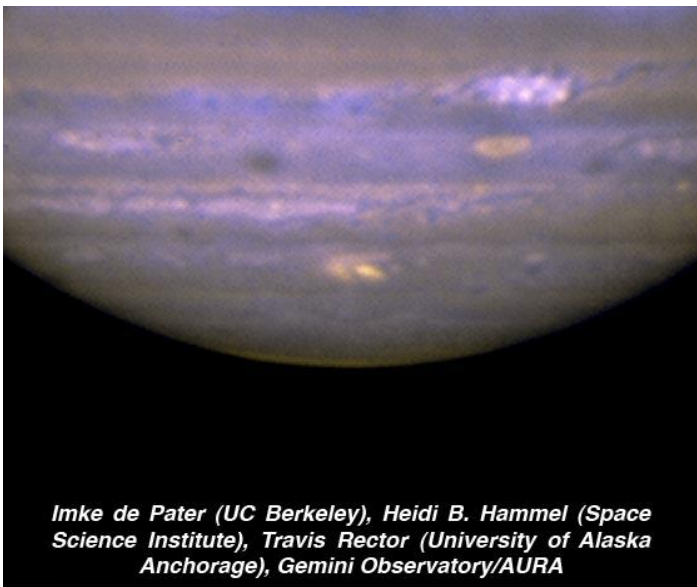
TELESCOPE LINGO: KEPLERIAN TELESCOPE: The first major improvement of the Galilean telescope, developed by Johannes Kepler. A positive (convex) lens was incorporated as the eyepiece, replacing the negative (concave) lens that Galileo used. This gave a larger (but inverted) field of view, and higher magnifications.

ASTRONOMY "FUN FACTS", "PLANETARY FOCUS", AND "MIRROR IMAGES" WILL RETURN NEXT MONTH – ENJOY THE REMAINING SUMMER!

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

SURPRISE COLLISION ON JUPITER CAPTURED BY GEMINI TELESCOPE

Jupiter is sporting a glowing bruise after getting unexpectedly whacked by a small solar system object, according to astronomers using the Gemini North telescope on Mauna Kea in Hawai'i. A spectacular new mid-infrared image is available for download.



This mid-infrared composite image was obtained with the Gemini North telescope on Mauna Kea, Hawai'i, on 22 July at ~13:30 UT with the MICHELLE mid-infrared spectrograph/imager. The impact site is the bright yellow spot at the center bottom of Jupiter's disk. The image was constructed from two images: one at 8.7 micron (blue) and one at 9.7 micron (yellow). The excellent quality of the Gemini images reveals that the morphology of this new impact bears a striking resemblance to that of the larger impact sites seen after the comet Shoemaker-Levy 9 crashed into Jupiter in 1994.

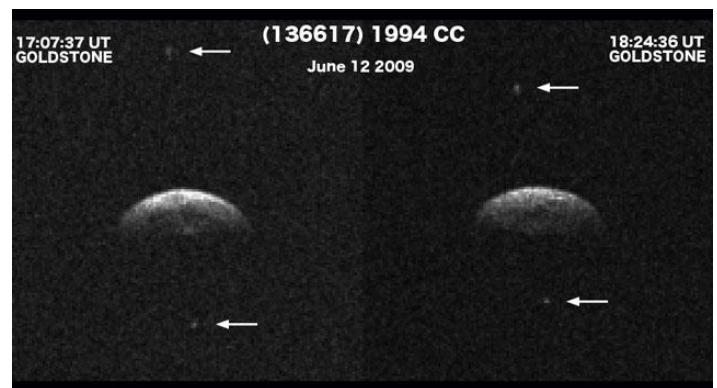
The new feature on Jupiter was first seen by Australian amateur astronomer Anthony Wesley on July 19th. The object that caused the impact scar could have been a small comet or asteroid. Using the SL9 impacts as a guide, the impacting object was probably just a few hundreds of meters in diameter. Such small bodies are nearly impossible to detect near or beyond Jupiter unless they reveal cometary activity, or, as in this case, make their presence known by impacting a giant planet. The impact site is dark in visible-wavelength images.

With the superb angular resolution of the Gemini observations, the data show the impact site in remarkable detail. "*The structure of the impact site is eerily reminiscent of the larger Shoemaker-Levy 9 sites 15 years ago,*" remarked Heidi Hammel, who was part of the team that supported the effort at Gemini. In 1994, she led the Hubble Space Telescope team that imaged Jupiter when it was pummeled by a shattered comet. "*The morphology is suggestive of an arc-like structure in the feature's debris field,*" Hammel noted. "*We utilized the powerful mid-infrared capabilities of the Gemini telescope to record the impact's effect on Jupiter's upper atmosphere,*" said Imke de Pater. "*At these wavelengths we receive thermal radiation (heat) from the planet's upper atmosphere. The impact site is clearly much warmer than its surroundings, as shown by our image taken at an infrared wavelength of 18 microns.*"

The Gemini images were obtained with the MICHELLE spectrograph/imager, yielding a series of images at 7 different mid-infrared wavelengths. Two of the images (8.7 and 9.7 microns) were combined into a color composite image by Travis Rector to create the final false-color image. By using the full set of Gemini images taken over a range of wavelengths from 8 to 18 microns, the team will be able to disentangle the effects of temperature, ammonia abundance, and upper atmospheric aerosol content. Comparing these observations with past and future images will permit the team to study the evolution of features as Jupiter's strong winds disperse them. "*The Gemini support staff made a heroic effort to get these data,*" said de Pater. "*We were on the telescope observing within 24 hours of contacting the observatory.*" Because of the transient nature of this event, the telescope was scheduled as a "Target of Opportunity" and required staff to react quickly to the request. http://www.gemini.edu/images/stories/press_release/pr2009-3/fig1_hi.jpg

TRIPLE ASTEROID SYSTEM TRIPLES OBSERVERS' INTEREST

Radar imaging at Goldstone Solar System Radar on June 12 and 14, 2009, revealed that near-Earth asteroid 1994 CC is a triple system. Asteroid 1994 CC encountered Earth within 2.52 million kilometers (1.56 million miles) on June 10. Prior to the flyby, very little was known about this celestial body. 1994 CC is only the second triple system known in the near-Earth population. A team led by Marina Brozovic and Lance Benner made the discovery.



Radar imaging at NASA's Goldstone Solar System Radar on June 12 and 14, 2009, revealed that near-Earth asteroid 1994 CC is a triple system. Image Credit: NASA/JPL/GSSR

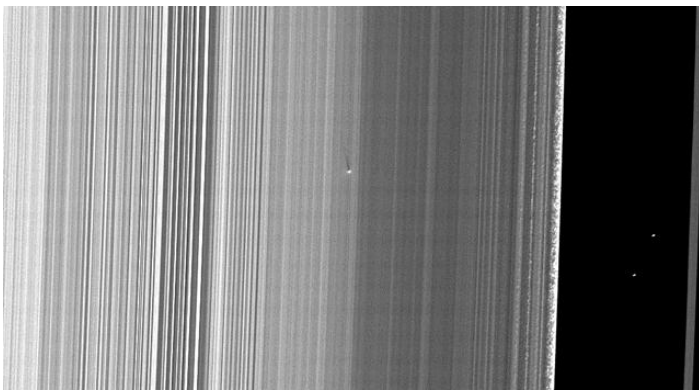
1994 CC consists of a central object about 700 meters (2,300 feet) in diameter that has two smaller moons revolving around it. Preliminary analysis suggests that the two small satellites are at least 50 meters (164 feet) in diameter. Radar observations at Arecibo Observatory in Puerto Rico, led by the center's director Mike Nolan, also detected all

three objects, and the combined observations from Goldstone and Arecibo will be utilized by the scientists and their colleagues to study 1994 CC's orbital and physical properties.

The next comparable Earth flyby for asteroid 1994 CC will occur in the year 2074 when the space rock trio flies past Earth at a distance of two-and-a-half million kilometers (1.6 million miles). Of the hundreds of near-Earth asteroids observed by radar, only about 1 percent are triple systems. <http://www.jpl.nasa.gov/news/features.cfm?feature=2259>

REVELATIONS IN SATURN'S RINGS CONTINUE AS EQUINOX APPROACHES

Thanks to a special play of sunlight and shadow as Saturn continues its march towards its August 11 equinox, recent images captured by Cassini spacecraft are revealing new three-dimensional objects and structures in the planet's otherwise flat rings. The Cassini spacecraft captured this image of a small object in the outer portion of Saturn's B ring casting a shadow on the rings as Saturn approaches its August 2009 equinox.



This new moonlet, situated about 300 miles (480 kilometers), inward from the outer edge of the B ring, was found by detection of its shadow which stretches 25 miles, or 41 kilometers, across the rings. The shadow length implies the moonlet is protruding about 660 feet, or 200 meters, above the ring plane. If the moonlet is orbiting in the same plane as the ring material surrounding it, which is likely, it must be about 1,300 feet, or 400 meters, across. This object is not attended by a propeller feature, unlike the band of moonlets discovered in Saturn's A ring earlier by Cassini. The A ring moonlets, which have not been directly imaged, were found because of the propeller-like narrow gaps on either side of them that they create as they orbit within the rings. The lack of a propeller feature surrounding the new moonlet is likely because the B ring is dense, and the ring material in a dense ring would be expected to fill in any gaps around the moonlet more quickly than in a less dense region like the mid-A ring. Also, it may simply be harder in the first place for a moonlet to create propeller-like gaps in a dense ring.

The search for three-dimensional structures in Saturn's rings has been a major goal of the imaging team during Cassini's "Equinox Mission," the two-year period containing exact equinox -- that moment when the sun is seen directly overhead at noon at the planet's equator. This novel illumination geometry, which occurs every half-Saturn-year, or about 15 Earth years, lowers the sun's angle to the ring plane and causes out-of-plane structures to cast long shadows across the rings' broad expanse, making them easy to detect. The new images can be found at <http://saturn.jpl.nasa.gov> and <http://www.nasa.gov/cassini> <http://www.jpl.nasa.gov/news/features.cfm?feature=2261>

METEORITE FOUND ON MARS YIELDS CLUES ABOUT PLANET'S PAST

Mars Rover Opportunity is investigating a metallic meteorite the size of a large watermelon that is providing researchers more details about the Red Planet's environmental history. The rock, dubbed "Block Island," is larger than any other known meteorite on Mars. Scientists calculate it is too massive to have hit the ground without disintegrating unless Mars had a much thicker atmosphere than it has now when the rock fell. Atmosphere slows the descent of meteorites. Additional studies also may provide clues about how weathering has affected the rock since it fell.

Two weeks ago, Opportunity had driven approximately 600 feet past the rock in a Mars region called Meridiani Planum. An image the rover had taken a few days earlier and stored was then transmitted back to Earth. The image showed the rock is approximately 2 feet in length, half that in height, and has a bluish tint that distinguishes it from other rocks in the area. The rover team decided to have Opportunity backtrack for a closer look, eventually touching Block Island with its robotic arm.

"There's no question that it is an iron-nickel meteorite," said Ralf Gellert. Gellert is the lead scientist for the rover's alpha particle X-ray spectrometer, an instrument on the arm used for identifying key elements in an object. "We already investigated several spots that showed elemental variations on the surface. This might tell us if and how the metal was altered since it landed on Mars." The microscopic imager on the arm revealed a distinctive triangular pattern in Block Island's surface texture, matching a pattern common in iron-nickel meteorites found on Earth. "Normally this pattern is exposed when the meteorite is cut, polished and etched with acid," said Tim McCoy, a rover team member. "Sometimes it shows up on the surface of meteorites that have been eroded by windblown sand in deserts, and that appears to be what we see with Block Island."

Opportunity found a smaller iron-nickel meteorite, called "Heat Shield Rock," in late 2004. At about a half ton or more, Block Island is roughly 10 times as massive as Heat Shield Rock and several times too big to have landed intact without more braking than today's Martian atmosphere could provide. "Consideration of existing model results indicates a meteorite this size requires a thicker atmosphere," said rover team member Matt Golombek. "Either Mars has hidden reserves of carbon-dioxide ice that can supply large amounts of carbon-dioxide gas into the atmosphere during warm periods of more recent climate cycles, or Block Island fell billions of years ago."

Spectrometer observations have already identified variations in the composition of Block Island at different points on the rock's surface. The differences could result from interaction of the rock with the Martian environment, where the metal becomes more rusted from weathering with longer exposures to water vapor or liquid.

"We have lots of iron-nickel meteorites on Earth. We're using this meteorite as a way to study Mars," said Albert Yen, a rover team member at JPL. "Before we drive away from Block Island, we intend to examine more targets on this rock where the images show variations in color and texture. We're looking to see how extensively the rock surface has been altered, which helps us understand the history of the Martian climate since it fell." When the investigation of Block Island concludes, the team plans to resume driving Opportunity on a route from Victoria Crater, which the rover explored for two years, toward the much larger Endeavour Crater. Opportunity has covered about one-fifth of the 12-mile route plotted for safe travel to Endeavour since the rover left Victoria nearly a year ago.

Opportunity and its twin rover, Spirit, landed on Mars in January 2004 for missions originally planned to last for three months. Both rovers

show signs of aging but are still very able to continue to explore and study Mars. <http://www.nasa.gov/rovers>

MARS ORBITER SHOWS ANGLED VIEW OF MARTIAN CRATER

The high-resolution camera on Mars Reconnaissance Orbiter has returned a dramatic oblique view of the Martian crater that a rover explored for two years. The new view of Victoria Crater shows layers on steep crater walls, difficult to see from straight overhead, plus wheel tracks left by Mars Exploration Rover Opportunity between September 2006 and August 2008. The orbiter's High Resolution Imaging Science Experiment camera shot it at an angle comparable to looking at landscape from an airplane window. Some of the camera's earlier, less angled images of Victoria Crater aided the rover team in choosing safe routes for Opportunity and contributed to joint scientific studies.

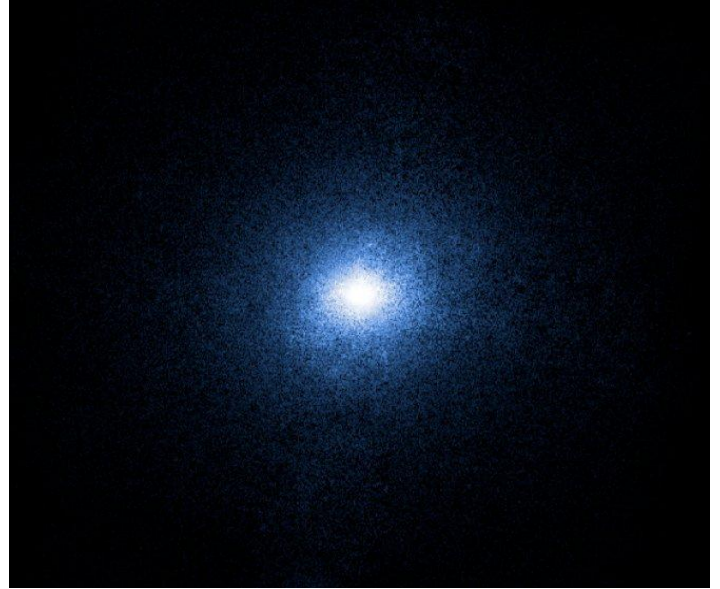


image of Victoria Crater in the Meridiani Planum region of Mars, taken by the High Resolution Imaging Science Experiment (HiRISE) camera on Mars Reconnaissance Orbiter This image of Victoria Crater in the Meridiani Planum region of Mars was taken by the High Resolution Imaging Science Experiment (HiRISE) camera on Mars Reconnaissance Orbiter at more of a sideways angle than earlier orbital images of this crater. Image Credit: NASA/JPL-Caltech/University of Arizona. The new Victoria Crater image is available online at: http://www.nasa.gov/mission_pages/MRO/multimedia/mro20091012a.html and as sub-image of the full-frame image at: http://hirise.lpl.arizona.edu/ESP_013954_1780.

CYGNUS X-1: STILL A "STAR"

Since its discovery 45 years ago, Cygnus X-1 has been one of the most intensively studied cosmic X-ray sources. About a decade after its discovery, Cygnus X-1 secured a place in the history of astronomy when a combination of X-ray and optical observations led to the conclusion that it was a black hole, the first such identification. The Cygnus X-1 system consists of a black hole with a mass about 10 times that of the Sun in a close orbit with a blue supergiant star with a mass of about 20 Suns. Gas flowing away from the supergiant in a fast stellar wind is focused by the black hole, and some of this gas forms a disk that spirals into the black hole. The gravitational energy release by this infalling gas powers the X-ray emission from Cygnus X-1.

Although more than a thousand scientific articles have been published on Cygnus X-1, its status as a bright and nearby black hole continues to attract the interest of scientists seeking to understand the nature of black holes and how they affect their environment. Observations with Chandra and ESA's XMM-Newton are especially valuable for studying the property of the stellar wind that fuels Cygnus X-1, and determining its rate of spin. This latter research has revealed that Cygnus X-1 is spinning very slowly. This puzzling result could indicate that Cygnus X-1 may have formed in an unusual type of supernova that somehow prevented the newly formed black hole from acquiring as much spin as other stellar black holes.



Chandra X-Ray Image of Cygnus X-1 - Credits: NASA/CXC

PLANET SMASH-UP SENDS VAPORIZED ROCK, HOT LAVA FLYING

Spitzer Space Telescope has found evidence of a high-speed collision between two burgeoning planets around a young star. Astronomers say that two rocky bodies, one as least as big as our moon and the other at least as big as Mercury, slammed into each other within the last few thousand years or so -- not long ago by cosmic standards. The impact destroyed the smaller body, vaporizing huge amounts of rock and flinging massive plumes of hot lava into space.



Artist's animation of the event is at

http://www.nasa.gov/mission_pages/spitzer/multimedia/spitzer-20090810.html

Spitzer's infrared detectors were able to pick up the signatures of the vaporized rock, along with pieces of refrozen lava, called tektites.

"This collision had to be huge and incredibly high-speed for rock to have been vaporized and melted," said Carey M. Lisse, lead author of a new paper describing the findings in the Aug. 20 issue of the *Astrophysical Journal*. "This is a really rare and short-lived event, critical in the formation of Earth-like planets and moons. We're lucky to have witnessed one not long after it happened."

Lisse and his colleagues say the cosmic crash is similar to the one that formed our moon more than 4 billion years ago, when a body the size of Mars rammed into Earth.

"The collision that formed our moon would have been tremendous, enough to melt the surface of Earth," said co-author Geoff Bryden. "Debris from the collision most likely settled into a disk around Earth that eventually coalesced to make the moon. This is about the same scale of impact we're seeing with Spitzer -- we don't know if a moon will form or not, but we know a large rocky body's surface was red hot, warped and melted."

Our solar system's early history is rich with similar tales of destruction. Giant impacts are thought to have stripped Mercury of its outer crust, tipped Uranus on its side and spun Venus backward, to name a few examples. Such violence is a routine aspect of planet building. Rocky planets form and grow in size by colliding and sticking together, merging their cores and shedding some of their surfaces. Though things have settled down in our solar system today, impacts still occur, as was observed last month after a small space object crashed into Jupiter.

Lisse and his team observed a star called HD 172555, which is about 12 million years old and located about 100 light-years away in the far southern constellation Pavo, or the Peacock (for comparison, our solar system is 4.5 billion years old). The astronomers used an instrument on Spitzer, called a spectrograph, to break apart the star's light and look for fingerprints of chemicals, in what is called a spectrum. What they found was very strange. "I had never seen anything like this before," said Lisse. "The spectrum was very unusual."

After careful analysis, the researchers identified lots of amorphous silica, or essentially melted glass. Silica can be found on Earth in obsidian rocks and tektites. Obsidian is black, shiny volcanic glass. Tektites are hardened chunks of lava that are thought to form when meteorites hit Earth. Large quantities of orbiting silicon monoxide gas were also detected, created when much of the rock was vaporized. In addition, the astronomers found rocky rubble that was probably flung out from the planetary wreck. The mass of the dust and gas observed suggests the combined mass of the two charging bodies was more than twice that of our moon. Their speed must have been tremendous as well -- the two bodies would have to have been traveling at a velocity relative to each other of at least 10 kilometers per second (about 22,400 miles per hour) before the collision.

Spitzer has witnessed the dusty aftermath of large asteroidal impacts before, but did not find evidence for the same type of violence -- melted and vaporized rock sprayed everywhere. Instead, large amounts of dust, gravel, and boulder-sized rubble were observed, indicating the collisions might have been slower-paced. "Almost all large impacts are like stately, slow-moving Titanic-versus-the-iceberg collisions, whereas this one must have been a huge fiery blast, over in the blink of an eye and full of fury," said Lisse. <http://www.jpl.nasa.gov/news/news.cfm?release=2009-119>

SPACE TELESCOPES FIND TRIGGER-HAPPY STAR FORMATION

A new study from two of NASA's Great Observatories provides fresh insight into how some stars are born, along with a beautiful new image of a stellar nursery in our Milky Way galaxy. The research shows that radiation from massive stars may trigger the formation of many more stars than previously thought.

While astronomers have long understood that stars and planets form from the collapse of a cloud of gas, the question of the main causes of this process has remained open.

One option is that the cloud cools, gravity gets the upper hand, and the cloud falls in on itself. The other possibility is that a "trigger" from some external source -- like radiation from a massive star or a shock from a supernova -- initiates the collapse. Some previous studies have noted a combination of triggering mechanisms in effect.



This composite image, combining data from NASA's Chandra X-ray Observatory and Spitzer Space Telescope shows the star-forming cloud Cepheus B, located in our Milky Way galaxy about 2,400 light years from Earth.

By combining observations of the star-forming cloud Cepheus B from the Chandra X-ray Observatory and the Spitzer Space Telescope, researchers have taken an important step in addressing this question. Cepheus B is a cloud of mainly cool molecular hydrogen located about 2,400 light years from Earth. There are hundreds of very young stars inside and around the cloud -- ranging from a few million years old outside the cloud to less than a million in the interior -- making it an important testing ground for star formation.

"Astronomers have generally believed that it's somewhat rare for stars and planets to be triggered into formation by radiation from massive stars," said Konstantin Getman, lead author of the study. "Our new result shows this belief is likely to be wrong."

This particular type of triggered star formation had previously been seen in small populations of a few dozen stars, but the latest result is the first time it has been clearly observed in a rich population of several hundred stars.

While slightly farther away than the famous Orion star-forming region, Cepheus B is at a better orientation for astronomers to observe the triggering process. The Chandra observations allowed the astronomers to pick out young stars within and around Cepheus B. Young stars have turbulent interiors that generate highly active magnetic fields, which, in turn, produce strong and identifiable X-ray signatures.

The Spitzer data revealed whether the young stars have a disk of material (known as "protoplanetary" disks) around them. Since they only exist in very young systems where planets are still forming, the presence of protoplanetary disks -- or lack thereof -- is an indication of the age of a star system.

The new study suggests that star formation in Cepheus B is mainly triggered by radiation from one bright, massive star outside the molecular cloud. According to theoretical models, radiation from this star would drive a compression wave into the cloud-triggering star formation in the interior, while evaporating the cloud's outer layers. The Chandra-Spitzer analysis revealed slightly older stars outside the cloud, and the youngest stars with the most protoplanetary disks in the cloud interior -- exactly what is predicted from the triggered star formation scenario. "We essentially see a wave of star and planet formation that is rippling through this cloud," said co-author Eric Feigelson. "It's clear that we can learn a lot about stellar nurseries by combining data from these two Great Observatories."

The Spitzer observations were taken during the observatory's "cold" mission, before its coolant ran out and it began operating at a warmer temperature. The new image and information about Spitzer are online at <http://www.spitzer.caltech.edu/spitzer> and <http://www.nasa.gov/spitzer> <http://www.jpl.nasa.gov/news/news.cfm?release=2009-123>

SCIENTISTS DISCOVER STORMS IN THE TROPICS OF TITAN

For all its similarities to Earth - clouds that pour rain (albeit liquid methane not liquid water) onto the surface producing lakes and rivers, vast dune fields in desert-like regions, plus a smoggy orange atmosphere that looks like Los Angeles's during fire season - Saturn's largest moon, Titan, is generally "a very bland place, weatherwise," says Mike Brown.

"We can watch for years and see almost nothing happen. This is bad news for people trying to understand Titan's meteorological cycle, as not only do things happen infrequently, but we tend to miss them when they DO happen, because nobody wants to waste time on big telescopes - which you need to study where the clouds are and what is happening to them - looking at things that don't happen," explains Brown, the Richard and Barbara Rosenberg Professor of Planetary Astronomy. However, just because weather occurs "infrequently" doesn't mean it never occurs, nor does it mean that astronomers, in the right place at the right time, can't catch it in the act.

That's just what Emily Schaller - then a graduate student of Brown's - and colleagues accomplished when they observed, in April 2008, a large system of storm clouds appear in the apparently dry mid- latitudes and then spread in a southeastward direction across the moon. Eventually, the storm generated a number of bright but transient clouds over Titan's tropical latitudes, a region where clouds had never been seen - and, indeed, where it was thought they were extremely unlikely to form.

Schaller, now a Hubble Postdoctoral Fellow, Brown, and their colleagues; Henry Roe, a former postdoctoral scholar in Brown's group, and Tapio Schneider, a professor of environmental science and engineering, describe their work, and its implications for climate on Titan, in an article in the August 13 issue of Nature.

"A couple of years ago, we set up a highly efficient system on a smaller telescope to figure out when to use the biggest telescopes," Brown says. The first telescope, the Infrared Telescope Facility, on Mauna Kea, takes a spectrum of Titan almost every single night. "From that we can't tell much, but we can say 'no clouds,' 'a few clouds,' or, if we get lucky 'monster clouds,'" he explains. Schaller explains, "The period during which I was collecting data for my thesis, sadly, corresponded entirely to an extended period of essentially no clouds, so we never really got to show the full power of the combined telescopes. But then, after finishing and turning in my thesis, I walked back across campus to my office to look at the data from the previous night to find that Titan

suddenly had the biggest clouds ever. I like to think it was Titan's graduation gift to me. Or perhaps a bad joke."

The day after the telescope's big find (and Schaller's thesis submission), Schaller, Brown, and Roe began tracking the clouds with the large Gemini telescope on Mauna Kea and watched this system evolve for a month. "And what a cool show it was," Brown says. "The first cloud was seen near the tropics and was caused by a still- mysterious process, but it behaved almost like an explosion in the atmosphere, setting off waves that traveled around the planet, triggering their own clouds. Within days a huge cloud system had covered the south pole, and sporadic clouds were seen all the way up to the equator."

Schneider, an expert on atmospheric circulations, was instrumental in helping to sort out the complicated chain of events that followed the initial outburst of cloud activity.

"The month-long event has many important implications for understanding the hydrological cycle on Titan," says Brown, "but one of the reasons I am most excited about it is that it shows clouds near the equator - where the [European Space Agency's] Huygens probe landed - for the first time. For a while now, people have speculated that the equatorial regions are simply too dry to ever have significant clouds."

And yet, the images snapped by the Huygens probe in January 2005, as it descended through Titan's soupy atmosphere and toward the surface, revealed small-scale channels and streams, which looked just like features created by fluids - by water, here on Earth, and on Titan, probably by liquid methane.

Experts had speculated for years on how there could be streams and channels in a region with no rain. The new results suggest those speculations may prove unnecessary. "No one considered how storms in one location can trigger them in many other locations," says Brown. The paper, "Storms in the tropics of Titan," appears in the August 13 issue of Nature. For more information about the discovery, go to <http://www.mikebrownsplanets.com>

SMALLER ASTEROID DETECTION PROGRAM NOT YET MEETING GOALS

According to a new interim report from the National Research Council, NASA's current near-Earth object surveys will not meet the congressionally mandated goal of discovering 90 percent of all objects over 140 meters in diameter by 2020. Funding for near-Earth object activities at NASA has been constrained, with most costs being met by funds from other programs.

The United States is currently the only country with an active, government-sponsored effort to detect and track potentially hazardous near-Earth objects (NEOs).

Congress has mandated that NASA detect and track 90 percent of NEOs that are 1 kilometer in diameter or larger. These objects represent a great potential hazard to life on Earth and could cause global destruction. NASA is close to accomplishing this goal.

Congress has also more recently mandated that by 2020 NASA should detect and track 90 percent of NEOs that are 140 meters in diameter or larger, a category of many more objects that is generally recognized to represent a very significant threat to life locally on Earth if they strike in or near urban areas. Achieving this goal may require the building of one or more additional observatories, possibly including a space-based observatory.

Congress directed NASA to ask the National Research Council to review NASA's near-Earth object programs. This interim report addresses some of the issues associated with the survey and detection of NEOs. The

final report will contain findings and recommendations for survey and detection, characterization, and mitigation of near-Earth objects based on an integrated assessment of the problem

A final report will include findings and recommendations on detecting, characterizing, and mitigating the hazard of near-Earth objects. Full report is available at http://www.nap.edu/catalog.php?record_id=12738

LONG DEBATE ENDED OVER CAUSE, DEMISE OF ICE AGES – MAY HELP PREDICT FUTURE

A team of researchers says it has largely put to rest a long debate on the underlying mechanism that has caused periodic ice ages on Earth for the past 2.5 million years -- they are ultimately linked to slight shifts in solar radiation caused by predictable changes in Earth's rotation and axis.

Researchers from Oregon State University and other institutions conclude that the known wobbles in Earth's rotation caused global ice levels to reach their peak about 26,000 years ago, stabilize for 7,000 years and then begin melting 19,000 years ago, eventually bringing to an end the last ice age. The melting was first caused by more solar radiation, not changes in carbon dioxide levels or ocean temperatures, as some scientists have suggested in recent years.

"Solar radiation was the trigger that started the ice melting, that's now pretty certain," said Peter Clark, a professor of geosciences at OSU. "There were also changes in atmospheric carbon dioxide levels and ocean circulation, but those happened later and amplified a process that had already begun."

The findings are important, the scientists said, because they will give researchers a more precise understanding of how ice sheets melt in response to radiative forcing mechanisms. And even though the changes that occurred 19,000 years ago were due to increased solar radiation, that amount of heating can be translated into what is expected from current increases in greenhouse gas levels, and help scientists more accurately project how Earth's existing ice sheets will react in the future. "We now know with much more certainty how ancient ice sheets responded to solar radiation, and that will be very useful in better understanding what the future holds," Clark said. "It's good to get this pinned down."

The researchers used an analysis of 6,000 dates and locations of ice sheets to define, with a high level of accuracy, when they started to melt. In doing this, they confirmed a theory that was first developed more than 50 years ago that pointed to small but definable changes in Earth's rotation as the trigger for ice ages. "We can calculate changes in the Earth's axis and rotation that go back 50 million years," Clark said. "These are caused primarily by the gravitational influences of the larger planets, such as Jupiter and Saturn, which pull and tug on the Earth in slightly different ways over periods of thousands of years."

That, in turn, can change the Earth's axis the way it tilts towards the sun about two degrees over long periods of time, which changes the way sunlight strikes the planet. And those small shifts in solar radiation were all it took to cause multiple ice ages during about the past 2.5 million years on Earth, which reach their extremes every 100,000 years or so.

Sometime around now, scientists say, the Earth should be changing from a long interglacial period that has lasted the past 10,000 years and shifting back towards conditions that will ultimately lead to another ice age unless some other forces stop or slow it. But these are processes that literally move with glacial slowness, and due to greenhouse gas emissions the Earth has already warmed as much in about the past 200

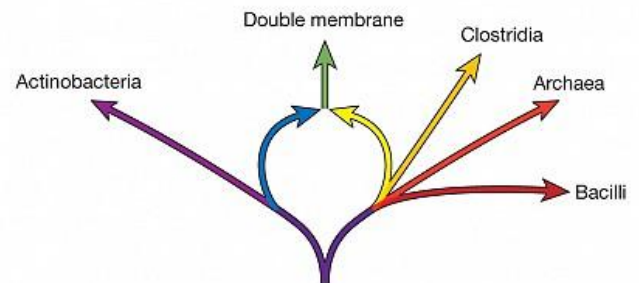
years as it ordinarily might in several thousand years, Clark said. "One of the biggest concerns right now is how the Greenland and Antarctic ice sheets will respond to global warming and contribute to sea level rise," Clark said. "This study will help us better understand that process, and improve the validity of our models."

RESEARCH REVEALS MAJOR INSIGHT INTO EVOLUTION OF LIFE ON EARTH

Humans might not be walking on Earth today if not for the ancient fusing of two microscopic, single-celled organisms called prokaryotes, recent research has found. By comparing proteins present in more than 3000 different prokaryotes - a type of single-celled organism without a nucleus - molecular biologist James A. Lake from the Center for Astrobiology showed that two major classes of relatively simple microbes fused together more than 2.5 billion years ago. Lake's research reveals a new pathway for the evolution of life on Earth.

This endosymbiosis, or merging of two cells, enabled the evolution of a highly stable and successful organism with the capacity to use energy from sunlight via photosynthesis. Further evolution led to photosynthetic organisms producing oxygen as a byproduct. The resulting oxygenation of Earth's atmosphere profoundly affected the evolution of life, leading to more complex organisms that consumed oxygen, which were the ancestors of modern oxygen-breathing creatures including humans.

"Higher life would not have happened without this event," Lake said. "These are very important organisms. At the time these two early prokaryotes were evolving, there was no oxygen in the Earth's atmosphere. Humans could not live. No oxygen-breathing organisms could live."



A schematic diagram illustrating the prokaryotic ring of life. The actinobacterial genome donor, at the left (blue), and the clostridial genome donor, at the right (yellow), transfer their genomes to form the double membrane prokaryotes at the top of the ring (green). The protein family data identify the Actinobacteria and the Clostridia as donors, and the double membrane prokaryotes as the fusion organism.

The genetic machinery and structural organization of these two organisms merged to produce a new class of prokaryotes, called double membrane prokaryotes. As they evolved, members of this double membrane class, called cyanobacteria, became the primary oxygen-producers on the planet, generating enough oxygen to alter the chemical composition of the atmosphere and set the stage for the evolution of more complex organisms such as animals and plants.

"This work is a major advance in our understanding of how a group of organisms came to be that learned to harness the sun and then effected the greatest environmental change Earth has ever seen, in this case with beneficial results," said Carl Pilcher, director of the NASA Astrobiology Institute.

Founded in 1998, the Astrobiology Institute is a partnership between NASA, 14 U.S. teams and six international consortia. The institute's

goals are to promote, conduct, and lead interdisciplinary astrobiology research; train a new generation of astrobiology researchers; and share the excitement of astrobiology with learners of all ages. The program supports research into the origin, evolution, distribution and future of life on Earth and the potential for life elsewhere. For more information, visit: <http://astrobiology.nasa.gov>

NASA FLIES "COLBERT" TREADMILL

The International Space Station module formerly known as "Node 3" has a new name. After more than a million online responses, the node will be called "Tranquility." The name Tranquility was chosen from thousands of suggestions submitted by participants on NASA's Web site, www.nasa.gov. The "Help Name Node 3" poll asked people to vote for the module's name either by choosing one of four options listed by NASA or offering their own suggestion. Tranquility was one of the top ten suggestions submitted by respondents to the poll, which ended March 20. *"The public did a fantastic job and surprised us with the quality and volume of the suggestions,"* said Bill Gerstenmaier, associate administrator for Space Operations.



"Apollo 11 landed on the moon at the Sea of Tranquility 40 years ago this July. We selected 'Tranquility' because it ties it to exploration and the moon, and symbolizes the spirit of international cooperation embodied by the space station."

Viewers of the Colbert Report TV show were asked to send in votes to name it COLBERT, and they did, but NASA decided to apply that to a treadmill instead. *"We don't typically name U.S. space station hardware after living people and this is no exception,"* Gerstenmaier joked. *"However, NASA is naming its new space station treadmill the 'Combined Operational Load Bearing External Resistance Treadmill,' or COLBERT. We have invited Stephen to Florida for the launch of COLBERT and to Houston to try out a version of the treadmill that astronauts train on."* The treadmill is targeted to launch to the station this August. It will be installed in Tranquility after the node arrives at the station next year. A newly-created patch will depict the acronym and an illustration of the treadmill.

Tranquility is scheduled to arrive at Kennedy Space Center in Florida in May. There, it will be prepared for space shuttle Endeavour's flight, designated STS-130, which is targeted for launch in February 2010. Tranquility will join four other named U.S. modules on the station: the Destiny laboratory, the Quest airlock, the Unity node and the Harmony node. Tranquility is a pressurized module that will provide room for many of the space station's life support systems. Attached to the node is a cupola, which is a unique work station with six windows on the sides and one on top.

Suni Williams made the announcement on "The Colbert Report" two years after running the Boston Marathon in space on a station treadmill similar to COLBERT. NASA broadcast a special message from comedian

Stephen Colbert on Monday, Aug. 24, as the space shuttle Discovery prepared to deliver the COLBERT treadmill to the International Space Station. The message aired on NASA Television after the shuttle's fueling commentary concluded.



Discovery and its seven-member crew were set to launch Tuesday, Aug. 25, on a 13-day mission to deliver scientific experiments, equipment and supplies to the station.

For NASA TV streaming video, downlink and schedule information, visit: <http://www.nasa.gov/ntv> After the initial broadcast, the video also will be available at: <http://www.youtube.com/NASATelevision>

For more information about the Node 3 module naming poll, visit: http://www.nasa.gov/externalflash/name_ISS/index.html

For more information about the COLBERT treadmill, visit: http://www.nasa.gov/mission_pages/station/behindscenes/colberttreadmill.html

JUMPING ASTEROIDS

How our solar system was formed has fascinated scientists and laymen alike for -- well, for a really, really long time. New research may have answered a piece to the puzzle - how big were the first planetesimals? For those of you scoring at home, "planetesimals" were the first solid objects in our newly minted solar system (also known as the protoplanetary disk). They began life as small grains of dust orbiting an infant sun. These grains would bump into each other, clump together and gradually form larger grains of dust, which eventually became small space rocks. Now the theory goes that some of these small rock-sized planetesimals aspired for greater things, and continued to gradually grow in size to become asteroids, and that a few of those continued to grow beyond the asteroid stage and become planets.

The problem with this tidy little theory is that when the burgeoning space rocks grew to about one meter (3.3 feet) in size, orbital mechanics tells us the gas comingling with them in the protoplanetary disk should have acted like a brake, slowing their velocity appreciably. Their orbital speed having been cut, these filing cabinet-sized space rocks would have spiraled into the sun. Essentially, the gas would have

acted as a celestial "mini-vacuum." The problem is, there are asteroids up there in space. Honest, ask any astronomer. So what happened?

Evidence is now mounting that these small space rocks quickly "jumped" (or grew) in size from below one meter to multi-kilometer in size. Planetesimals that size were big enough to plow through the drag created by the gas in the protoplanetary disk without having their orbits appreciably altered, hence they did not spiral into the sun.



A massive collision between rocky, embryonic planets as big as mountain ranges.

What data point to a jump in asteroid sizes? Simply, the asteroids available for viewing in the night's sky. Telescopic surveys indicate there is currently a plethora of asteroids less than one kilometer (.62 mile) wide but those over one kilometer drop considerably in number. The authors used computer simulations in an attempt to mimic the impacts and coagulation processes that took place over the millions of years between when the asteroids formed and now. The only way they could arrive at the current asteroid size distribution was to begin these simulations with planetesimals that quickly morphed into asteroids hundreds of kilometers in size. Once their growth spurt was over, these massive celestial bodies began an epoch-sized game of demolition derby as they orbited the sun. Over the eons, and with each extraterrestrial pileup, came fewer and fewer large asteroids - a fragmentation process that continues to this day. Despite the modest sizes of asteroids today, the paper's authors conclude that asteroids must have been born big. For more: www.jpl.nasa.gov/asteroidwatch . <http://www.jpl.nasa.gov/news/features.cfm?feature=2286>

CATALINA SKY SURVEY (CSS) SPAWNS REAL-TIME 'TRANSIENT' SURVEY

Astronomers have been mining a mother lode of astronomical data from the Catalina Sky Survey (CSS) and finding more "optical transients" than they can characterize during the past 17 months. They have found more than 700 unique "optical transients," or objects that change brightness on time scales of minutes to years. They've also found 177 supernovae. That's more than dedicated supernova surveys have turned up during that time. Their discoveries include the most energetic supernova ever seen, and a nearby stellar explosion in the Antennae galaxy that is helping astronomers refine the cosmic distance scale. Unlike most dedicated supernova surveys, CSS telescopes cover the entire sky each month, allowing the team to record supernovae in dim galaxies where others weren't looking. The bonanza of transient optical objects detected in the CSS data also includes:

** 185 cataclysmic variable stars, which is about three out of every four such objects discovered over the same time span and more than the Sloan Digital Sky Survey found in six years. This result suggests that cataclysmic variables are more common than previously thought.*

** 32 blazars, or beamed active galactic nuclei.*

These very compact and highly variable energy sources are among the most violent phenomena in the universe.

** About 30 stellar flares, which are large explosions in stellar atmospheres.*

** About 100 other highly erratic light sources that include active galactic nuclei, high proper motion stars and sources that remain unknown.*

Capturing such ephemeral astronomical events is not what the CSS is primarily about. NASA funds the CSS, to search for potentially hazardous, Earth-orbit crossing asteroids and comets, also called Near-Earth objects, or NEOs. The CSS is the most successful NEO survey that exists. CSS observers have found about 70 percent of all NEOs discovered over the past three-and-a-half years. Two years ago, CSS director Ed Beshore and co-investigator Steve Larson began collaborating with scientists on a pilot project to mine the CSS data for optical transients.

CSS is a relatively small-budget operation. Six observers use the 1.5 meter, or 60-inch reflector telescope at Steward Observatory's Mount Lemmon site and the 0.7-meter, or 28-inch Schmidt telescope near Mount Bigelow in the Santa Catalina Mountains north of Tucson. Two observers use Australian National University's 0.5-meter, or 20-inch Uppsala Schmidt telescope at Siding Spring, New South Wales, Australia. Each telescope takes about 20 gigabytes of data each night. Caltech astronomer Andrew Drake tapped real-time data from the 28-inch Schmidt telescope on Mount Bigelow for the pilot project. Drake and his colleagues at Caltech observed many of the new CSS discoveries using some of the most powerful telescopes in the world, including the Hale Telescope at Mount Palomar, the Keck Telescope on Mauna Kea and the Gemini Telescope in Chile

Last year, the Caltech team wrote a NSF proposal to expand what's called the Catalina Real-Time Transient Survey (CRTS), into a true, fully open synoptic sky survey. The CRTS team soon will construct a Web site that will make roughly 10 terabytes of data taken by the CSS over the past five years -- as well all new CSS data that continues to stream in -- available over the Internet to astronomers worldwide, professional and amateur.



The CRTS will be the first and only fully public synoptic sky survey, team members say. It's a bargain-rate boon to astronomers who are trying to figure out how to manage enormous data streams to be delivered by future synoptic sky survey telescopes, such as Pan-STARRS and the LSST, they add. "The grant will allow our colleagues to expand our project to get real-time data from our two other telescopes - the 1.5

meter Mount Lemmon telescope and the Siding Spring telescope in Australia - and buy computers and storage equipment that will allow them to put all this data online for anybody in the world to use," Larson said.

Researchers will be able to compare real-time CSS images to any image in the 5-year CSS archive, thanks to a fortuitous decision early on. "Fortunately, we decided to divide the sky into a grid and basically shoot and reshoot the same defined patches of sky within that grid," Beshore said. "That's a big help when it comes to comparing what a specific patch of sky looked like earlier and what it looks like now."

The emergence of CRTS illustrates an important new trend in astronomical research - the search for objects that appear, disappear and even move, Beshore said. "Objects can change on time scales of minutes, hours and weeks, not just years." "We've seen a star dim in images taken only 10 minutes apart, for example," Larson said.

The CSS team can co-add all the images taken at a specific place on the sky and get a very deep sky image showing very faint objects, objects down to the 21st magnitude, Larson added.

Former team member Eric Christensen produced the CSS team's first catalog of deep-sky images in this way. The CSS team is contributing its cataloged images to the CRTS. Releasing data over the Internet in real time rather than keeping it proprietary is another striking trend in astronomy, and a necessary one, Larson and Beshore say. Observers see many more objects in their data than they have time to follow up. "We just crank out the data so amateurs and professionals alike can figure out what they can do with it," Beshore said. The optical transient search is a valuable spin-off astronomy project born from the CSS search for near-Earth asteroids and comets.

But NASA can rest assured that CSS observers remain focused on their primary mission: Last year CSS tallied 565 NEO discoveries, breaking its own record of 460 NEO discoveries the previous year.

Also last year, a CSS team member made history when he spotted the small asteroid 2008 TC₃ hours before it became a brilliant fireball over Sudan. It was the first time scientists discovered an asteroid before it reached Earth and predicted when and where the impact would be. U.S. and African students and researchers recovered more than eight pounds of meteorites from the fall. CSS - <http://www.lpl.arizona.edu/css/> CRTS - <http://www.lpl.arizona.edu/crts/>

GALAXIES DEMAND A STELLAR RECOUNT – WITH GALAXY EXPLORER

For decades, astronomers have gone about their business of studying the cosmos with the assumption that stars of certain sizes form in certain quantities. Like grocery stores selling melons alone, and blueberries in bags of dozens or more, the universe was thought to create stars in specific bundles. In other words, the proportion of small to big stars was thought to be fixed. For every star 20 or more times as massive as the sun, for example, there should be 500 stars with the sun's mass or less. This belief, based on years of research, has been tipped on its side with new data from Galaxy Evolution Explorer. The ultraviolet telescope has found proof that small stars come in even bigger bundles than previously believed; for example, in some places in the cosmos, about 2,000 low-mass stars may form for each massive star. The little stars were there all along but masked by massive, brighter stars.

"What this paper is showing is that some of the standard assumptions that we've had – that the brightest stars tell you about the whole population of stars – this doesn't seem to work, at least not in a

constant way," said Gerhardt R. Meurer, principal investigator on the study and research scientist.

Astronomers have long known that many stars are too dim to be seen in the glare of their brighter, more massive counterparts. Though the smaller, lighter stars outnumber the big ones, they are harder to see. Going back to a grocery store analogy, the melons grab your eyes, even though the total weight of the blueberries may be more.

Beginning in the 1950s, astronomers came up with a method for counting all the stars in a region, even the ones they couldn't detect. They devised a sort of stellar budget, an equation called the "stellar initial mass function," to estimate the total number of stars in an area of the sky based on the light from only the brightest and most massive. For every large star formed, a set number of smaller ones were thought to have been created regardless of where the stars sat in the universe.

"We tried to understand properties of galaxies and their mass by looking at the light we can see," Meurer said. But this common assumption has been leading astronomers astray, said Meurer, especially in galaxies that are intrinsically small and faint.

To understand the problem, imagine trying to estimate the population on Earth by observing light emitted at night. Looking from above toward North America or Europe, the regions where more people live light up like signposts. Los Angeles, for example, is easily visible to a scientist working on the International Space Station. However, if this method were applied to regions where people have limited electricity, populations would be starkly underestimated, for example in some sections of Africa.

The same can be said of galaxies, whose speckles of light in the dark of space can be misleading. Meurer and his team used ultraviolet images from the Galaxy Evolution Explorer and carefully filtered red-light images from telescopes at the Cerro Tololo International Observatory in Chile to show that many galaxies do not form a lot of massive stars, yet still have plenty of lower-mass counterparts. The ultraviolet images are sensitive to somewhat small stars three times or more massive than the sun, while the filtered optical images are only sensitive to the largest stars with 20 or more times the mass of the sun.

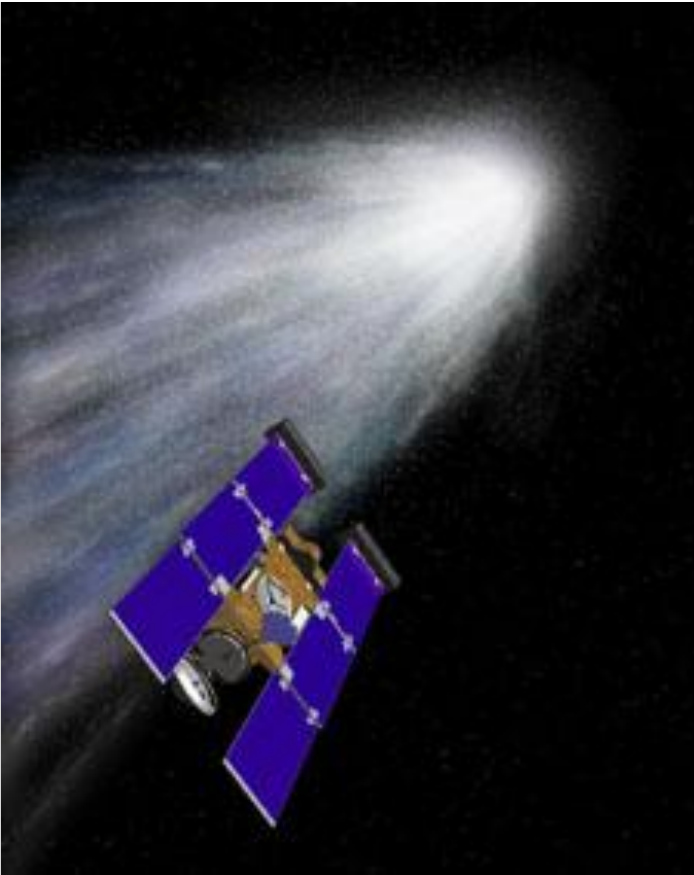
The effects are particularly important in parts of the universe where stars are spread out over a larger volume -- the rural Africa of the cosmos. There could be about four times as many stars in these regions than previously estimated. "Especially in these galaxies that seem small and piddling, there can be a lot more mass in lower mass stars than we had previously expected from what we could see from the brightest, youngest stars," Meurer said. "But we can now reduce these errors using satellites like the Galaxy Evolution Explorer."

SCIENTISTS MAKE FIRST DISCOVERY OF LIFE'S BUILDING BLOCK IN COMET

Scientists have discovered glycine, a fundamental building block of life, in samples of comet Wild-2 returned by the Stardust spacecraft. "Glycine is an amino acid used by living organisms to make proteins, and this is the first time an amino acid has been found in a comet," said Jamie Elsila. "Our discovery supports the theory that some of life's ingredients formed in space and were delivered to Earth long ago by meteorite and comet impacts." Elsila is the lead author of a paper on this research accepted for publication.

"The discovery of glycine in a comet supports the idea that the fundamental building blocks of life are prevalent in space, and strengthens the argument that life in the universe may be common rather than rare," said Carl Pilcher, director of the NASA Astrobiology

Institute. Proteins are the workhorse molecules of life, used in everything from structures like hair to enzymes, the catalysts that speed up or regulate chemical reactions. Just as the 26 letters of the alphabet are arranged in limitless combinations to make words, life uses 20 different amino acids in a huge variety of arrangements to build millions of different proteins.



Stardust passed through dense gas and dust surrounding the icy nucleus of Wild 2 (pronounced "Vilt-2") on Jan. 2, 2004. As the spacecraft flew through this material, a special collection grid filled with aerogel – a novel sponge-like material that's more than 99 percent empty space – gently captured samples of the comet's gas and dust. The grid was stowed in a capsule that detached from the spacecraft and parachuted to Earth on Jan. 15, 2006. Since then, scientists around the world have been busy analyzing the samples to learn the secrets of comet formation and our solar system's history.

"We actually analyzed aluminum foil from the sides of tiny chambers that hold the aerogel in the collection grid," said Elsila. "As gas molecules passed through the aerogel, some stuck to the foil. We spent two years testing and developing our equipment to make it accurate and sensitive enough to analyze such incredibly tiny samples." Earlier, preliminary analysis in the Goddard labs detected glycine in both the foil and a sample of the aerogel. However, since glycine is used by terrestrial life, at first the team was unable to rule out contamination from sources on Earth. "It was possible that the glycine we found originated from handling or manufacture of the Stardust spacecraft itself," said Elsila. The new research used isotopic analysis of the foil to rule out that possibility.

Isotopes are versions of an element with different weights or masses; for example, the most common carbon atom, Carbon 12, has six protons and six neutrons in its center (nucleus). However, the Carbon

13 isotope is heavier because it has an extra neutron in its nucleus. A glycine molecule from space will tend to have more of the heavier Carbon 13 atoms in it than glycine that's from Earth. That is what the team found. "We discovered that the Stardust-returned glycine has an extraterrestrial carbon isotope signature, indicating that it originated on the comet," said Elsila. The team includes Daniel Glavin and Jason Dworkin. "Based on the foil and aerogel results it is highly probable that the entire comet-exposed side of the Stardust sample collection grid is coated with glycine that formed in space," adds Glavin.

"The discovery of amino acids in the returned comet sample is very exciting and profound," said Stardust Principal Investigator Donald E. Brownlee, a professor at the University of Washington, Seattle. "It is also a remarkable triumph that highlights the advancing capabilities of laboratory studies of primitive extraterrestrial materials." http://www.nasa.gov/mission_pages/stardust/news/stardust_amino_acid.html

KEPLER ALREADY DETECTS AN EXOPLANET ATMOSPHERE

NASA's new exoplanet-hunting Kepler space telescope has detected the atmosphere of a known giant gas planet, demonstrating the telescope's extraordinary scientific capabilities. "As NASA's first exoplanets mission, Kepler has made a dramatic entrance on the planet-hunting scene," said Jon Morse, director of the Science Mission Directorate's Astrophysics Division. "Detecting this planet's atmosphere in just the first 10 days of data is only a taste of things to come. The planet hunt is on!" Launched March 6, 2009, from Cape Canaveral, Kepler will spend the next three-and-a-half years searching for planets as small as Earth, including those that orbit stars in a warm "Goldilocks zone" where there could be water. It will do this by looking for periodic dips in the brightness of stars, which occur when orbiting planets transit, or cross in front of, the stars.



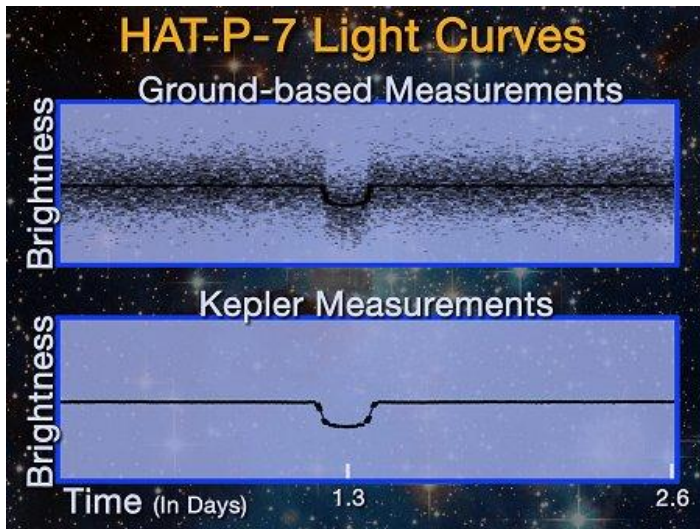
Artist's concept of an exoplanet orbiting close to its sun. Image credit: NASA

"When the light curves from tens of thousands of stars were shown to the Kepler science team, everyone was awed; no one had ever seen such exquisitely detailed measurements of the light variations of so many different types of stars," said William Borucki, the principal science investigator and lead author of the paper.

The observations were collected from a planet called HAT-P-7, known to transit a star located about 1,000 light years from Earth. The planet orbits the star in just 2.2 days and is 26 times closer than Earth is to the sun. Its orbit, combined with a mass somewhat larger than the planet

Jupiter, classifies this planet as a "hot Jupiter." It is so close to its star, the planet is as hot as the glowing red heating element on a kitchen stove.

HAT-P-7 was known before Kepler turned its attention to the planet. Kepler's measurements are so precise, however, they show something new: a smooth rise and fall of the light caused by the changing phases of the planet, similar to the phases of our own Moon. Kepler could also see the planet's light vanish completely when it passed behind its parent star. This vanishing act is called an "occultation."



A comparison of ground-based and space-based light curves for hot exoplanet HAT P7b. Image credit: NASA.

The new Kepler data can be used to study this hot Jupiter in unprecedented detail. The depth of the occultation and the shape and amplitude of the light curve show the planet has an atmosphere with a day-side temperature of about 4,310 degrees Fahrenheit. Little of this heat is carried to the cool night side. The occultation time compared to the main transit time shows the planet has a circular orbit. The discovery of light from this planet confirms the predictions by researchers and theoretical models that the emission would be detectable by Kepler. The observed brightness variation is just one and a half times what is expected for a transit caused by an Earth-sized planet. Although this is already the highest precision ever obtained for an observation of this star, Kepler will be even more precise after analysis software being developed for the mission is completed.

"This early result shows the Kepler detection system is performing right on the mark," said David Koch, deputy principal investigator. "It bodes well for Kepler's prospects to be able to detect Earth-size planets." http://science.nasa.gov/headlines/y2009/06aug_kepler2.htm?list72230

BROOKS MEMORIAL STATE PARK STAR PARTY - 2009

SAS Brooks Memorial park star party site at Brook's ELC



Upper Meadow – potential future star party site



The Seattle Astronomical Society (and its president Karl Schroeder) have for a number of years held a late summer star party at the state park near Satus Pass, 12 miles north of Goldendale on Hwy. 97, and south of Ellensburg and Yakima. It is held at the Environmental Learning Center meadow portion of the park. Large undeveloped portions of the park, with dark, un-light-polluted skies, (21.6 mag./arc-sec, or 6.4 limiting magnitude) have potential for more frequent recurring star parties, and the park staff are very supportive of astro activities.

RETURN OF THE NOCTILUCENT CLOUDS - AT 2009 TMSP



Photos of Noctilucent clouds at TMSP 7/23/09 – 9:50 PM PDT
Mark Folkerts – Canon 10D DSLR 17-40 mm lens – 1 sec. exposures

These ice-crystal clouds are the highest type of clouds known, up to 55 miles above the Earth’s surface. They are usually rare and seen only from high-latitude locations such as Finland, Iceland, Scotland, or Norway, near mid-summer. For reasons still unknown, they have increased dramatically over the past decade. They have a dramatic electric blue glow against the dark twilight sky, as they catch the high sunlight, well after the surface is dark

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

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In August's StarGazer:

- **** ASTRO CALENDAR - UPCOMING ASTRONOMY EVENTS
- **** OBSERVER'S INFORMATION - SUN, MOON, AND PLANET VISIBILITY
- **** UP IN THE SKY -- THE PLANETS (AND PLUTO)
- **** WESTERN US STAR PARTIES THIS SEASON
- **** CONSTELLATION OF THE MONTH
- **** YOUNG ASTRONOMER'S CORNER
- **** ASTRONOMY AND TELESCOPE "LINGO"
- **** SURPRISE COLLISION ON JUPITER CAPTURED BY GEMINI TELESCOPE
- **** TRIPLE ASTEROID SYSTEM TRIPLES OBSERVERS' INTEREST
- **** REVELATIONS IN SATURN'S RINGS CONTINUE AS EQUINOX APPROACHES
- **** METEORITE FOUND ON MARS YIELDS CLUES ABOUT PLANET'S PAST
- **** MARS ORBITER SHOWS ANGLED VIEW OF MARTIAN CRATER
- **** PLANET SMASH-UP SENDS VAPORIZED ROCK, HOT LAVA FLYING
- **** SPACE TELESCOPES FIND TRIGGER-HAPPY STAR FORMATION
- **** SCIENTISTS DISCOVER STORMS IN THE TROPICS OF TITAN
- **** ASTEROID DETECTION PROGRAMS NOT YET MEETING U.S. GOALS
- **** LONG DEBATE ENDED OVER CAUSE, DEMISE OF ICE AGES – MAY HELP PREDICT FUTURE
- **** RESEARCH REVEALS MAJOR INSIGHT INTO EVOLUTION OF LIFE ON EARTH
- **** NASA FLIES "COLBERT" TREADMILL
- **** JUMPING ASTEROIDS
- **** CATALINA SKY SURVEY (CSS) SPAWNS REAL-TIME TRANSIENT SURVEY
- **** SCIENTISTS MAKE FIRST DISCOVERY OF LIFE'S BUILDING BLOCK IN COMET
- **** KEPLER ALREADY DETECTS AN EXOPLANET'S ATMOSPHERE

The next EAS Meeting is Saturday August 29th at Aurora Astro store