

The Stargazer

January 2008

President: Mark Folkerts (425) 486-9733
 Vice President: James Bielaga (425) 337-4384
 Librarian: Mike Locke (425) 259-5995
 Treasurer: Carol Gore (360) 856-5135
 Newsletter co-editor: Bill O'Neil (774) 253-0747
 Web assistance: Cody Gibson (425) 348-1608

folkerts at seanet.com
 jamesbielaga at aol.com
 lockemi at comcast.net
 janeway7C at aol.com
 wonastrn at seanet.com
 sircody01 at comcast.net
 (change 'at' to @ to send email)

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

See EAS website at:

http://members.tripod.com/everett_astronomy

EAS BUSINESS...

**NEXT EAS MEETING – SATURDAY JANUARY 19TH
 AT 7:00 PM AT AURORA ASTRO PRODUCTS STORE.
 -> NOTE LOCATION CHANGE <-**

★★ Saturday January 19th 7:00 pm MEETING ★★

The presentation will be the recent Timothy Ferris film "Seeing in the Dark" about amateur observing the sky. It will be located at the Aurora Astro Products store in Silver Lake.

Map/Directions to Aurora Astro Products store location - http://www.skyvalleyscopes.com/aurora_astro_products_silver_lak.htm

Silver Lake Plaza, 11419 19th AVE. SE, Everett, WA 98208

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

If you are traveling southbound on I-5:

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

Map to library - <http://www.epls.org/about/mlmap.htm>

2702 Hoyt Avenue
Everett, WA 98201

Directions to library - <http://www.epls.org/about/mldirect.htm>

★ STAR PARTY INFO ★

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

(EAS scheduled star parties are suspended until spring due the cloudy weather.)

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@nwlink.com) 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.

Planned events are 'On hold' until spring weather returns in March or so – call Ron about spur-of-the-moment observing.

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

Other Western US Star Parties This Season...

Rooster Rock OR State Park 2008 RCA Star parties - 22 miles east of Portland on I-84 (east of Sandy River) at exit 25.

Mar 15 - Vernal Equinox Celebration at Rooster Rock

Apr 12 - Planet Parade at Rooster Rock

May 10 - Astronomy Day at Rooster Rock

Jun 14 - Summer Solstice Celebration at Rooster Rock

Jul 12 - Luna Viewing at Rooster Rock

Aug 11 - Perseid Meteor Shower Watch at Rooster Rock

Sep 06 - Autumnal Equinox Celebration at Rooster Rock

(503) 797-4610. <http://www.oms.edu/visit/planetarium/starparties.cfm>

Mar 28-30 - RCA 2008 Messier Marathon Star Party - Kah-Nee-Ta Resort and Casino, Warm Springs, OR - <http://www.rca-omsi.org/kahneeta.htm>

May 23-26 - 40th annual RTMC Astronomy Expo 2008, Riverside, CA - <http://www.rtmcastronomyexpo.org/>

May 24-26 - Fire in the Sky – Rocket launch and Star party – Mansfield, WA - <http://www.fireinthesky.org/FITS2007.htm> <http://www.tas-online.org/calendar.php>

May 02-05 - OAS Camp Delaney Star Party - Sun Lakes SP <http://www.olympicastronomicalsociety.com/Documents/FALLCAMPDELANYSign-UpForm.pdf>

Jun 01-08 - Texas Star Party (TSP) 2008- Prude Ranch, Fort Davis, TX - <http://www.texasstarparty.org/>

Jun 05-07 – Goldendale 2008 NWRAL "First Light" - Skyview Acres - Goldendale WA <http://klickitatstarparty.net/>

(tbd June) - **Mt. St. Helens Star Party** - near Mt. St. Helens Visitors Center

Jun 21-28 - 2008 Grand Canyon Star Party (GCSP) - On the South Rim - <http://www.tucsonastronomy.org/gcsp.html>

Jun 30-Jul 07 - Shingletown Star Party 2008 - Shingletown, Mt. Shasta, CA <http://www.shingletownstarparty.org/>

Jul 02-06 - Golden State Star Party - Frosty Acres Ranch, Adin, CA <http://goldenstatestarparty.blogspot.com/>

Jul 02-06 - The Rocky Mountain Star Stare (RMSS) 2008 - Pike Nat Forest, Colorado Springs, CO <http://www.rmss.org/>

Jul 31- Aug 02 – Table Mt. Star Party (TMSP) 2008 - Ellensburg WA <http://www.tmspa.com/>

Jul 31-Aug 02 2008 - 18th Annual Weekend Under the Stars - Foxpark WY - <http://home.bresnan.net/~curranm/wuts.html>

Aug 01-03 – RCA Trout Lake Star Party 2008 – Trout Lake WA <http://www.rca-omsi.org/TroutLake2008.pdf>

Aug 02-10 - Mt. Kobau Star Party 2008 - Mt. Kobau, near Osoyoos BC <http://www.mksp.ca/>

Aug 06-10 - Mt Bachelor Star Party (MBSP) 2008 - Mt. Bachelor (Bend) OR <http://www.mbsp.org/>

Aug 29-31 - RASCals Star Party 2008 - Victoria Fish & Game Assoc - Holker Place, Malahat, (Near Victoria) BC, CA <http://victoria.rasc.ca/events/StarParty/>

Aug 25-31 – Oregon Star Party 2008 (OSP) - Ochocco NF <http://www.oregonstarparty.org/>

(tbd Aug) - **Deception Pass Star Party 2008** - Bowman Bay, Deception Pass, WA - <http://www.eastsideastro.org/index.htm>

Sep 05-07 - Idaho Star Party 2008 - Bruneau Dunes State Park <http://www.boiseastro.org/>

Sep 24-27 - The Enchanted Skies Star Party 2008 - Socorro NM - <http://www.socorro-nm.com/starparty/>

Sep 25-28 - OAS Camp Delaney Star Party - Sun Lakes SP - <http://www.olympicastronomicalsociety.com/Documents/FALLCAMPDELANYSign-UpForm.pdf>

Sep 25-28 - Alberta Star Party 2008 – Eccles Ranch Obs., Caroline, Alberta, CA http://calgary.rasc.ca/RASCcalendar.htm#_September

Sep 25-27 - CalStar08 - Lake San Antonio Park <http://www.sjaa.net/calstar/> - <http://www.sjaa.net/>

Sep 26-27 - Orion Nebula 2008 Star Party – Table Mt. (Ellensburg) WA <http://www.seattleastro.org/orionnebsp.shtml>

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

(tbd October) - **White Sands Star Party** - Alamogordo/White Sands, NM <http://www.zianet.com/wssp/>

(tbd) - **Blue Mountain Star Party**, Ukiah, OR http://www.tri-cityastronomyclub.org/bluemtn_starparty.htm

(tbd) - **Montana Starwatch**, Great Falls, MT <http://smaasweb.org/>

(tbd) - **Stars Over Yellowstone star parties** - Madison Campground Amphitheater

(tbd) **Craters Star Party** - Craters of the Moon National Monument, ID - <http://www.boiseastro.org/>

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

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

CLUB SCOPES

SCOPE	LOAN STATUS
10-INCH WARD DOBSONIAN	AVAILABLE
10-INCH SONOTUBE DOBSONIAN	AVAILABLE
8-INCH DOBSONIAN	AVAILABLE

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

EAS MEMBER NEWS

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

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

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

- Clear Skies, Jim Bielaga”

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

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



Aurora Astro

Aurora Astro Products

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

11419 19th Avenue SE #A102
Everett, WA 98208

www.auroraastro.com

425-337-4384

425-337-4758 fax

New hours:

Mon, Thu, Fri – 9:00 am to 6:00 pm

Tues/Weds – Noon to 8:00 pm

Sat – 10:00 am to 5:00 pm

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

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

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

ASTRO CALENDAR FOR 2008

January 2008

Jan 03 - Earth At Perihelion (0.983 AU From Sun)
Jan 03 - Quadrantids Meteor Shower Peak
Jan 19 – EAS Meeting 7:00 pm Aurora Astro Products store
Jan 22 - Mercury At Its Greatest Eastern Elongation (19 Degrees)
Jan 27 - Comet 8P/Tuttle Perihelion (1.027 AU)

February 2008

Feb 07 - Annular Solar Eclipse, Visible in Antarctica
Feb 07 - Chinese New Year
Feb 16 – EAS Meeting 7:00 pm Aurora Astro Products store
Feb 20 - Uranus Ring Plane Crossing
Feb 21 - Total Lunar Eclipse
<http://sunearth.gsfc.nasa.gov/eclipse/leplot/leplot2001/le2008feb21t.gif>
Feb 24 - Saturn At Opposition
Feb 29 – Leap Day 2008

March 2008

Mar 03 - Mercury At Its Greatest Western Elongation (27 Degrees)
Mar 09 - Daylight Saving - Set Clock Ahead 1 Hour (United States)
Mar 22 – EAS Meeting 3:00 pm Everett Public Library Auditorium
Mar 20 - Vernal Equinox, 05:48 UT
Mar 23 - Easter Sunday
Mar 28-30 - RCA 2008 Messier Marathon Star Party - Kah-Nee-Ta OR

April 2008

Apr 22 - Lyrids Meteor Shower Peak

May 2008

May 02 - Space Day
May 02-05 - OAS Camp Delaney Star Party - Sun Lakes SP
May 05 - Eta Aquarids Meteor Shower Peak
May 09 - Astronomy Day Star Party at Harborview Park
May 10 - Astronomy Day at Library and Harborview Park
May 14 - Mercury At Its Greatest Eastern Elongation (22 Degrees)
May 23-26 - RTMC Camp Oakes, CA

June 2008

Jun 05-07 –2008 NWRAL "First Light" Star Party - Goldendale WA
Jun 16 - Prineville Reservoir Star Party (Prineville, OR)
Jun 20 - Summer Solstice, 20:24 UT
Jun 20 - Pluto At Opposition
Jun 30 - Jul 07 2008 Shingletown Star Party, Shingletown CA

July 2008

Jul 01 - Mercury At Its Greatest Western Elongation (22 Degrees)
Jul 2-6 – Golden State Star Party – Adin CA (Frosty Acres Ranch)
Jul 04 - Earth At Aphelion (1.017 AU From Sun)
Jul 09 - Jupiter At Opposition
Jul 29 - South Delta-Aquarids Meteor Shower Peak
Jul 31-Aug 02 – Table Mt. Star Party

August 2008

Aug 01-03 – RCA Trout Lake Star Party 2008 – Trout Lake WA
Aug 01 - Total Solar Eclipse, Visible in Canada, Greenland
Aug 01 - Alpha Capricornids Meteor Shower Peak
Aug 2-10 – Mt Kobau Star Party – Osoyoos BC
Aug 06 - Southern Iota Aquarids Meteor Shower Peak
Aug 6-10 - Mt. Bachelor Star Party - near Bend, OR
Aug 12 - Perseids Meteor Shower Peak
Aug 15 - Neptune At Opposition
Aug 16 - Partial Lunar Eclipse
Aug 25-31 Oregon Star Party
Aug TBD - Deception Pass Star Party - Bowman Bay, Deception Pass, WA

September 2008

Sep 11 - Mercury At Its Greatest Eastern Elongation (27 Degrees)
Sep 13 - Uranus At Opposition
Sep 22 - Autumnal Equinox (22:16 UT)
Sep 26-28 – Orion Nebula Star Party – Table Mt. WA

October 2008

Oct 21 - Orionids Meteor Shower Peak
Oct 27 - Asteroid 4 Vesta Closest Approach To Earth (1.539 AU)

November 2008

Nov 03 - Taurids Meteor Shower Peak
Nov 17 - Leonids Meteor Shower Peak

December 2008

Dec 01 - Conjunction of Moon, Venus, and Jupiter (3 Degree Triangle)
Dec 01 - Moon Occults Venus
Dec 13 - Geminids Meteor Shower Peak
Dec 21 - Winter Solstice, 12:04 UT
Dec 22 - Ursids Meteor Shower Peak
Dec 29 - Moon Occults Jupiter

UW Astronomy Speakers Colloquium Schedule

The Astronomy Department weekly colloquium meets
Thursdays at 4:00 pm in PAB A102 - the classroom part of

the **Physics/Astronomy Building complex.**
<http://www.astro.washington.edu/pages/colloquium.html>

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

"Our group of radio script writers now consists of EAS and SAS members Jim Ehrmin, Greg Donohue, and Ted Vosk, who are now regularly writing and helping to produce our **astronomy radio show, "It's Over Your Head"** on radio station **KSER, FM 90.7**. The six-minute segment is broadcast **every Wednesday morning at approximately 7:20 A.M.** and gives a weekly look at what's up in the sky over Snohomish County, with other information. If you are a listener to the program, show your support by giving the program director of KSER a call!" Web page with lots of archives and other info is available at <http://www.itsoveryourhead.org/>

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

EAS MEMBERSHIP BENEFITS & INFORMATION

EAS Benefits -

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

Magazine Discounts -

In addition you will be able to subscribe to **Sky and Telescope** for \$7 off the normal subscription rate, contact the treasurer (Carol Gore) for more information.

http://members.tripod.com/everett_astronomy/application.htm (When renewing your subscription to **Sky & Telescope** you should send your S&T renewal form along with a check made out to **Everett Astronomical Society to the EAS address**. The EAS treasurer Carol Gore will renew your **Sky and Telescope** subscription for you. **Astronomy** magazine offers a similar opportunity to club members.)

Membership in the Astronomical League -

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

EAS Club Telescope Borrowing -

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

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

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

EAS Library -

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

Send your annual dues renewals to the
Everett Astronomical Society
 P.O. Box 12746, Everett, WA 98206.

OBSERVER'S INFORMATION...

LUNAR FACTS

Dec 31	Last Quarter Moon
Jan 08	New Moon
Jan 15	First Quarter Moon
Jan 22	Full Moon
Jan 30	Last Quarter Moon
Feb 07	New Moon
Feb 14	First Quarter Moon
Feb 21	Full Moon
Feb 29	Last Quarter Moon
Mar 07	New Moon
Mar 14	First Quarter Moon
Mar 21	Full Moon

Digital Lunar Orbiter Photographic Atlas of the Moon

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

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

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

UP IN THE SKY -- THE PLANETS

Object	Rises	Sets	Con	Mag
Sun	07:52 am	16:06	Sag	-27.5
Mercury	08:52 am	18:31	Cap	+0.8
Venus	05:25 am	14:08	Oph	-4.0
Mars	13:46	06:25 am	Tau	-1.0
Jupiter	06:43 am	15:07	Sag	-1.8
Saturn	20:16	09:56 am	Leo	+0.5
Uranus	10:00 am	21:10	Aqr	+5.8
Neptune	09:04 am	18:54	Cap	+7.9
Pluto	05:41 am	15:09	Sag	+14.0

(times local time for Everett PST)

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>

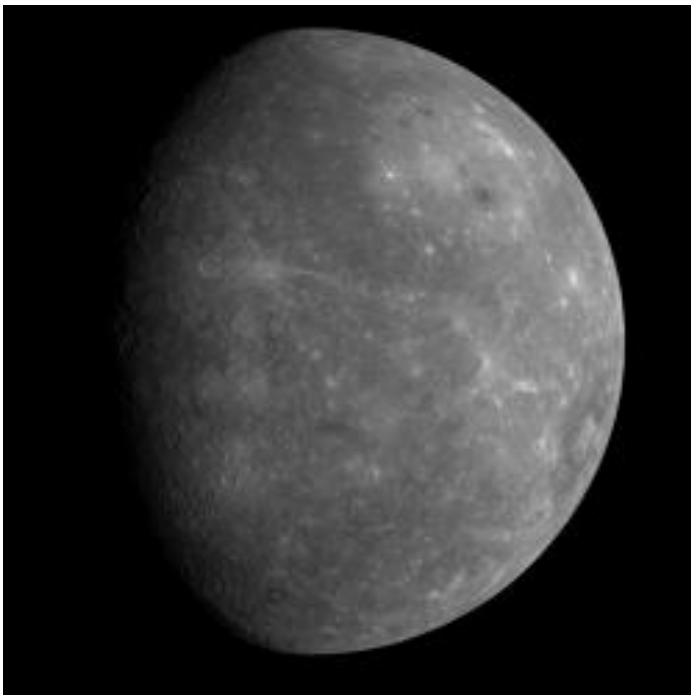
CONSTELLATIONS OF THE MONTH, YOUNG ASTRONOMER'S CORNER, ASTRONOMY & TELESCOPE LINGO, ASTRONOMY "FUN FACTS",

PLANETARY FOCUS, AND "MIRROR IMAGES" WILL RETURN NEXT MONTH

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

FIRST LOOK AT MERCURY'S PREVIOUSLY UNSEEN SIDE

When Mariner 10 flew past Mercury three times in 1974 and 1975, the same hemisphere was in sunlight during each encounter. As a consequence, Mariner 10 was able to image less than half the planet. Planetary scientists have wondered for more than 30 years about what spacecraft images might reveal about the hemisphere of Mercury that Mariner 10 never viewed. On January 14, 2008, the MESSENGER spacecraft observed about half of the hemisphere missed by Mariner 10. An image was snapped by the Wide Angle Camera, part of the Mercury Dual Imaging System (MDIS) instrument, about 80 minutes after MESSENGER's closest approach to Mercury (2:04 pm EST Jan 14), when the spacecraft was at a distance of about 27,000 kilometers (about 17,000 miles). The image shows features as small as 10 kilometers (6 miles) in size. The image was taken through a filter sensitive to light near the red end of the visible spectrum (750 nm), one of a sequence of images taken through each of MDIS's 11 filters.



Like the previously mapped portion of Mercury, this hemisphere appears heavily cratered. It also reveals some unique and distinctive features. On the upper right is the giant Caloris basin, including its western portions never before seen by spacecraft. Formed by the impact of a large asteroid or comet, Caloris is one of the largest, and perhaps one of the youngest, basins in the Solar System. The new image shows the complete basin interior and reveals that it is brighter than the surrounding regions and may therefore have a different composition. Darker smooth plains completely surround Caloris, and many unusual dark-rimmed craters are observed inside the basin. Several other multi-ringed basins are seen in this image for the first time. Prominent fault scarps (large ridges) lace the newly viewed region. Other images obtained during the flyby will reveal surface features in color and in much more detail. Collectively, these images and

measurements made by other instruments will soon provide a detailed global view of the surface of Mercury, yielding key information for understanding the formation and geologic history of the innermost planet.

EXOPLANET'S REFLECTED LIGHT DETECTED FOR FIRST TIME

The ability to explore remote worlds in space has been enhanced through a polarization technique that allows the first ever detection of light reflected by extrasolar (exoplanet) planets. An international team of astronomers, led by Svetlana Berdyugina, has for the first time ever been able to detect and monitor the visible light that is scattered in the atmosphere of an exoplanet. Employing techniques similar to how Polaroid sunglasses filter away reflected sunlight to reduce glare, the team of scientists were able to extract polarized light to enhance the faint reflected starlight 'glare' from an exoplanet. As a result, the scientists could infer the size of its swollen atmosphere. They also directly traced the orbit of the planet, a feat of visualization not possible using indirect methods. Hot Jupiter - The transiting exoplanet under study circles the dwarf star HD189733 in the constellation Vulpecula and lies more than 60 light years from the earth. Known as HD189733b, this exoplanet was discovered two years ago via Doppler spectroscopy. HD189733b is so close to its parent star that its atmosphere expands from the heat. Until now, astronomers have never seen light reflected from an exoplanet, although they have deduced from other observations that HD189733b probably resembles a 'hot Jupiter' -- a planet orbiting extremely closely to its parent star. Unlike Jupiter, however, HD189733b orbits its star in a couple of days rather than the 12 years it takes Jupiter to make one orbit of the sun.

Two half-moon phases - The team, consisting of Svetlana Berdyugina and Dominique Fluri, Andrei Berdyugin and Vilppu Piirola, used the 60cm KVA telescope by remote control. The telescope, which belongs to the Royal Swedish Academy of Science, is located at La Palma, Spain and was modernized by scientists in Finland. The researchers obtained polarimetric measurements of the star and its planet. They discovered that polarization peaks near the moments when half of the planet is illuminated by the star as seen from the earth. Such events occur twice during the orbit, similar to half-moon phases. The polarization indicates that the scattering atmosphere is considerably larger (>30%) than the opaque body of the planet seen during transits and most probably consists of particles smaller than half a micron, for example atoms, molecules, tiny dust grains or perhaps water vapor, which was recently suggested to be present in the atmosphere. Such particles effectively scatter blue light -- in exactly the same scattering process that creates the blue sky of the earth's atmosphere. The scientists were also able for the first time to recover the orientation of the planet's orbit and trace its motion in the sky. *"The polarimetric detection of the reflected light from exoplanets opens new and vast opportunities for exploring physical conditions in their atmospheres"*, Svetlana Berdyugina said. *"In addition, more can be learned about radii and true masses, and thus the densities of non-transiting planets."*

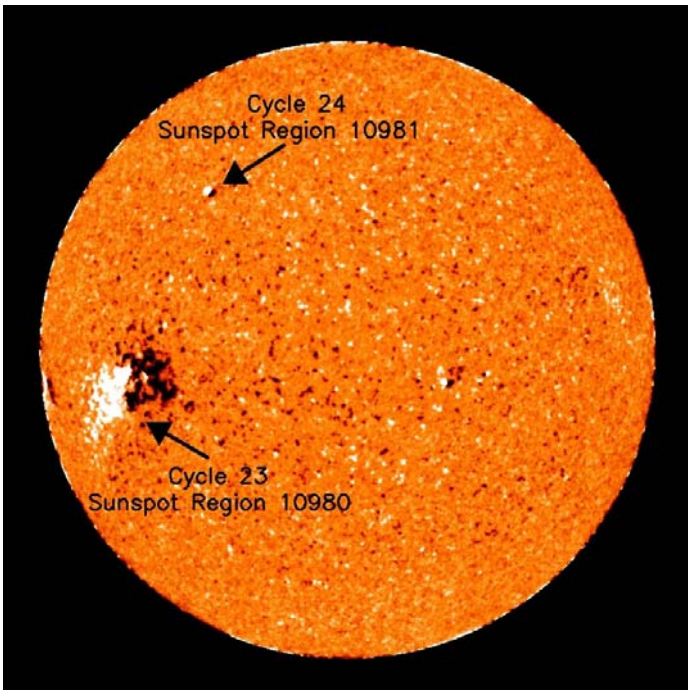
FIRST SUNSPOT OF NEW SOLAR CYCLE OBSERVED

A new 11-year cycle of heightened solar activity, bringing with it increased risks for power grids, critical military, civilian and airline communications, GPS signals and even cell phones and ATM transactions, finally showed signs it was on its way when the cycle's first sunspot appeared in the sun's Northern Hemisphere, NOAA scientists said. *"This sunspot is like the first robin of spring,"* said solar physicist Douglas Biesecker of the Space Weather Prediction Center. SWPC is the nation's first alert for

solar activity and its effects on Earth. The center's space weather forecasters issue outlooks for the next 11-year solar "season" and warn of individual storms occurring on the sun that could impact Earth. *"In this case, it's an early omen of solar storms that will gradually increase over the next few years."*

A sunspot is an area of highly organized magnetic activity on the surface of the sun. The new 11-year cycle, called Solar Cycle 24, is expected to build gradually, with the number of sunspots and solar storms reaching a maximum by 2011 or 2012, though devastating storms can occur at any time. During a solar storm, highly charged material ejected from the sun may head toward Earth, where it can bring down power grids, disrupt critical communications, and threaten astronauts with harmful radiation. Storms can also knock out commercial communications satellites and swamp Global Positioning System signals. Routine activities such as talking on a cell phone or getting money from an ATM machine could suddenly halt over a large part of the globe. *"Our growing dependence on highly sophisticated, space-based technologies means we are far more vulnerable to space weather today than in the past,"* said Conrad C. Lautenbacher, Jr. *"NOAA's space weather monitoring and forecasts are critical for the nation's ability to function smoothly during solar disturbances."*

Last April, in coordination with an international panel of solar experts, NOAA issued a forecast that Solar Cycle 24 would start in March 2008, plus or minus six months. The panel was evenly split between those predicting a strong or weak cycle. Both camps agree that the sooner the new cycle takes over the waning previous cycle, the more likely that it will be a strong season with many sunspots and major storms, said Biesecker



. Many more sunspots with Solar Cycle 24 traits must emerge before scientists consider the new cycle dominant, with the potential for more frequent storms. The new sunspot, identified as No. 10,981, is the latest visible spot to appear since NOAA began numbering them on January 5, 1972. Its high-latitude location at 27 degrees North, and its negative polarity leading to the right in the Northern Hemisphere are clear-cut signs of a new solar cycle, according to experts. The first active regions and sunspots of a new solar cycle can emerge at high latitudes while those from the previous cycle continue to form closer to the

equator.

<http://www.noaanews.noaa.gov/stories2008/images/gong2.jpg>

DISTANT GALAXY REVEALS FURIOUS STAR FORMATION

A furious rate of star formation discovered in a distant galaxy shows that galaxies in the early universe developed either much faster or in a different way from what astronomers have thought. *"This galaxy is forming stars at an incredible rate,"* said Wei-Hao Wang, an astronomer at the National Radio Astronomy Observatory in Socorro, NM. The galaxy, Wang said, is forming the equivalent of 4,000 Suns a year. This is a thousand times more violent than our own Milky Way galaxy. The galaxy, called GOODS 850-5, is 12 billion light-years from Earth, and thus is seen as it was only about 1.5 billion years after the Big Bang. Wang and his colleagues observed it using the Submillimeter Array (SMA) on Mauna Kea in Hawaii.

Young stars in the galaxy were enshrouded in dust that was heated by the stars and radiated infrared light strongly. Because of the galaxy's great distance from Earth, the infrared light waves have been stretched out to submillimeter-length radio waves, which are seen by the SMA. The waves were stretched or "redshifted," as astronomers say, by the ongoing expansion of the Universe. *"This evidence for prolific star formation is hidden by the dust from visible-light telescopes,"* Wang explained. The dust, in turn, was formed from heavy elements that had to be built up in the cores of earlier stars. This indicates, Wang said, that significant numbers of stars already had formed, then spewed those heavy elements into interstellar space through supernova explosions and stellar winds. *"Seeing the radiation from this heated dust revealed star formation we could have found in no other way,"* Wang said. Similar dusty galaxies in the early universe may contain most of the star formation at those times. *"This means that future telescopes such as the Atacama Large Millimeter Array (ALMA) can reveal many more such galaxies and give us a much more complete picture of star formation in the early universe,"* he added.



Lennox Cowie said, *"We found out in the last decade that most of the recent star formation in the Universe occurs in large dusty galaxies, but we had always expected that early star formation would be dominated by smaller and less obscured galaxies. Now it seems that even at very early times it may be the same big dusty star formers that are the sites of most of the star formation. That's quite a surprise."* Astronomers believe that large galaxies originally formed through mergers of smaller objects. Seeing a large galaxy such as GOODS 850-5 forming stars so rapidly at such an early time in the history of the universe is a surprise. *"Either the mergers that formed the galaxy happened much faster than we thought or some other process altogether produced the galaxy,"* Wang said. http://cfa-www.harvard.edu/press/2007/pr200733_images.html

WHITE DWARF "SIBLING RIVALRY" EXPLODES IN SUPERNOVA

Astronomers have found that a supernova discovered last year was caused by two colliding white dwarf stars. The white dwarfs were siblings orbiting each other. They slowly spiraled inward until they merged, touching off a titanic explosion. Observations show the strongest evidence yet of what was, until now, a purely theoretical mechanism for creating a supernova. *"This finding shows that nature may be richer than we suspected, with more than one way to make a white dwarf explode,"* said author Malcolm Hicken. Astronomers characterize an observed supernova based on whether its spectrum shows evidence of hydrogen (Type II) or not (Type I). In Type II, a massive, short-lived star undergoes core collapse and explodes. In the conventional picture for Type Ia, the most common supernovae lacking hydrogen, a white dwarf star collects gas from a companion star until it undergoes catastrophic nuclear fusion and blasts itself apart. The new find, supernova 2006gz, was classified as a Type Ia due to the lack of hydrogen and other characteristics. However, an analysis combining CfA data with measurements from The Ohio State University suggested that SN 2006gz was unusual and deserved a closer look.

Most importantly, SN 2006gz showed the strongest spectral signature of unburned carbon ever seen. Merging white dwarfs are expected to have carbon outside their densest regions. The powerful explosion from the inside then should push off the outmost carbon-rich layers. The spectrum of SN 2006gz also showed evidence for compressed layers of silicon. Silicon was created during the explosion and then compressed by a shock wave that rebounded from the surrounding layers of carbon and oxygen. Computer models for merging white dwarfs predict both the carbon and silicon spectral signatures. Additionally, SN 2006gz was brighter than expected, indicating that its progenitor exceeded the 1.4 solar mass Chandrasekhar limit -- the upper bound for a single white dwarf. Only one other potential example of a super-Chandrasekhar supernova has been seen: SN 2003fg. While observations of that event were suggestive, the data from SN 2006gz are much stronger. *"Our case is different. Although 2006gz is also extra bright, the chemistry we see, particularly unburned carbon, is well observed and very unusual,"* said Harvard astronomer Robert Kirshner, a member of the discovery team.

In addition to providing the first example of a new way to make supernovae, SN 2006gz holds implications for the field of cosmology. Type Ia supernovae typically have a narrow spread in brightness, which makes them useful as "standard candles" for calculating cosmic distances. It was the study of Type Ia supernovae that led to the discovery of dark energy, the mysterious force causing the expansion of the universe to accelerate. If Type Ia supernovae are more varied than previously expected, then astronomers must be extra cautious when using them to study the cosmos. *"Supernova 2006gz stands out from normal Type Ia objects and wouldn't be included in cosmology studies,"* commented Hicken. *"But we have to be careful not to mistake a double white dwarf explosion for a single white dwarf blast. SN 2006gz was easy to recognize, but there may be less clear-cut cases." http://cfa-www.harvard.edu/press/2007/pr200729_images.html*

VLBA MOVIES REVEAL NEW DETAILS OF COSMIC JETS

Astronomers have known for decades that supermassive black holes at the cores of galaxies can shoot out jets of subatomic particles at tremendous speeds. However, details about the physics of such jets, including how they are generated, how the

high-speed flows are shaped into jets, and how fast the particles are moving, among many others, have remained elusive.

An international team of researchers now is making an unprecedented long-term study of the motions of these giant jets, using the super-sharp imaging capabilities of the Very Long Baseline Array (VLBA). *"We're making images of 200 galactic jets at regular intervals, tracking their motions and studying their magnetic-field properties. This is making major contributions to our understanding of such jets,"* said Matthew Lister. The research team has produced time-lapse movies of 100 of the jets, allowing measurement of the speed and direction of motion. *"The results of these VLBA observations are going into a rich and still-growing set of data that is available to the entire astronomical research community as a tool for understanding the many unresolved questions we have about these jets,"* Lister said. The jet study is called MOJAVE -- Monitoring Of Jets in Active galactic nuclei with VLBA Experiments -- and began in 2002. It is a successor to an earlier VLBA study that regularly made images of nearly 200 jets from 1994 to 2002.

The jets are powered by the gravitational energy of black holes containing hundreds of millions times more mass than the Sun. Black holes are concentrations of mass so dense that not even light can escape them. As these monsters draw material toward them, the material falls into a circular disk orbiting the black hole. The jets are propelled outward along the poles of the disk.

The MOJAVE movies have given astronomers some surprises and also have spurred follow-on studies of individual objects. *"Before the VLBA was built, we were hindered in our studies of extragalactic jets by the lack of a facility that could do high-quality, regularly-spaced images showing very great detail. The VLBA's capabilities have made it a premier facility for studying these objects out to very large distances, and thus getting a large sample,"* Lister said.

The MOJAVE observations are showing new details about the structures of magnetic fields in the jets. This is important, because magnetic fields are thought to play vital roles in the acceleration of the particles and in shaping the jets. The time-lapse movies have revealed a variety of interesting behavior in the jets. For example, the powerful radio galaxy called 3C279 emitted a bright feature that moved along a straight path for 15 years, then suddenly brightened, showed a change in its magnetic field, and sped off in a new direction. Other jets shoot successive bright features that move outward in curved paths. Some features in jets are seen to break apart. *"These detailed movies of complex motions are real-world data that allow researchers to refine their computer simulations of the jets, leading to a far better understanding of the physics involved in such impressive cosmic particle accelerators,"* Lister said.

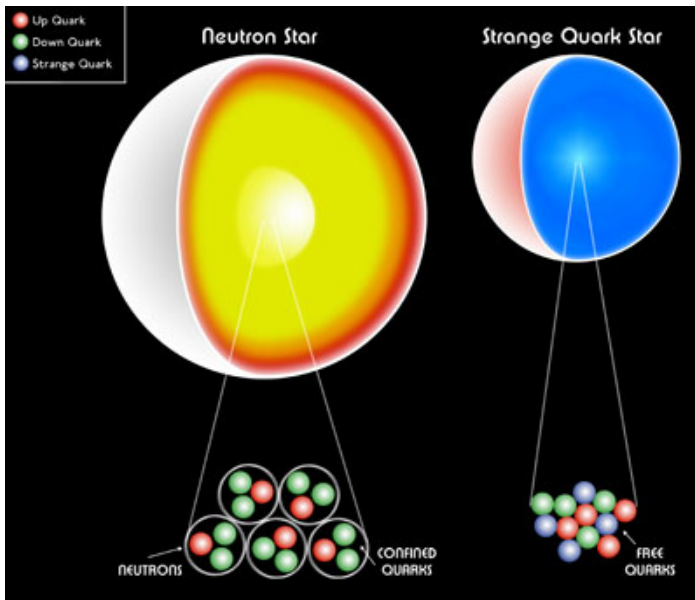
The MOJAVE data will prove valuable for comparison with the gamma-ray information to be collected by NASA's upcoming GLAST satellite. *"Using the MOJAVE data along with data from other ground-based and orbiting observatories at different wavelengths is bringing the studies of galactic jets into a new era,"* Lister concluded. <http://www.physics.purdue.edu/MOJAVE> <http://www.physics.purdue.edu/MOJAVE/movies.html> <http://www.nrao.edu/pr/2008/mojave2/3c279.mpg>

XMM-NEWTON GIVES NEW INSIGHT INTO NEUTRON STARS

XMM-Newton has given astronomers and physics a valuable new insight into the most exotic stars in the Universe. Known as neutron stars, the composition of these extremely dense stellar objects has always been something of a puzzle. Now, XMM-Newton has revealed that they almost certainly resemble over-

sized atomic nuclei. Natalie Webb and Didier Barret have used XMM-Newton's EPIC camera to find three previously undiscovered neutron stars and accurately measure the quantity of various X-rays coming from their surfaces. They were then able to compare their results with theoretical predictions to deduce the internal composition of the neutron stars. All three neutron stars lie in globular clusters of stars that orbit the centre of our galaxy. Neutron stars are the exotic remains of exploded stars. Whilst most of a massive star's outer layers are thrown off into space, the dead heart at the centre of the former star implodes. Astronomers call this small heart a neutron star and it has some amazing properties. Although it is the size of an asteroid, usually about 10-12 kilometers across, it contains more mass than our Sun, meaning its composition must be highly dense -- so dense, in fact, that it cannot be made of normal atoms. Initially astronomers believed that the neutron star was composed almost exclusively of neutrons, all squeezed together and resembling a giant atomic nucleus. Doubts crept in when observations started showing that some neutron stars appeared to have higher masses than expected, up to double the mass of the Sun, whilst others appeared to have even smaller radii of just 6-8 kilometers, so astronomers postulated exotic models containing uncommon particles such as pions, kaons or quarks.

Determining the mass and radius of a neutron star is a big challenge because they are such small objects they cannot be seen in detail. Instead, astronomers must collect the light coming from the neutron star and then use computer models to converge on a solution that reveals the neutron star's size and mass. "Knowing the distance to the neutron star accurately is crucial in this work," says Webb. This is why the researchers looked for neutron stars in the spherical clusters of stars surrounding the Milky Way. Known as globular clusters, these well-studied objects have accurate distance estimates, which can be used for any star found in them. The team identified a likely neutron star in three different clusters: Omega Centauri, M13 and NGC 2808.



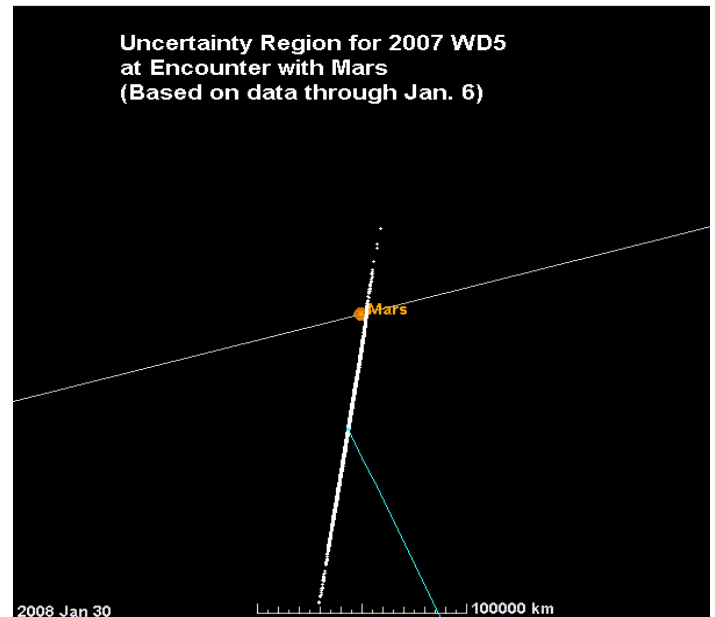
The neutron stars were all found to be orbiting other stars and emitting X-rays. These X-rays are expected to pass through an atmosphere of hydrogen gas surrounding the neutron star. Webb and Barret compared their results to those produced by new theories of possible neutron star interiors. The computer codes that used these theoretical models were only released into the astronomical community by other astronomy groups about a year ago. Webb and Barret's new analysis shows that astronomers

had previously been under-estimating the mass and over-estimating the radii of some neutron stars. They conclude that neutron stars can have masses up to 2.4 solar masses and radii that start from 8 km. They discovered that despite all the musing over highly complicated particle interiors, still the most likely composition of a neutron star is what astronomers first suspected forty years ago: neutrons. They found only one exotic solution that remained feasible, an interior made of quarks. These particles are constituents of neutrons and would be able to squeeze together more densely. They hope to extend the work to other neutron stars.

ASTEROID 2007WD5 MARS IMPACT MUCH LESS LIKELY NOW

The orbit of 2007 WD5 has been updated using new observations from the 3.5-meter telescope at the Calar Alto Observatory in Spain, and also incorporating refinements to previous Sloan pre-discovery observations. While the best estimate of close approach distance remains steady at about 30,000 km, the uncertainty in position at the close approach has decreased by a factor of three. As a result, the impact probability estimate has fallen to 2.5%, or 1-in-40 odds.

If the estimated miss distance remains stable in future updates, the impact probability will continue to fall as continuing observations further constrain the uncertainties. Updated uncertainty region for 2007 WD5 at encounter with Mars, is shown as white dots. The thin white line is the orbit of Mars. The blue line traces the motion of the center of the uncertainty region, which is the most likely position of the asteroid.



<http://neo.jpl.nasa.gov/news/news155.html>

EVIDENCE OF 'INCONVENIENT' GALAXY BACKWARD ARMS

Discovery of two new components within a puzzling spiral galaxy confirm it must have a pair of arms winding in the opposite direction from most galaxies, according to results by Drs. Gene Byrd, Ron Buta, Tarsh Freeman, and Dr. Sethanne Howard. "While the existence of a galaxy with a pair of 'backward' arms may seem like an inconvenient truth to many, our latest analysis indicates it is, nonetheless, a reality," says Byrd. The galaxy, known as NGC4622, lies 200 million light years away in the constellation Centaurus. Spiral arm pairs seen in galaxies are thought to trail, meaning they wind outward, opposite the direction

of rotation of the disk material. Leading arms, such as the pair reported by the astronomers for NGC4622, do the opposite, opening outward in the same direction as the rotation of the galaxy's disk.

Using a Fourier component image method to further analyze a 2001 HST image, the team discovered a previously hidden inner counter clockwise pair of spiral arms. *"Contrary to conventional wisdom, with both an inner counter-clockwise pair and an outer clockwise pair of spiral arms, NGC4622 must have a pair of leading arms,"* Byrd said. *"With two pairs of arms winding in opposite directions, one pair must lead and one pair must trail. Which way is which depends on the disk's rotation. The outer clockwise pair must be the leading pair if the disk turns clockwise. Alternatively, the inner counter clockwise pair must be the leading pair if the disk turns counter clockwise."* The team also discovered an outer clockwise single arm, previously hidden by the stronger outer clockwise arm pair. The galaxy also has a previously identified inner single counterclockwise arm. This confirms the galaxy must have a single leading arm. The outer clockwise arm must be the leading arm if the disk turns clockwise. The inner counter clockwise arm must be the leading single arm if the disk turns counter clockwise.

The researchers also performed a more complicated analysis of different color Fourier image components. This revealed the stronger outer clockwise pair of arms as the leading pair. In 2002, team members first published, to great skepticism, results from a previous method that indicated the galaxy had a leading pair of spiral arms.



Other astronomers were skeptical of the 2002 announcement, in part, because the galaxy disk is only tilted about 19 degrees from face-on and because clumpy dust clouds might be concentrated on one side of the disk, creating misleading results. In response, the team's new Fourier component method is actually assisted by the small tilt, and the effects of dust are not used in the latest analysis. *"Two independent methods now indicate that NGC4622's arms do indeed behave in a very unusual fashion, with the outer arms winding outward in the same direction the galaxy turns,"* said Byrd. Further studies of the origin of this

behavior are needed, the researchers said. The HST image reveals a dark dust lane in the center which suggests the galaxy may have consumed a smaller companion galaxy, the researchers said.

<http://uanews.ua.edu/aneews2008/jan08/galaxy010808.htm>

'GEMS' FROM HUBBLE, SPITZER SHOW COSMIC FIREWORKS FIZZLED OUT AS UNIVERSE REACHED MID-LIFE

We all start to party less around middle age, and new studies by a team led by astronomer Shardha Jogee now finds that the universe, as a whole, is no exception. According to the current models of galaxy formation, dubbed "hierarchical lambda cold dark matter" models, galaxies built up to their current masses, shapes, and sizes through the successive mergers of less massive protogalaxies made of gas, stars, and dark matter. In the first quarter of the universe's lifespan, the cosmic landscape was dominated by violent galaxy mergers, which could radically transform the shape of a galaxy and convert its gas into stars at an extreme rate. More than half of bright galaxies were indulging in such violent "partying." New research is showing that all changed when the universe hit middle age. *"Our study finds that over the last 7 billion years, after the universe hit its mid-forties, so to speak, it transitioned from a violent merger-driven mode into a quieter mode,"* Jogee said. She and her team find that over each billion-year interval, only 10% of galaxies are typically involved in strong interactions and mergers. Jogee's research team includes students Sarah Miller and Kyle Penner, as well as her colleagues in the international GEMS collaboration, whose principal investigator is Hans-Walter Rix. Jogee's team has analyzed more than 5,000 galaxies imaged by HST as part of GEMS, one of the largest-area surveys conducted with Hubble in two filters. *"With Hubble's spectacular resolution,"* Penner said, *"we could discern amazing tell-tale clues of the mergers and interactions -- huge tails, warps, ripples, double nuclei -- in galaxies billions of light-years away."* *"It's been exciting to apply different complementary techniques in this large survey,"* Miller said, *"and to sift through the merger history of the universe during this elusive era."* In addition to estimating the frequency of mergers, Jogee and her colleagues found that contrary to what is commonly assumed, the average star formation rate in these interacting and merging galaxies is only enhanced by a modest factor of two to three compared to that in normal non-interacting galaxies. *"While extreme bursts of star formation, so-called cosmic fireworks, may happen in some galaxy mergers or interactions, they are not the norm in the vast majority of galaxy interactions taking place over the last 7 billion years,"* Jogee said. The findings of Jogee's team result from a powerful synergy of data from HST and Spitzer space telescopes. *"Mid-infrared observations from the Spitzer Telescope, taken by George Rieke, were key for tracing hidden star formation, obscured by dust,"* Jogee said. *"The exquisite resolution of the GEMS Hubble data in turn allowed us to identify strongly interacting and merging galaxies at much earlier cosmological times than conventional ground-based telescopes,"* said team member Daniel McIntosh. Jogee and her team, in fact, find that only 20% of the total cosmic star formation that took place over the last 7 billion years appears to come from strongly interacting and merging galaxies. These results extend the similar trend found for a smaller sample of about 1,500 galaxies over a narrower time interval by fellow team members Christian Wolf and Eric Bell. Furthermore, the results reported by Jogee and her team on the modest fraction (about 20%) of merger-induced star formation, and the frequency of galaxy mergers over the last 7 billion years, are in remarkably good agreement with prevailing theoretical cold dark matter models of galaxy evolution. According to team member Rachel

Somerville, "Mergers are thought to be a crucial process in transforming galaxies, causing bursts of star formation, and perhaps even feeding gas to the supermassive black holes lurking in the galaxy's nucleus." "Although the frequency of mergers predicted by the models agrees quite well with the observed frequency," Somerville said, "these observations can also teach us much more about the effect these violent episodes have on galaxies." In fact, Jogee said, "Our results raise many additional questions which can only be addressed with next generation facilities. For example, the cosmic star-formation rate is declining in normal galaxies, but it remains unclear what drives this decline. Are galaxies using up their internal cold gas supply, or is the accretion rate of gas from external filaments declining?" Next-generation radio facilities, such as ALMA [the Atacama Large Millimeter/Sub-millimeter Array] will be critical for exploring how the cold gas content of galaxies changes over the last seven billion years, she said. "Another key thing to note is that some of our results starkly disagree with prevailing hierarchical models of galaxy evolution," Jogee said. According to these models, the frequency of pure disk galaxies or so-called "bulge-less galaxies" is expected to be extremely low, because a past major merger in the life of every galaxy invariably builds a bulge. Contrary to such predictions, postdoc Fabio Barazza, formerly working with Jogee, found that about 20% of present-day spiral galaxies are bulge-less or disk-dominated, based on the analysis of about 1,000 galaxies from the Sloan Digital Sky Survey. "We also see striking super-thin bulgeless galaxies in GEMS, at earlier epochs," Jogee said. "We yet have to characterize the frequency and origin of these enigmatic bulgeless galaxies at different epochs, but there is no denying their prevalence in the local universe." All in all, "We have made important headway in piecing part of the cosmic puzzle of galaxy evolution, but daunting challenges loom ahead for both observers and theorists," she said. <http://mcdonaldobservatory.org/news/releases/2008/0109.html>

JET POWER AND BLACK HOLE ASSORTMENT REVEALED IN NEW X-RAY IMAGE

A dramatic new Chandra image of the nearby galaxy Centaurus A provides one of the best views to date of the effects of an active supermassive black hole.



Opposing jets of high-energy particles can be seen extending to the outer reaches of the galaxy, and numerous smaller black holes in binary star systems are also visible. The image was made from an ultra-deep look at the galaxy Centaurus A, equivalent to more than seven days of continuous observations. Centaurus A is the nearest galaxy to Earth that contains a supermassive black hole actively powering a jet. A prominent X-ray jet extending for 13,000 light years points to the upper left in the image, with a shorter "counterjet" aimed in the opposite direction. Astronomers think that such jets are important vehicles for transporting energy from the black hole to the much larger dimensions of a galaxy, and affecting the rate at which stars form there.

High-energy electrons spiraling around magnetic field lines produce the X-ray emission from the jet and counterjet. This emission quickly saps the energy from the electrons, so they must be continually reaccelerated or the X-rays will fade out. Knot-like features in the jets detected in the Chandra image show where the acceleration of particles to high energies is currently occurring, and provides important clues to understanding the process that accelerates the electrons to near-light speeds. The inner part of the X-ray jet close to the black hole is dominated by these knots of X-ray emission, which probably come from shock waves -- akin to sonic booms -- caused by the jet. Farther from the black hole there is more diffuse X-ray emission in the jet. The cause of particle acceleration in this part of the jet is unknown.

Hundreds of point-like sources are also seen in the Chandra image. Many of these are X-ray binaries that contain a stellar-mass black hole and a companion star in orbit around one another. Determining the population and properties of these black holes should help scientists better understand the evolution of massive stars and the formation of black holes. Another surprise was the detection of two particularly bright X-ray binaries. These sources may contain stellar mass black holes that are unusually massive, and this Chandra observation might have caught them gobbling up material at a high rate.

In this image, low-energy X-rays are colored red, intermediate-energy X-rays are green, and the highest-energy X-rays detected by Chandra are blue. The dark green and blue bands running almost perpendicular to the jet are dust lanes that absorb X-rays. This dust lane was created when Centaurus A merged with another galaxy perhaps 100 million years ago. <http://chandra.harvard.edu/photo/2008/cena/>

LSST GETS \$30M GO-AHEAD FROM GATES & SIMONYI

The Large Synoptic Survey Telescope (LSST) Project announced receipt of two major gifts: \$20M from the Charles Simonyi Fund for Arts and Sciences and \$10M from Bill Gates. Under development since 2000, the LSST is a public-private partnership. This gift enables the construction of LSST's three large mirrors; these mirrors take over five years to manufacture. The first stages of production for the two largest mirrors are now beginning at the Mirror Laboratory at the University of Arizona in Tucson, Arizona. Other key elements of the LSST system will also be aided by this commitment. "The LSST will be the world's most powerful survey telescope. This major gift keeps the project on schedule by enabling the early fabrication of LSST's large optics and other long-lead components of the LSST system," said Donald Sweeney, LSST Project Manager.

The Large Synoptic Survey Telescope (LSST) is a proposed ground-based 8.4-meter, 10 square-degree-field telescope that will provide digital imaging of faint astronomical objects across the entire sky, night after night. In a relentless campaign of 15 second

exposures, LSST will cover the available sky every three nights, opening a movie-like window on objects that change or move on rapid timescales: exploding supernovae, potentially hazardous near-Earth asteroids, and distant Kuiper Belt Objects. The superb images from the LSST will also be used to trace billions of remote galaxies and measure the distortions in their shapes produced by lumps of Dark Matter, providing multiple tests of the mysterious Dark Energy. Proposed for "first light" in 2014, the 8.4-meter LSST will survey the entire visible sky deeply in multiple colors every week with its three-billion pixel digital camera, probing the mysteries of Dark Matter and Dark Energy, and opening a movie-like window on objects that change or move. The LSST will be constructed on Cerro Pachon, a mountain in northern Chile. Its design of three large mirrors and three refractive lenses in a camera leads to a 10 square degree field-of-view with excellent image quality. The telescope's 3200 Megapixel camera will be the largest digital camera ever constructed. Over ten years of operations, about 2000 deep exposures will be acquired for every part of the sky over 20,000 square degrees. This color "movie" of the Universe will open an entirely new window: the time domain. LSST will produce 30 Terabytes of data per night, yielding a total database of 150 Petabytes. Dedicated data facilities will process the data in real time.

"What a shock it was when Galileo saw in his telescope the phases of Venus, or the moons of Jupiter, the first hints of a dynamic universe" Simonyi said. "Today, by building a special telescope-computer complex, we can study this dynamism in unprecedented detail. LSST will produce a database suitable for answering a wide range of pressing questions: What is dark energy? What is dark matter? How did the Milky Way form? What are the properties of small bodies in the solar system? Are there potentially hazardous asteroids that may impact the earth causing significant damage? What sort of new phenomena have yet to be discovered?"

"LSST is just as imaginative in its technology and approach as it is with its science mission. LSST is truly an internet telescope, which will put terabytes of data each night into the hands of anyone that wants to explore it. Astronomical research with LSST becomes a software issue -- writing code and database queries to mine the night sky and recover its secrets. The 8.4 meter LSST telescope and the three gigapixel camera are thus a shared resource for all humanity -- the ultimate network peripheral device to explore the universe" Gates said. "It is fun for Charles and me to be a team again supporting this work given all we have done together on software projects."

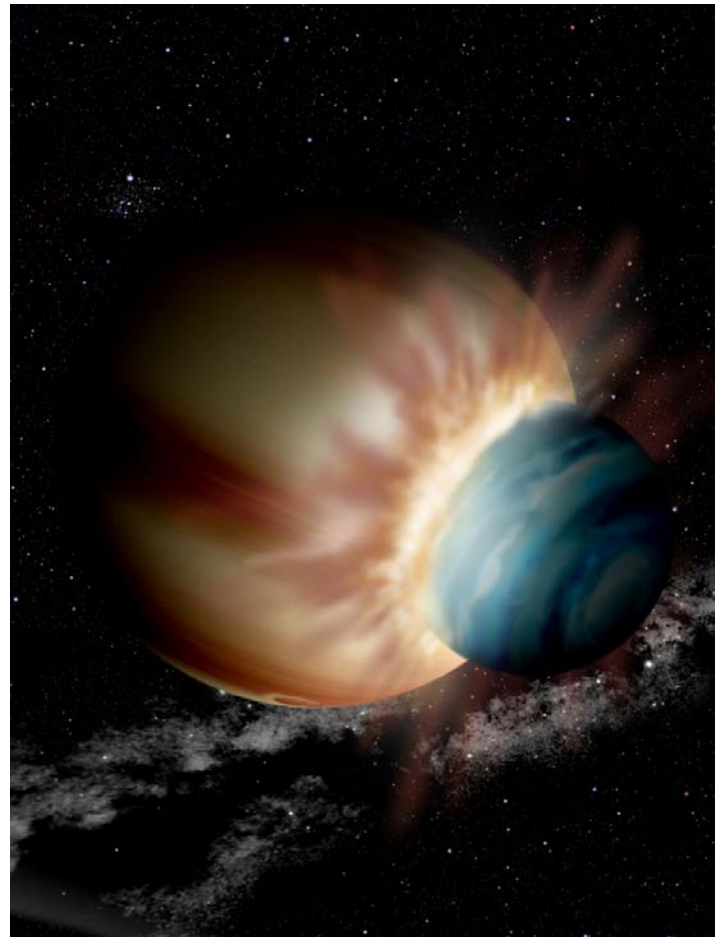
LSST is designed to be a public facility -- the database and resulting catalogs will be made available to the community at large with no proprietary restrictions. A sophisticated data management system will provide easy access, enabling simple queries from individual users (both professionals and amateurs), as well as computationally intensive scientific investigations that utilize the entire database. The public will be able to actively share the adventure of discovery of the Universe. <http://www.lsst.org>

WHEN WORLDS COLLIDE: AFTERMATH OF DISTANT PLANETARY COLLISION?

Astronomers announced that a mystery object orbiting a star 170 light-years from Earth might have formed from the collision and merger of two protoplanets. The object, known as 2M1207B, has puzzled astronomers since its discovery because it seems to fall outside the spectrum of physical possibility. Its temperature, luminosity, age, and location do not match up with any theory. *"This is a strange enough object that it needs a strange explanation,"* said Eric Mamajek.

2M1207B orbits a 25-Jupiter-mass brown dwarf called 2M1207A seen in the direction of the constellation Centaurus. Computer models show that 2M1207A is very young, only about 8 million years old; therefore its companion should also be 8 million years old. At that age, it should have cooled to a temperature of less than 1300 degrees Fahrenheit (1000 Kelvin). However, observations show that 2M1207B is actually about 2400 degrees F (1600 K). The extra heat might be the result of a protoplanetary collision. *"Most, if not all, planets in our solar system were hit early in their history. A collision created Earth's moon and knocked Uranus on its side,"* explained Mamajek. *"It's quite likely that major collisions happen in other young planetary systems, too."* Given its temperature, astronomers would expect a certain luminosity for 2M1207B, but it is 10 times fainter than expected. In 2006, astronomers suggested that it is obscured by a dusty, edge-on disk. Mamajek and his colleague, Michael Meyer, propose an alternative explanation: 2M1207B is small, only about the size of Saturn, and therefore has a smaller-than-expected surface area radiating energy.

They derive a radius of 31,000 miles (50,000 km) for 2M1207B, compared to 37,000 miles (60,000 km) for Saturn. Given typical densities for giant planets, this would give 2M1207B a mass about 80 times Earth (or one-fourth Jupiter). The only plausible way for such a small object to be so hot millions of years after it formed is if it suffered a recent, titanic collision that heated it.



The planets in our solar system assembled from dust, rock, and gas, gradually growing larger over millions of years. But sometimes, two planet-sized objects collided catastrophically. For example, the Moon formed when an object about half the size of Mars hit the proto-Earth. If planet formation works the same way in other star systems, then 2M1207B might be the product of a

collision between a Saturn-sized gas giant and a planet about three times the size of Earth. The two smashed into each other and stuck, forming one larger world still boiling from the heat generated in the collision. *"The Earth was hit by something one-tenth its mass, and it's likely that other planets in our solar system were too, including Venus and Uranus,"* explained Meyer. *"If that one-tenth scale holds in other planetary systems, then we could be seeing the aftermath of a collision between a 72 Earth-mass gas giant and an 8 Earth-mass planet, even though such collisions are very unlikely."* Mamajek also points out that the collision theory is reasonable from a timescale point of view. A 2400-degree, Saturn-sized object would radiate its heat away over about 100,000 years. If the system were billions of years old, it is unlikely that we would be looking at the right time, but since the system is young, the chances are much better that we would catch it shortly after the collision while the hot aftermath is still observable. The collision hypothesis makes several predictions that astronomers can test. Chief among them is a low surface gravity (which depends on a planet's mass and radius). To check this prediction, astronomers will need to get a better spectrum of 2M1207B -- a challenge since it is very faint and very close to the brown dwarf 2M1207A. Others are checking the dusty disk theory by looking for signs of polarization in the light from 2M1207B. More answers should be forthcoming within a year or two. Mamajek emphasized that while a planet collision may not be the correct explanation for the weirdness of 2M1207B, examples of colliding planets are likely to be found by the next generation of ground-based telescopes. *"Hot, post-collision planets might be a whole new class of objects we will see with the Giant Magellan Telescope."* *"Even if we're wrong, I wouldn't be surprised if someone finds a clear-cut case in the next 10 years,"* Mamajek added.

http://cfa-www.harvard.edu/press/2008/pr200801_images.html

EARTH: A BORDERLINE PLANET FOR LIFE?

Our planet is changing before our eyes, and as a result, many species are living on the edge. Yet Earth has been on the edge of habitability from the beginning. New work by astronomers at the Harvard-Smithsonian Center for Astrophysics shows that if Earth had been slightly smaller and less massive, it would not have plate tectonics -- the forces that move continents and build mountains.



And without plate tectonics, life might never have gained a foothold on our world. *"Plate tectonics are essential to life as we know it,"* said Diana Valencia. *"Our calculations show that bigger*

is better when it comes to the habitability of rocky planets." Plate tectonics involve the movement of huge chunks, or plates, of a planet's surface. Plates spread apart from each other, slide under one another, and even crash into each other, lifting gigantic mountain ranges like the Himalayas. Plate tectonics are powered by magma boiling beneath the surface, much like a bubbling pot of chocolate. The chocolate on top cools and forms a skin or crust, just as magma cools to form the planet's crust. Plate tectonics are crucial to a planet's habitability because they enable complex chemistry and recycle substances like carbon dioxide, which acts as a thermostat and keeps Earth balmy. Carbon dioxide that was locked into rocks is released when those rocks melt, returning to the atmosphere from volcanoes and oceanic ridges. *"Recycling is important even on a planetary scale,"* Valencia explained.

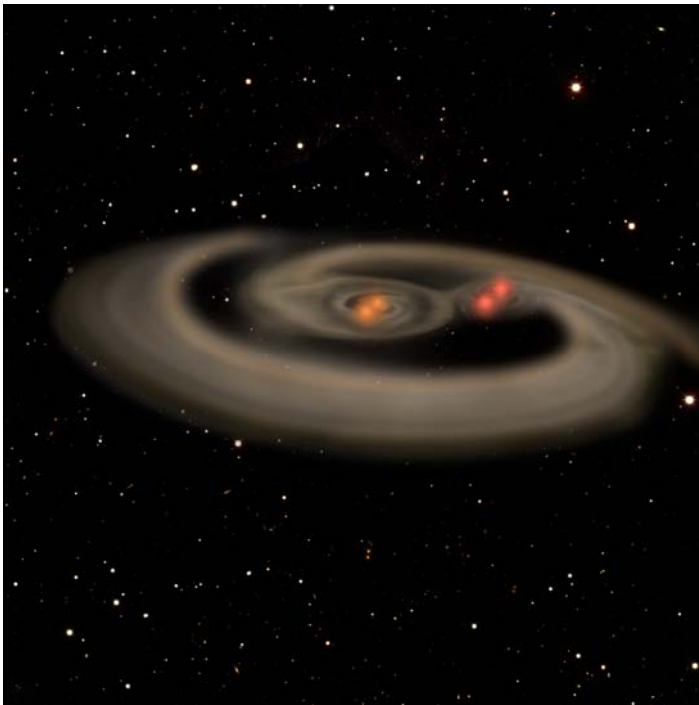
Valencia and her colleagues, Richard O'Connell and Dimitar Sasselov, examined the extremes to determine whether plate tectonics would be more or less likely on different-sized rocky worlds. In particular, they studied so-called "super-Earths" -- planets more than twice the size of Earth and up to 10 times as massive. (Any larger, and the planet would gather gas as it forms, becoming like Neptune or even Jupiter.) The team found that super-Earths would be more geologically active than our planet, experiencing more vigorous plate tectonics due to thinner plates under more stress. Earth itself was found to be a borderline case, not surprisingly since the slightly smaller planet Venus is tectonically inactive. *"It might not be a coincidence that Earth is the largest rocky planet in our solar system, and also the only one with life,"* said Valencia. Exoplanet searches have turned up five super-Earths already, although none have life-friendly temperatures. If super-Earths are as common as observations suggest, then it is inevitable that some will enjoy Earth-like orbits, making them excellent havens for life. *"There are not only more potentially habitable planets, but MANY more,"* stated Sasselov, who is director of the Harvard Origins of Life Initiative. In fact, a super-Earth could prove to be a popular vacation destination to our far-future descendants. Volcanic "rings of fire" could span the globe while the equivalent of Yellowstone Park would bubble with hot springs and burst with hundreds of geysers. Even better, an Earth-like atmosphere would be possible, while the surface gravity would be up to three times that of Earth on the biggest super-Earths. *"If a human were to visit a super-Earth, they might experience a bit more back pain, but it would be worth it to visit such a great tourist spot,"* Sasselov suggested with a laugh. He added that although a super-Earth would be twice the size of our home planet, it would have similar geography. Rapid plate tectonics would provide less time for mountains and ocean trenches to form before the surface was recycled, yielding mountains no taller and trenches no deeper than those on Earth. Even the weather might be comparable for a world in an Earth-like orbit. *"The landscape would be familiar. A super-Earth would feel very much like home,"* said Sasselov. http://cfa-www.harvard.edu/press/2008/pr200802_images.html

QUARTET OF STARS MAY UNLOCK SECRETS OF STELLAR EVOLUTION

Astronomers using the Keck and CFHT telescopes on Mauna Kea have found an extremely rare quartet of stars that orbit each other within a region smaller than Jupiter's orbit round the Sun. The quartet appears as a speck of light even when viewed with the world's most powerful telescopes but its spectrum reveals not one, but four distinct stars arranged in two pairs. Astronomers are now struggling to work out whether they could have been born that way, or were forced together by a dense disk of gas in their youth. This discovery that the star called "BD -22 5866" is really

a very rare system of four closely orbiting stars was announced by Dr. Evgenya Shkolnik. She and collaborators Dr. Michael C. Liu, and Dr. I. Neill Reid were monitoring several hundred nearby low-mass stars when one observation caught their attention because it was unlike anything they had seen before. At the time of the observations, two of the stars were orbiting each other at 133 km/s (300,000 mph, a speed that would get you from Honolulu to New York in less than a minute), while the second pair moved at a more modest speed of 52 km/s (120,000 mph). Using these speeds and the stars' masses, astronomers were able to determine the maximum sizes of their oddly tight orbits. Less than 1 in 2,000 stars observed might be such tightly bound systems, making this quadruple stellar system extremely rare.

The first pair orbits each other in less than 5 days with the orbits radius of at most 0.06 AU (where 1 AU is the distance from Earth to the sun). The second pair orbits with a period of less than 55 days and a maximum radius of 0.26 AU. The two pairs are orbiting each other with a maximum radius of only 5.8 AU (= orbital period of less than 9 years), about the same as Jupiter's distance from the sun.



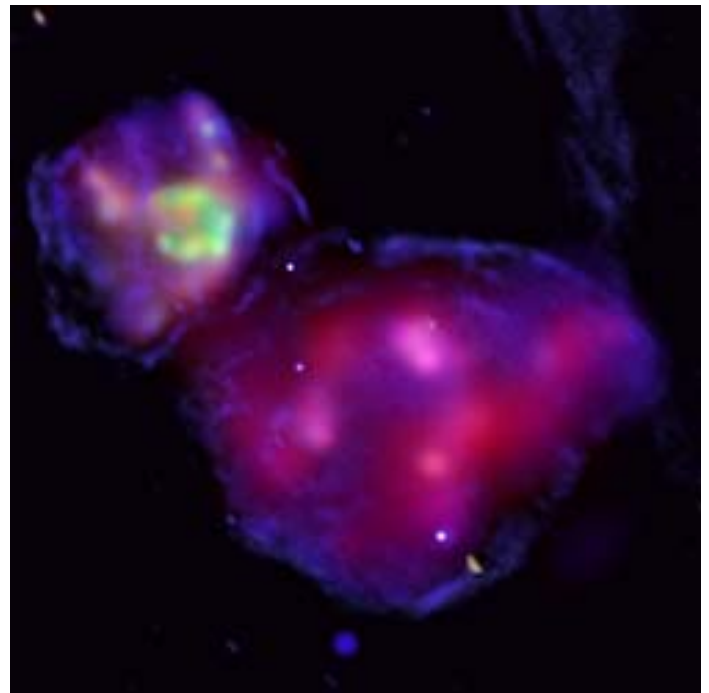
"The extraordinarily tight configuration of this stellar system tells us that there may have been a single gaseous disk that forced them into such small orbits within the first 100,000 years of their evolution, as the stars could not have formed so close to one another. This is the first evidence of a disk completely encompassing four stars," says Dr. Shkolnik. "It is remarkable how much a single stellar spectrum can tell us about both the present and the past of these stars." The data were acquired at the Keck I 10-m (33-foot) telescope and on the Canada-France-Hawaii 3.6-m (12-foot) telescope, both located on the summit of Mauna Kea, a 14,000-foot-high dormant volcano on the Big Island of Hawaii. Each telescope is equipped with a high-resolution spectrograph, an instrument capable of breaking up the star's light into different colors (or wavelengths), known as a spectrum. The stellar system is 51 pc (or 166 light-years) away from the Sun and lies just south of the constellation Aquarius (The Water Bearer). Though BD -22 5866 cannot be seen without a telescope, it is relatively bright and will be carefully monitored to map the orbits in more detail. Since most stars form as part of a

binary- or multiple-star system, the enormous potential of this quadruple system to give us previously unavailable physical information makes it a key to unlocking a few mysteries of stellar evolution. http://www.ifa.hawaii.edu/info/press-releases/AAS-Jan08/shkolnik_quadrupleQuand_rgb.jpg

Artist's view of the gaseous disk that may have once engulfed and maneuvered the quadruple stellar system into its unusually small orbit. <http://www.ifa.hawaii.edu/info/press-releases/AAS-Jan08/quad-solarsystem.tif>

SUPERNOVA REMNANTS DANCE IN THE LMC

The Gemini South Multi-Object Spectrograph (GMOS) recently captured a dramatic image of a vast cloud complex named DEM L316 located in the Large Magellanic Cloud. The peanut-shaped nebula appears to be a single object, but the latest research indicates that it is really comprised of two distinct gas and dust clouds formed by different types of supernova explosions. A new image reveals the intricate tendrils of gas and dust located in the remnants of the stellar explosions that created the still-expanding cloud complex. The object was first recognized in the early 1970s as a supernova remnant, a type of object that is enriched with elements created in stellar explosions. The nebula was likely created a few tens of thousands of years ago by more than one type of supernova exploding in this region of the Large Magellanic Cloud. "The remarkable clarity of these observations shows the complex shock structure of these two supernova remnants in impressive detail," said Dr. Rosa Williams, an astronomer who has studied DEM L316 extensively. "It's a great step forward in efforts to understand this fascinating pair of remnants -- whether they represent only a chance alignment on the sky or some as-yet uncovered physical relationship."



Other recent observations of DEM L316 by the Chandra and XMM-Newton X-ray space telescopes have strengthened the idea that the cloud is actually two supernova remnants that are aligned in the sky by chance and not a single remnant with a distorted bipolar shape. The Chandra observations reveal that the chemical compositions of the two shells are very different. This is a strong hint that they were created in very different types of supernova outbursts. The data show that the smaller shell (lower left in the

GMOS image) contains significantly more iron than the larger one.

The high abundance of iron in the small bubble indicates that the gas is the product of a Type Ia supernova. This type of explosion is triggered by the infall of matter from a star onto a white dwarf. Since white dwarf stars are extremely old objects, the system must have been a few billion years old when this supernova explosion took place. By contrast, the larger, less iron-rich bubble is the result of a Type II supernova that was triggered by the collapse of a massive star (more than seven times the mass of our Sun) when it was only a few million years old. Since the two progenitor systems had vastly different ages when they "went supernova", there is little chance they came from the same system. Therefore, while the detailed structure seen in the GMOS image makes it look like the two bubbles are colliding, they only seem to be close together in the sky because of a chance alignment in our line of sight. The Large Magellanic Cloud is a sister satellite galaxy to our Milky Way and lies about 160,000 light-years away in the direction of the constellation Dorado. The DEM L316 nebula is located within the LMC and its two bubbles extend over a distance of about 140 light-years (roughly 35 times larger than the distance between our Sun and its nearest stellar neighbor).

<http://chandra.harvard.edu/photo/2005/d316/>
<http://www.gemini.edu/index.php?option=content&task=view&id=265>

SATURN'S MOON EPIMETHEUS IS REVEALED IN DETAIL

The Cassini spacecraft's close flyby of Epimetheus in December 2007 returned detailed images of the moon's south polar region.



The view shows what might be the remains of a large impact crater covering most of this face, and which could be responsible for the somewhat flattened shape of the southern part of Epimetheus (116 kilometers, or 72 miles across) seen previously at much lower resolution. The image also shows two terrain types: darker, smoother areas, and brighter, slightly more yellowish, fractured terrain. One interpretation of this image is that the darker material evidently moves down slopes, and probably has a lower ice content than the brighter material, which appears

more like "bedrock." Nonetheless, materials in both terrains are likely to be rich in water ice.

The images that were used to create this enhanced color view were taken with the Cassini spacecraft narrow-angle camera on Dec. 3. The views were obtained at a distance of approximately 37,400 kilometers (23,000 miles) from Epimetheus and at a Sun-Epimetheus-spacecraft, or phase, angle of 65 degrees. Image scale is 224 meters (735 feet) per pixel.

<http://photojournal.jpl.nasa.gov/catalog/PIA09813>
<http://saturn.jpl.nasa.gov> <http://ciclops.org>

LIGO MEASUREMENTS SHOW - NO NEUTRON STAR MERGER

An analysis by the international LIGO (Laser Interferometer Gravitational-Wave Observatory) Scientific Collaboration has excluded one previously leading explanation for the origin of an intense gamma-ray burst that occurred last winter. Gamma-ray bursts are among the most violent and energetic events in the universe, and scientists have only recently begun to understand their origins. The LIGO project, was designed for the purpose of detecting cosmic gravitational waves and for the development of gravitational-wave observations as an astronomical tool. Research is carried out by the LIGO Scientific Collaboration, a group of 580 scientists at universities around the United States and in 11 foreign countries. The LIGO Scientific Collaboration interferometer network includes the GEO600 interferometer, located in Hannover, Germany. Each of the L-shaped LIGO interferometers (including the 2-km and 4-km detectors in Hanford, Washington, and a 4-km instrument in Livingston, Louisiana) uses a laser split into two beams that travel back and forth down long arms, each of which is a beam tube from which the air has been evacuated. The beams are used to monitor the distance between precisely configured mirrors. According to Albert Einstein's 1916 general theory of relativity, the relative distance between the mirrors will change very slightly when a gravitational wave -- a distortion in space-time, produced by massive accelerating objects, that propagates outward through the universe -- passes by. The interferometer is constructed in such a way that it can detect a change of less than a thousandth the diameter of an atomic nucleus in the lengths of the arms relative to each other.

On February 1, 2007, the Konus-Wind, Integral, Messenger, and Swift gamma-ray satellites measured a short but intense outburst of energetic gamma rays originating in the direction of M31, the Andromeda galaxy, located 2.5 million light-years away. The majority of such short (less than two seconds in duration) gamma-ray bursts (GRBs) are thought to emanate from the merger and coalescence of two massive but compact objects, such as neutron stars or black-hole systems. They can also come from astronomical objects known as soft gamma-ray repeaters, which are less common than binary coalescence events and emit less energetic gamma rays.

During the intense blast of gamma rays, known as GRB070201, the 4-km and 2-km gravitational-wave interferometers at the Hanford facility were in science mode and collecting data. They did not, however, measure any gravitational waves in the aftermath of the burst. That non-detection was itself significant. The burst had occurred along a line of sight that was consistent with it originating from one of Andromeda's spiral arms, and a binary coalescence event -- the merger of two neutron stars or black holes, for example -- was considered among the most likely explanations. Such a monumental cosmic event occurring in a nearby galaxy should have generated gravitational waves that would be easily measured by the ultrasensitive LIGO detectors.

The absence of a gravitational-wave signal meant GRB070201 could not have originated in this way in Andromeda. Other causes for the event, such as a soft gamma-ray repeater or a binary merger from a much further distance, are now the most likely contenders. LIGO's contribution to the study of GRB070201 marks a milestone for the project, says Jay Marx, LIGO's executive director: *"Having achieved its design goals two years ago, LIGO is now producing significant scientific results. The nondetection of a signal from GRB070201 is an important step toward a very productive synergy between gravitational-wave and other astronomical communities that will contribute to our understanding of the most energetic events in the cosmos."* "This is the first time that the field of gravitational-wave physics has made a significant contribution to the gamma-ray astronomical community, by searching for GRBs in a way that electromagnetic observations cannot," adds David Reitze, a spokesperson for the LIGO Collaboration. Up until now, Reitze says, astronomers studying GRBs relied solely on data obtained from telescopes conducting visible, infrared, radio, X-ray, and gamma-ray observations. Gravitational waves offer a new window into the nature of these events. *"We are still baffled by short GRBs. The LIGO observation gives a tantalizing hint that some short GRBs are caused by soft gamma repeaters. It is an important step forward,"* says Neil Gehrels, the lead scientist of the Swift mission. *"This result is not only a breakthrough in connecting observations in the electromagnetic spectrum to gravitational-wave searches, but also in the constructive integration of teams of complementary expertise. Our findings imply that multimessenger astronomy will become a reality within the next decade, opening a wonderful opportunity to gain insight on some of the most elusive phenomena of the universe,"* says Szabolcs Mka. <http://www.ligo.caltech.edu/>

STARDUST FORMED CLOSE TO SUN

Samples of the material picked up during the Stardust mission indicate that parts of the comet Wild 2 actually formed in an area close to the sun. New research by an international collaboration including researcher Saija Bajt analyzed noble gases within Stardust samples. The helium and neon isotope analysis suggests that some of the Stardust grains match a special type of carbonaceous material found in meteorites; hence both must have spent time in the same gas reservoir, which was close to the sun. About 10 percent of the mass of Wild 2 is estimated to be from particles transported out from hot inner zones to the cold zone where Wild 2 formed. The paper concludes that this is how these grains with unusual isotope ratios go incorporated into a comet. Earlier research showed that the comet formed in the Kuiper Belt, outside the orbit of Neptune, and only recently entered the inner regions of the solar system.

Wild 2 spent most of its life orbiting in the Kuiper Belt, far beyond Neptune, and in 1974 had a close encounter with Jupiter that placed it into its current orbit. The Stardust spacecraft's seven-

year mission returned to earth in January 2006 with particles that are the same material that accreted along with ice to shape the comet about 4.57 billion years ago, when the sun and planets formed. But during its lifetime, Wild 2 gathered material that formed much closer to the sun. And the new research shows that some of the particles in Stardust are consistent with the early solar nebula. *"The unusual isotope ratio of helium and neon demonstrate that materials in comet Wild 2 had been much closer to the young sun than previously expected,"* Bajt said. Bajt, who studied tracks in aerogel caused by cometary particles rich in noble gases, used infrared spectroscopy, which is very sensitive in detecting organic molecules. She found none, at least not in the pieces of aerogel she examined. The group concluded that the carriers of the noble gases must be the refractory metal-metal sulfide-metal carbide grains, unlike what many expected would be a meteoritic Q-phase, which is known to be organic. *"That's the first-order finding of the paper, and it's a rather startling one,"* said lead author Robert Pepin.

The second conclusion is that the ion irradiation is the only known mechanism that could load the grains (by ion implantation) to the very high concentrations based on mass density estimates from X-ray absorption spectroscopy by Andrew Westphal and his team. Noble gases are excellent tracers of contributions from various solar system volatile reservoirs and of physical processing of gases acquired from these reservoirs. Their elemental and isotopic compositions in primitive meteorites differ from those in the Sun. Planetary atmospheres display noble gas signatures distinct from both solar and meteoritic patterns. X-ray absorption spectroscopy in the current study showed that the grains are composed primarily of high-temperature metal. The X-ray and isotopic analyses point to gas acquisition in a hot, high-ion flux nebular environment close to the young sun.

Stardust launched in February 1999 and set off on three giant loops around the sun. It began collecting interstellar dust in 2000 and met Wild 2 in January 2004, when the spacecraft was slammed by millions of comet particles, nearly halting the mission. It is the first spacecraft to safely make it back to Earth with cometary dust particles.

FROM THE EDITOR'S TERMINAL

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

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

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

In January's StarGazer:

- **** **ASTRO CALENDAR - UPCOMING ASTRONOMY EVENTS FOR 2008**
- **** **OBSERVER'S INFORMATION - SUN, MOON, AND PLANET VISIBILITY**
- **** **STAR PARTY CALENDAR FOR 2008**
- **** **FIRST LOOK AT MERCURY'S PREVIOUSLY UNSEEN SIDE**
- **** **EXOPLANET'S REFLECTED LIGHT DETECTED FOR FIRST TIME**
- **** **FIRST SUNSPOT OF NEW SOLAR CYCLE OBSERVED**
- **** **DISTANT GALAXY REVEALS FURIOUS STAR FORMATION**
- **** **WHITE DWARF "SIBLING RIVALRY" EXPLODES IN SUPERNOVA**
- **** **VLBA MOVIES REVEAL NEW DETAILS OF COSMIC JETS**
- **** **XMM-NEWTON GIVES NEW INSIGHT INTO NEUTRON STARS**
- **** **ASTEROID 2007WD5 MARS IMPACT MUCH LESS LIKELY NOW**
- **** **EVIDENCE OF 'INCONVENIENT' GALAXY BACKWARD ARMS**
- **** **'GEMS' SHOW COSMIC FIREWORKS FIZZLED OUT AS UNIVERSE REACHED MID-LIFE**
- **** **JET POWER AND BLACK HOLE ASSORTMENT REVEALED IN NEW X-RAY IMAGE**
- **** **LSST GETS \$30M GO-AHEAD FROM GATES & SIMONYI**
- **** **WHEN WORLDS COLLIDE: AFTERMATH OF DISTANT PLANETARY COLLISION?**
- **** **EARTH: A BORDERLINE PLANET FOR LIFE?**
- **** **QUARTET OF STARS MAY UNLOCK SECRETS OF STELLAR EVOLUTION**
- **** **SUPERNOVA REMNANTS DANCE IN THE LMC**
- **** **SATURN'S MOON EPIMETHEUS IS REVEALED IN DETAIL**
- **** **LIGO MEASUREMENTS SHOW - NO NEUTRON STAR MERGER**
- **** **STARDUST FORMED CLOSE TO SUN**

<p>The next EAS Meeting is - 7:00 P.M. Saturday January 19th at the 'Aurora Astro Products' store location at Silver Lake.</p>
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