

The Stargazer

August 2008

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See EAS website at:

EAS BUSINESS...

NEXT EAS MEETING – SATURDAY AUG 16TH
7:00 PM AT AURORA ASTRO PRODUCTS STORE AT SILVER LAKE.

★★ Saturday Aug 16th 7:00 pm MEETING ★★
The Aug 16th speaker will be Dr. Victoria Meadows, Astrobiologist at the University of Washington, speaking about 'Life in the Universe - the search for extra-solar habitable planets', where (microbial) life could exist.

(It may be helpful for some folks to bring a folding chair to the meeting.) We have changed the layout to improve seating, based on the larger crowds we have had at the last few meetings.

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

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

If you are traveling northbound on I-5:

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

If you are traveling southbound on I-5:

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

★ STAR PARTY INFO ★

Next EAS Star Party: Aug 23 - Ron Tam's home.

EAS member Ron Tam has offered a flexible opportunity to EAS members to come to his home north of Snohomish for observing on clear weekend evenings and for EAS starparties. Anyone

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

Upcoming tentative EAS star party schedule: (also see the regional star parties listed in the 'Astro Calendar for 2008') Aug 23, Sep 20, Oct 4, Nov 1.

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

DARK MOON PERIODS THIS YEAR

New Moon	1 st Qtr	3 rd Qtr	EAS Star Party at Ron's
Jan 8 th	Jan 15 th	Jan 29 th	--
Feb 6 th	Feb 13 th	Feb 28 th	--
Mar 7 th	Mar 14 th	Mar 29 th	Sat Mar 08, Sat Mar 29
Apr 5 th	Apr 12 th	Apr 28 th	Saturday April 05
May 5 th	May 11 th	May 27 th	Saturday May 03
Jun 3 rd	Jun 10 th	Jun 26 th	Saturday Jun 07
Jul 2 nd	Jul 9 th	Jul 25 th	Saturday Jul 05
Aug 1 st , 30 th	Aug 8 th	Aug 23 rd	Saturday Aug 23
Sep 29 th	Sep 7 th	Sep 21 st	Saturday Sep 20
Oct 28 th	Oct 7 th	Oct 21 st	Saturday Oct 04
Nov 27 th	Nov 5 th	Nov 19 th	Saturday Nov 01
Dec 27 th	Dec 5 th	Dec 19 th	--

Other Western US Star Parties This Season...

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

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>

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/>

Aug 25-31 (Labor Day) - SAS Brooks Memorial Park Star Party 2008 - SR 97 near Goldendale <http://www.seattleastro.org/events.shtml>

Aug 30- Sep 07 Merritt Star Quest 2008, Loon Lake Site, near Kelowna BC <http://www.merrittastronomical.com/index.html>

Aug 22-24 - Deception Pass Star Party 2008 - Bowman Bay, Deception Pass, WA - <http://www.eastsideastro.org/index.htm> TMSF this year was almost a bust with clouds, freezing temperatures, dew, and great amounts of hot coffee consumed while shivering. The next local star party of the summer is our own yearly gathering at Bowman Bay State Park at Deception Pass. We are planning on sunny weather, dry and cloudless evenings this year! (fingers crossed) This star party is our Eastside yearly event which we mainly do for visitors at the campground. We'll have a "campfire talk" intro to astronomy both nights at sunset, then invite visitors to come down and see the sky through our telescopes. This event is open to all the local astronomy club members, just [email](#) us with how many are coming in your group

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

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

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

Sep 26-28 - Blue Mountain Star Party, Ukiah, OR
<http://www.stargazing.net/tcac/> mw.bryant@hotmail.com

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

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 CA
<http://www.sjaa.net/calstar/> - <http://www.sjaa.net/>

Sep 26-28 - White Sands Star Party - Alamogordo/White Sands, and Cloudcroft NM <http://www.zianet.com/wssp/>

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

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

EAS MEMBER NEWS

Sidewalk Astronomy

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

School and Community Group Astronomy Outreach

We often have requests for members of the EAS to come and help with an 'astronomy night' event from local schools, scout groups, senior homes, or similar groups. Usually this would be in

the form of a star party at their gathering, or perhaps a short slide show or night sky talk. Providing education and support to the community about interest astronomy is one of the main missions of the EAS. Please let club president know if you are interested and available to be on list of volunteers to handle these requests, so that we can say YES when people ask. Recent January cub-scout group visited by Jim Bielaga, Mark Folkerts, Mike Schilling, and Ron Tam for a star party night was a great example of how this can be a rewarding event for all involved.

Please email Mark Folkerts with your interest (or suggestions).

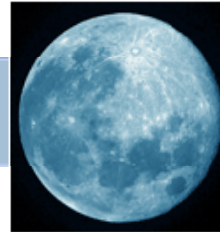
Attention EAS Members - 10% Discount for all Everett Astronomical Society Members at Aurora Astro Products

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

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

- Clear Skies, Jim Bielaga"

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



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

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

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

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

CLUB SCOPES

SCOPE	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.

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**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 – EAS Meeting 7:00 pm Aurora Astro Products store
 Aug 16 - Partial Lunar Eclipse
 Aug 17 - kappa-Cygnids meteor shower peak
 Aug 19 11:12a Northern Iota-Aquarids meteor shower peak
Aug 23 – EAS monthly suburban star party – Ron Tam's place
Aug 25-31 Oregon Star Party
 Aug TBD - Deception Pass Star Party - Bowman Bay, Deception Pass, WA

September 2008

Sep 08 - delta-Aurigids meteor shower peak
 Sep 11 - Mercury At Its Greatest Eastern Elongation (27 Degrees)
 Sep 13 - Uranus At Opposition
 Sep 19 - Piscids meteor shower peak
Sep 20 – EAS Meeting 7:00 pm Aurora Astro Products store
Sep 20 – EAS monthly suburban star party – Ron Tam's place
 Sep 22 - Autumnal Equinox (22:16 UT)
Sep 26-28 – Orion Nebula Star Party – Table Mt. WA

October 2008

Oct 04 – EAS monthly suburban star party – Ron Tam's place
 Oct 08 - Draconids meteor shower peak
 Oct 17 - epsilon-Geminids meteor shower peak
 Oct 21 - Orionids Meteor Shower Peak
Oct 25 – EAS Meeting 7:00 pm Aurora Astro Products store
 Oct 27 - Asteroid 4 Vesta Closest Approach To Earth (1.539 AU)

November 2008

Nov 01 – EAS monthly suburban star party – Ron Tam's place
 Nov 03 - Taurids meteor Shower Peak
 Nov 17 - Leonids meteor Shower Peak
Nov 22 – EAS Meeting 7:00 pm Aurora Astro Products store

December 2008

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

UW Astronomy Speakers Colloquium Schedule

Astronomy Department weekly colloquium meets Thursdays at 4:00 pm in PAB A102 - the classroom part of the Physics/Astronomy Building complex.
<http://www.astro.washington.edu/pages/colloquium.html>

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

"Our group of radio script writers now consists of EAS and SAS members Jim Ehrmin, Greg Donohue, and Ted Vosk, who are now regularly writing and helping to produce our **astronomy radio show, "It's Over Your Head"** on radio station **KSER, FM 90.7**. The 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://everettastro.org/application.htm> **(When renewing your subscription to Sky & Telescope you should send your S&T renewal form along with a check made out to Everett Astronomical Society to the EAS address.** The EAS treasurer Carol Gore will renew your **Sky and Telescope** subscription for you. **Astronomy** magazine offers a similar opportunity to club members.)

Membership in the Astronomical League -

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

EAS Club Telescope Borrowing -

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

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

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

EAS Library -

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

Joining or Renewing with the EAS -

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

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

OBSERVER'S INFORMATION...

LUNAR FACTS

Aug 16	Full Moon
Aug 23	Last Quarter Moon
Aug 30	New Moon
Sep 07	First Quarter Moon
Sep 15	Full Moon
Sep 22	Last Quarter Moon
Sep 29	New Moon
Oct 07	First Quarter Moon
Oct 14	Full Moon
Oct 21	Last Quarter Moon
Oct 28	New Moon
Nov 06	First Quarter 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	Diam.	Mag
Sun	05:05 am	19:22	Can	30'	-27.5
Mercury	06:27 am	20:01	Leo	05"	-0.5
Venus	06:42 am	20:08	Leo	10"	-3.9
Mars	08:14 am	20:35	Vir	04"	+1.7
Jupiter	17:19	01:48	Sag	45"	-2.6
Saturn	06:36 am	20:06	Leo	16"	+0.8
Uranus	20:19	07:52am	Aqr	04"	+5.7
Neptune	19:16	05:16 am	Cap	02"	+7.8
Pluto	15:44	01:14 am	Sag	--	+13.9

(times are in local time for Everett PDT)

Observing Jupiter's Moons – Java tool

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

Transit times for Jupiter's Great Red Spot in 2008

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

NOAA SUN CALCULATOR

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

LUPUS: Lupus (the Wolf) borders on the constellations of Centaurus, Circinus, Libra, Norma, and Scorpius. There are no established asterisms within its borders. Lupus ranks 5th in overall brightness among the constellations, but 46th in size: it takes up approximately 333.68 square degrees (0.809%) of the sky. Lupus contains no known meteor showers, and no Messier objects. Lupus is completely visible from latitudes South of +35 degrees, and completely invisible from latitudes North of +60 degrees. It has 50 stars brighter than magnitude 5.5, and its central point is at RA=15h09m, Dec.= -42.5 degrees. The solar conjunction date of Lupus is November 8th, and its midnight culmination date is May 9th. One of the most spectacular and brightest supernovae explosions occurring in our Galaxy was observed near Beta Lupi in the year 1006. The only supernova to be recorded in Europe and the Arab empire before the Renaissance, historical descriptions estimated its brightness as "three times as bright as Venus" and "a quarter the brightness of the Moon". These and other descriptions place the visual magnitude at approximately -8 to -10.

Lupus is well known for containing some fine globular and open clusters, as well as planetary nebulae. The unusually shaped planetary nebula IC-4406 glows at photographic magnitude 10.6, and has a long dimension of only 28"; this gives a relatively high average surface brightness. IC-4406's central star is embedded in a thick cloud of nebulosity, dimly glowing at photographic magnitude 14.7, making it extremely difficult for backyard observers. Larger scopes show this nebula to be a bright, bluish-gray rectilinear patch of light. NGC-5882, another planetary nebula in Lupus, appears as a slightly out-of-focus bluish green "star", with a photographic magnitude of 10.5; it is located right between two relatively bright stars of 7th and 8th magnitude. Another planetary nebula in Lupus (NGC-6026) lies near its eastern border, about halfway between Chi and Theta Lupi: this is NGC-6026, a 45" diameter planetary. This object for a long time was thought to be a galaxy, until University of Texas astronomer Gerard de Vaucouleurs identified it as a member of the Milky Way. NGC-6026 is a rather large planetary with a very low surface brightness due to a magnitude of 12.5; a moderate sized scope shows this object as uniformly illuminated faint haze, with a condensed stellar-like nucleus. NGC-5824 is a fine globular cluster in Northwestern Lupus. It shines at magnitude 9.0, and measures 6.2' across. This cluster is condensed strongly towards its center and is thus difficult to resolve with smaller scopes. Brighter and larger than NGC-5824 is NGC-5986; this globular measures 9.6' across, and shines at magnitude 7.1, making it easily visible as a large, fuzzy disk of light. A moderate backyard scope at high power shows many individual points of light ringing the cluster's edges. Another beautiful globular in Lupus is NGC-5927, lying about 3 degrees northeast of Zeta Lupi. It glows at magnitude 8.3, and measures about 12'; it appears in smaller scopes as a nebulous haze dotted with tiny stellar points with a bright white central core surrounded by a field full of sparkling stars. Many astronomers have raved about this lesser known globular cluster.

Lupus also contains two bright open clusters : NGC-5749 and NGC-5822. NGC-5749 is a 9th magnitude group of 30 stars compressed into an area measuring only 8' across. NGC-5822 is

a much larger and brighter open cluster, requiring a larger field of view. It contains 150 stars in an area covering 40', and has a total photographic magnitude of 6.5; its brightest stars glow at 10th magnitude, making the object visible in small telescopes as a large scattered field of bright and faint stars loosely comprising an open, or galactic, cluster. If you are able to get a good southern horizon in the spring and early summer, try to enjoy some of the wonders of the constellation Lupus.

CAPRICORNUS: "The Sea Goat" as this constellation is also known, borders on the constellations of Aquarius, Aquila, Microscopium, Piscis Austrinus, and Sagittarius, and ranks 36th in overall brightness among the constellations, containing 31 stars brighter than magnitude 5.5. Its central point is located at RA=21h00m, and Dec.= -18 degrees. Capricorn is completely visible from latitudes South of +62 degrees, and completely invisible from latitudes North of + 82 degrees. The constellation of Capricorn has no associated asterisms, although some of its stars notably form either an outline of the "smile in the sky" or "the lady's high-heeled shoe". This constellation ranks 40th in overall size, and takes up almost 414 square degrees, or 1.003% of the entire sky. Capricorn has two associated meteor showers (the Capricornids (22 July) and the alpha Capricornids (30 July)), and one associated Messier object, M-30, a fine globular cluster. Its solar conjunction date is February 5, and its midnight culmination date is August 8, making it well-placed for summer star party viewing.

Capricorn is the smallest of the traditional zodiacal constellations. Over 2000 years ago, the Sun was positioned within Capricorn at the winter solstice; the Sun was, at this point, at declination -23.5 degrees, or 23.5 degrees below the celestial equator. The corresponding latitude on Earth (which was the southernmost point where the Sun could be directly overhead at noon time) was thus named the "Tropic of Capricorn". This latitude still is known as the Tropic of Capricorn, but because of the Earth's precession, the position of the Sun at the December solstice has moved into the next-door neighboring constellation of Sagittarius. Another interesting point about Capricorn is that about 2500 years ago, the Chinese are documented to have seen five planets in conjunction within Capricorn.

M-30 is a globular cluster that measures 11 arc-minutes across, and shines at magnitude 7.5, making it one of the best Fall globulars to be observed. However, it lies 8.2 kiloparsecs away, making it somewhat difficult to resolve into stars. Capricorn contains many fine double stars, including 41-Capricorni (a difficult one for amateur astronomers due to the very wide magnitude variability between its two components: 5.3 and 11.5)); optical double and yellow spectral G-type Alpha 1,2,-Capricorni; easily split white-blue Beta-Capricorni; Pi and Omicron Capricorni; and Delta Capricorni, which contains a magnitude 2.9 eclipsing binary bluish white primary, around which orbits a 12th magnitude companion nearly two arc-minutes away. Capricorn also contains many variable stars, including long-period variable R-Capricorni (range of variability 9.4 -14.9 and period of 345 days); TW-Capricorni (bright Cepheid variable with a smaller magnitude range of 9.7 to 10.5 and a period of 28.6 days); RW-Capricorni (a bright eclipsing binary with magnitude range of 9.8 to 11.0 over a period of 3.39 days); and RS-Capricorni (a semi-regular variable with a range of 8.3 to 10.3 over a period of (like R-Capricorni) 345 days. There are two galaxies of note within the confines of the constellation of Capricorn. NGC-6712 is a 14th magnitude barred-spiral measuring 1.6' x 1.3' across. NGC-6907 is another barred-spiral, which at magnitude 11, is the second brightest deep-sky object in Capricorn after M-30. NGC-6907 is bright enough to be viewed with a 6-inch telescope, and measures 3.4' x

3.0' across. Try to enjoy these wonderful objects in any late summer or early fall observing that you are able to do.

YOUNG ASTRONOMER'S CORNER

Now is the time of year when many amateur astronomers' thoughts turn to observing outdoors with their telescopes, binoculars, etc... Here are some helpful hints for observing at outdoor telescope "STAR" PARTIES this season: enjoy the night sky warmly and safely!!!

★★ 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!!

The Young Astronomer's Corner will also talk a bit this month - giving some very basic information - about Supernovae, Neutron Stars, and Black Holes: many people always ask the basic differences between these three types of objects... not just young astronomers!!

Supernovae, Neutron Stars, and Black Holes: What happens (when a star "dies") if that star is bigger or more massive than the sun to begin with?

If a star is anywhere from at least 1.1 to about 1.4 times as large (more massive) than the sun, it will generally undergo a more violent and spectacular end. Actually, a star with a mass of about 10 times that of the sun will probably end up as a supernova. As with the red giant stage of a smaller star, there is a similar collapse due to gravity, more nuclear fusion and a change in production to heavier elements, a rise in temperature, and then a halt in the collapse. These cycles of collapse, rise in temperature, expansion (opposite of collapse), and collapse again, continue until iron is produced in these reactions as the ultimate "heavy" element: iron does not release energy in nuclear reactions, but requires it. When the star builds an iron core and collapses again and cannot be compressed anymore, it explodes violently, (it is no longer able to resist the force of gravity). This is a supernova. The expanding shell or blanket of gas and dust forms what is known as a supernova remnant, and it is this gas and dust which is the "star stuff" that we are all made of.

Present in the core of a supernova is the remainder of the collapsed star; this is called a neutron star. It is composed of tightly packed neutrons, and is even more dense than a white dwarf; a neutron star also spins very rapidly. Either light or radio waves from these stars can be detected on earth in pulses; these rapidly spinning neutron stars are therefore also known as pulsars (the fastest of which can rotate at almost 1,000 times per second.). Finally, if a star is very big or massive (generally over 10 times as big as the sun), it will become a black hole. A black hole is an object so dense and collapsed that not even light can escape (that is, we can't "see" it; we can detect it however by what it releases (X-rays, for example), from its effect on other nearby objects.). Also, a supernova that leaves a central core

greater than three times the size of the sun is too large to remain either a white dwarf or a neutron star (pulsar); it too will become a black hole.

ASTRONOMY & TELESCOPE LINGO

ASTRONOMY "LINGO": Rho Ophiuchi Cloud: A very complex area of molecular and dark clouds, and emission and reflection nebulae, close to the star known as rho Ophiuchi in (obviously) Ophiuchus. Observations in the X-ray and infrared wavelengths show that star formation is occurring in the region of the dark cloud.

TELESCOPE/EQUIPMENT "LINGO": Dwingeloo Radio Observatory: The administrative headquarters of what used to be the Netherlands Foundation for Research in Astronomy (NFRA); it is currently known as ASTRON (Stichting Astronomisch Onderzoek in Nederland). It came into operation in 1955, and has a 25-meter dish capable of observing at 1.42, 1.66, and 5 GHz.

PLANETARY FOCUS

This column prints periodically in the EAS newsletter; it will return at a later date.

ASTRONOMY "FUN FACTS"

★★ The star S Doradus is a very bright, variable supergiant star, which also happens to be located in the Large Magellanic Cloud. Its average luminosity is 500,000 times brighter than the Sun (because of its variability, its luminosity can exceed that of the Sun's by over 1,000,000 times). If S Doradus were our "Sun", and were located over 700 times farther away from Earth than the present Sun, it would still generate the same amount of energy as the Earth currently receives from the "real" Sun!

★★ One of the largest stars known in the entire Universe is the red giant VV Cephei (in Cepheus). It is located almost 4,000 light years from Earth, and its diameter is 1,900 times greater than that of the Sun. If the Sun were no bigger than a chick-pea, VV Cephei would be a large, hot-air balloon almost 12 meters in diameter!! If VV Cephei were centered on our Solar System, it would extend out to the orbit of Saturn!

★★ Not counting the Sun, the light from all stars is equal to about one-fifteenth the light of the full Moon, or one six-millionth the light of the Sun itself. If the total of all such starlight could be focused in one object, it would be equal to about a 100-watt bulb seen from a distance of almost 190 meters – approximately the length of two football fields!

"MIRROR IMAGES"

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

Class of Object: X-RAY Pulsators: Regularly variable X-ray binaries that have periods of a few seconds up to a few minutes (in the case of slow X-ray pulsators). This pulsation is generally acknowledged to be associated with the rotation of a magnetized

neutron star: thus, these objects may be regarded as X-ray pulsars. These X-ray pulsations are thought to arise from the conveyance of the accreting gas onto the magnetic poles of the neutron star. This gas flow affects the neutron star's spin and as a result, all X-ray pulsars (unlike other pulsars) are gradually speeding up.

Representative Northern Hemisphere Object: Cygnus X-3

Representative Southern Hemisphere Object: Centaurus X-3

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

NEW PLUTO SCIENCE, TO BE CHECKED BY NEW HORIZONS WHEN IT ARRIVES AT PLUTO

Two recent science results that relate to the New Horizons spacecraft main flyby target - the Pluto system.

The first of the two science results appears in the *Astronomical Journal*, in a paper by Bradley Shaffer and a host of co-workers. Brad and company accurately reanalyzed and recalibrated photographs of Pluto taken from the 1930s through the early 1950s. The really neat thing they found is that Pluto's surface appearance changed a good amount during that time, indicating that frost deposits are migrating around the surface on a global scale due to seasonal and/or orbital distance changes. This has long been suspected, but Brad and his team could conclusively prove it because the parts of Pluto we could see in the early 1930s and early 1950s were identical - something that hasn't occurred since. Their analysis of the old data using modern techniques made it possible to detect what astronomers of the mid-20th century had missed, and therefore allowed Shaffer's team to rule out the competing theory - that Pluto's changing photometric properties were just due to our seeing Pluto from differing angles over the decades. This result also confirms the prediction that global atmospheric change is important on Pluto. Indeed, this may even portend other kinds of changes (like day-to-day or day/night frost migration) will be discovered when New Horizons makes detailed surface maps as it approaches Pluto in 2015.

The other scientific result is about the planet's largest moon, Charon. Submitted for publication by New Horizons co-investigator Mike Summers and three co-workers, the result is based on new computer models, rather than new data. These models show that some of Pluto's escaping atmosphere is captured by Charon's gravity, creating a tenuous atmosphere around Charon which - if confirmed by New Horizons - can be used to help diagnose the escape rate from Pluto.

SPITZER REVEALS 'NO ORGANICS' ZONE AROUND PINWHEEL GALAXY M101

The Pinwheel galaxy is gussied up in infrared light in a new picture from NASA's Spitzer Space Telescope.

The fluffy-looking galaxy, officially named Messier 101, is dominated by a mishmash of spiral arms. In Spitzer's new view, in which infrared light is color coded, the galaxy sports a swirling blue center and a unique, coral-red outer ring.

A new paper appearing July 20 in the *Astrophysical Journal* explains why this outer ring stands out. According to the authors, the red color highlights a zone where organic molecules called polycyclic aromatic hydrocarbons, which are present throughout most of the galaxy, suddenly disappear.

Polycyclic aromatic hydrocarbons are dusty, carbon-containing molecules found in star nurseries, and on Earth in barbeque pits, exhaust pipes and anywhere combustion reactions take place. Scientists believe this space dust has the potential to be converted into the stuff of life.

"If you were going look for life in Messier 101, you would not want to look at its edges," said Karl Gordon. *"The organics can't survive in these regions, most likely because of high amounts of harsh radiation."* To view Spitzer's Pinwheel, visit http://www.nasa.gov/mission_pages/spitzer/multimedia/20080721a.html

The Pinwheel galaxy is located about 27 million light-years away in the constellation Ursa Major. It has one of the highest known gradients of metals (elements heavier than helium) of all nearby galaxies in our universe. In other words, its concentrations of metals are highest at its center, and decline rapidly with distance from the center. This is because stars, which produce metals, are squeezed more tightly into the galaxy's central quarters.

Gordon and his team used Spitzer to learn about the galaxy's gradient of polycyclic aromatic hydrocarbons. The astronomers found that, like the metals, the polycyclic aromatic hydrocarbons decrease in concentration toward the outer portion of the galaxy. But, unlike the metals, these organic molecules quickly drop off and are no longer detected at the very outer rim.

"There's a threshold at the rim of this galaxy, where the organic material is getting destroyed," said Gordon.

The findings also provide a better understanding of the conditions under which the very first stars and galaxies arose. In the early universe, there were not a lot of metals or polycyclic aromatic



hydrocarbons around. The outskirts of the Pinwheel galaxy therefore serves as a close-up example of what the environment might look like in a distant galaxy.

In this image, infrared light with a wavelength of 3.6 microns is colored blue; 8-micron light is green; and 24-micron light is red. All three of Spitzer instruments were used in the study: the infrared array camera, the multiband imaging photometer and the infrared spectrograph. <http://www.spitzer.caltech.edu/spitzer>
<http://www.nasa.gov/spitzer>

CASSINI CONFIRMS LIQUID SURFACE LAKE ON TITAN - SHOWS LARGE HYDROCARBON LAKE IS TRULY WET

Scientists have confirmed that at least one body in our solar system, other than Earth, has a surface liquid lake. Using an instrument on Cassini orbiter, they discovered that a lake-like feature in the south polar region of Saturn's moon, Titan, is truly wet. The lake is about 235 kilometers, or 150 miles, long.

The visual and infrared mapping spectrometer, or VIMS, an instrument, identifies the chemical composition of objects by the way matter reflects light. When VIMS observed the lake, named Ontario Lacus, it detected ethane, a simple hydrocarbon that Titan experts have long been searching for. The ethane is in liquid solution with methane, nitrogen and other low-molecular weight hydrocarbons. *"This is the first observation that really pins down that Titan has a surface lake filled with liquid,"* VIMS principal investigator said. *"Detection of liquid ethane in Ontario Lacus confirms a long-held idea that lakes and seas filled with methane and ethane exist on Titan,"* said Larry Soderblom of the U.S. Geological Survey.

The fact that the VIMS could detect the spectral signatures of ethane on the moon's dimly lit surface while viewing at a highly slanted angle through Titan's thick atmosphere "raises expectations for exciting future lake discoveries by the infrared spectrometer," Soderblom, an interdisciplinary Cassini scientist, said. The ubiquitous hydrocarbon haze in Titan's atmosphere hinders the view to Titan's surface. But there are transparent atmospheric "windows" at certain infrared light wavelengths through which Cassini's VIMS can see to the ground. VIMS observed Ontario Lacus on Cassini's 38th close flyby of Titan in December 2007.

The lake is roughly 20,000 square kilometers, or 7,800 square miles, just slightly larger than North America's Lake Ontario, Brown said. Infrared spectroscopy doesn't tell the researchers how deep the lake is, other than it must be at least a centimeter or two, or about three-quarters of an inch, deep.

"We know the lake is liquid because it reflects essentially no light at 5-micron wavelengths," Brown said. *"It was hard for us to accept the fact that the feature was so black when we first saw it. More than 99.9 percent of the light that reaches the lake never gets out again. For it to be that dark, the surface has to be extremely quiescent, mirror smooth. No naturally produced solid could be that smooth."* VIMS observations at 2-micron wavelengths shows the lake holds ethane. The scientists saw the specific signature of ethane as a dip at the precise wavelength that ethane absorbs infrared light. Tiny ethane particles almost as fine as cigarette smoke are apparently filtering out of the atmosphere and into the lake, Brown said. Ethane is a simple hydrocarbon produced when ultraviolet light from the sun breaks up its parent molecule, methane, in Titan's methane-rich, mostly nitrogen atmosphere.

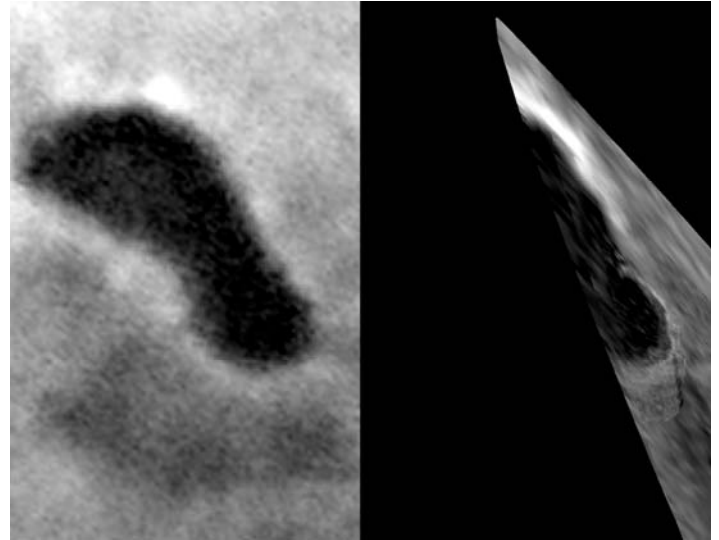
Before the Cassini mission, several scientists thought that Titan would be awash in global oceans of ethane and other light hydrocarbons, the byproducts of photolysis, or the action of ultraviolet light on methane over 4.5 billion years of solar system history. But 40 close flybys of Titan by the Cassini spacecraft show no such oceans exist.

The observations also suggest the lake is evaporating. The lake is ringed by a dark beach, where the black lake merges with the bright shoreline. *"We can see there's a shelf, a beach, that is being exposed as the lake evaporates,"* Brown said. That the

beach is darker than the shoreline could mean that the "sand" on the beach is wet with organics, or it could be covered with a thin layer of liquid organics, he said. The VIMS measurements rule out the presence of water ice, ammonia, ammonia hydrate and carbon dioxide in Ontario Lacus. The VIMS result gives researchers new insight on Titan's chemistry and weather dynamics.

Titan, which is one-and-a-half times the size of Earth's moon and bigger than either Mercury or Pluto, is one of the most fascinating bodies in the solar system when it comes to exploring environments that may give rise to life.

Cassini cameras and radar and the camera aboard the European Space Agency's Huygens probe that landed on Titan in January 2005 have shown that methane saturates and drains from Titan's atmosphere, creating river-like and lake-like features on the surface. Just as water cycles through the hydrologic regime on Earth, methane cycles through a methanological cycle on Titan.



<http://mediaimages.opi.arizona.edu/silk/ontario.jpg>

The Imaging Science System aboard Cassini orbiter took the image, left, of Ontario Lacus in June 2005. Cassini's Visual and Infrared Mapping Spectrometer took the image, right, of Ontario Lacus in December 2007. This view, taken at 5-micron wavelengths from 1,100 kilometers (680 miles) away, shows the part of the lake that is visible on Titan's sunlit side. What appears to be a beach is seen at the lower right of the image, below the bright lake shoreline. <http://www.vims.lpl.arizona.edu>
<http://www.nasa.gov/cassini>

PHOENIX CONFIRMS MARTIAN WATER; MISSION EXTENDED

Laboratory tests aboard the Phoenix Mars Lander have identified water in a soil sample. The lander's robotic arm delivered the sample Wednesday to an instrument that identifies vapors produced by the heating of samples. *"We have water,"* said William Boynton, lead scientist for the Thermal and Evolved-Gas Analyzer, or TEGA. *"We've seen evidence for this water ice before in observations by the Mars Odyssey orbiter and in disappearing chunks observed by Phoenix last month, but this is the first time Martian water has been touched and tasted."*

With enticing results so far and the spacecraft in good shape, NASA also announced operational funding for the mission will extend through Sept. 30. The original prime mission of three months ends in late August. The mission extension adds five weeks to the 90 days of the prime mission.

"Phoenix is healthy and the projections for solar power look good, so we want to take full advantage of having this resource in one of the most interesting locations on Mars," said Michael Meyer, chief scientist for the Mars Exploration Program.

The soil sample came from a trench approximately 2 inches deep. When the robotic arm first reached that depth, it hit a hard layer of frozen soil. Two attempts to deliver samples of icy soil on days when fresh material was exposed were foiled when the samples became stuck inside the scoop. Most of the material in Wednesday's sample had been exposed to the air for two days, letting some of the water in the sample vaporize away and making the soil easier to handle.

"Mars is giving us some surprises," said Phoenix principal investigator Peter Smith. "We're excited because surprises are where discoveries come from. One surprise is how the soil is behaving. The ice-rich layers stick to the scoop when poised in the sun above the deck, different from what we expected from all the Mars simulation testing we've done. That has presented challenges for delivering samples, but we're finding ways to work with it and we're gathering lots of information to help us understand this soil."

Since landing on May 25, Phoenix has been studying soil with a chemistry lab, TEGA, a microscope, a conductivity probe and cameras. Besides confirming the 2002 finding from orbit of water ice near the surface and deciphering the newly observed stickiness, the science team is trying to determine whether the water ice ever thaws enough to be available for biology and if carbon-containing chemicals and other raw materials for life are present.

The mission is examining the sky as well as the ground. A Canadian instrument is using a laser beam to study dust and clouds overhead. "It's a 30-watt light bulb giving us a laser show on Mars," said Victoria Hipkin.

A full-circle, color panorama of Phoenix's surroundings also has been completed by the spacecraft. "The details and patterns we see in the ground show an ice-dominated terrain as far as the eye can see," said Mark Lemmon, lead scientist for Phoenix's Surface Stereo Imager camera. "They help us plan measurements we're making within reach of the robotic arm and interpret those measurements on a wider scale." <http://www.nasa.gov/phoenix>

MARS EXPRESS ACQUIRES SHARPEST IMAGES OF PHOBOS

Mars Express closed in on the intriguing Martian moon Phobos at 6:49 CEST [0449 UTC] on 23 July, flying past at 3 km/s, only 93 km from the moon. The spacecraft's fly-bys of the moon have returned its most detailed full-disc images ever, also in 3-D, using the High Resolution Stereo Camera on board. Phobos is what scientists call a 'small irregular body'. Measuring 27 km x 22 km x 19 km, it is one of the least reflective objects in the Solar System, thought to be a capture-asteroid or a remnant of the material that formed the planets.

The best images of Phobos ever - The HRSC images, which are still under processing, form a bounty for scientists studying Phobos. They are a result of observations carried out over several close fly-bys of the Martian moon, performed over the past three weeks. At their best, the pictures have a resolution of 3.7 m/pixel and are taken in five channels (in the stereo channel) for images in 3-D and (in the photometric channels) to perform analyses of the physical properties of the surface. The images obtained by several other spacecraft so far have either been of a lower resolution, or not available in 3D and have not covered the entire disc of Phobos. This is also the first time that portions of the far-

side of the moon have been imaged in such high resolution (Phobos always faces Mars on the same side).

Scientific bounty - In observing Phobos, Mars Express benefits from its highly elliptical orbit which takes it from a closest distance of 270 km from the planet to a maximum of 10,000 km (from the center of Mars), crossing the 9000 km orbit of the Martian moon. Mars Express imaged the far-side of Phobos (with respect to Mars) for the first time after the Viking mission, by flying outside the spacecraft's orbit around Mars.

Phobos-Grunt (Phobos soil), a Russian sample-return mission, is due to for launch in 2009. It is expected to land on the far-side of Phobos at a region between 5 deg south to 5 deg north, and 230 deg west to 235 deg west. This region was last imaged in the 1970s by the Viking orbiters.

The HRSC observations have been awaited eagerly to better assess and characterize the choice of the landing site.

The moon's remarkably grooved surface can be seen in the pictures quite clearly. The origin of these grooves is still debated. It is not known whether they are produced by ejecta thrown up from impacts on Mars, or if they result from the surface regolith, or soil, slipping into internal fissures. In this image, at least two families of grooves with distinct orientations can be seen along with an elongated crater. The stereo observations (resolution 3.7 m/pixel) are important for structural analysis and they will be used to derive a digital terrain model (a 3-D map of the surface that includes elevation data). The extra photometric channels (at 7.4 m/pixel) make it possible to study the properties of the Phobos regolith at micron to millimeter scales. An operational challenge - Managing the close fly-bys was an operational challenge, made possible by spacecraft operations engineers and scientists who worked together to specially optimize Mars Express's trajectory and obtain the best possible views.



The observation made use of a spacecraft slew, a special maneuver whereby the body of the spacecraft is rotated against the direction of motion, to effectively lower the speed at which the target passes in the field of view of the camera. This makes it possible to avoid blurring of the pictures despite the high fly-by velocities, whilst maintaining acceptable exposure time. The HRSC Super Resolution Channel (SRC) also observed during this close fly-by, with a nominal resolution of 90 cm/pixel. As expected, despite the slew, some residual motion blur has crept

into the image, but much detail is expected to be recovered after further processing.

In the days running up to the observation, the primary star-tracker - a navigation device that helps the spacecraft point its instruments at the target accurately - experienced some temporary difficulty in recognizing the star constellations in its field of view, leaving the spacecraft operating on its secondary system. Concerned that this might affect this critical observation, the team at European Space Operations Centre (ESOC) in Darmstadt, Germany, worked intensely to recover the primary system and were able to switch back successfully two days before the fly-by. http://www.esa.int/esaCP/SEM5H48N9JF_index_1.html

SATELLITES DISCOVER WHAT POWERS NORTHERN LIGHTS

Researchers using a fleet of five satellites have discovered that explosions of magnetic energy a third of the way to the moon power substorms that cause sudden brightenings and rapid movements of the aurora borealis, called the Northern Lights. The culprit turns out to be magnetic reconnection, a common process that occurs throughout the universe when stressed magnetic field lines suddenly snap to a new shape, like a rubber band that's been stretched too far. "*We discovered what makes the Northern Lights dance,*" said Dr. Vassilis Angelopoulos. Angelopoulos is the principal investigator for the Time History of Events and Macroscale Interactions during Substorms mission, or THEMIS.

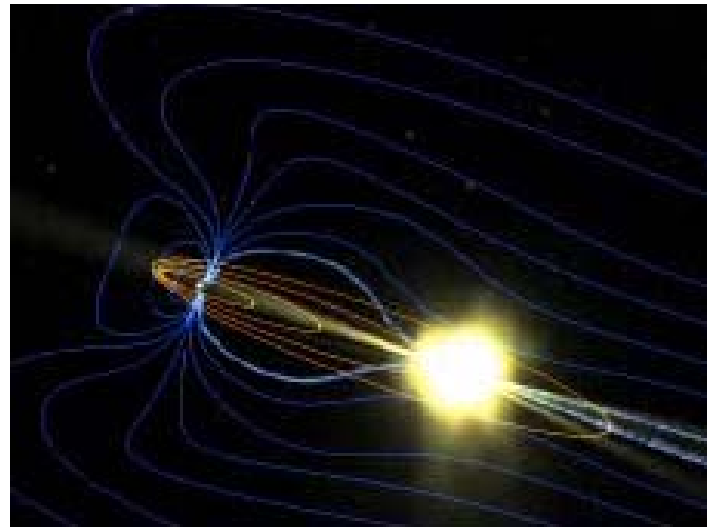
Substorms produce dynamic changes in the auroral displays seen near Earth's northern and southern magnetic poles, causing a burst of light and movement in the Northern and Southern Lights.

Substorms often accompany intense space storms that can disrupt radio communications and global positioning system signals and cause power outages. Solving the mystery of where, when, and how substorms occur will allow scientists to construct more realistic substorm models and better predict a magnetic storm's intensity and effects.

"As they capture and store energy from the solar wind, the Earth's magnetic field lines stretch far out into space. Magnetic reconnection releases the energy stored within these stretched magnetic field lines, flinging charged particles back toward the Earth's atmosphere," said David Sibeck, THEMIS project scientist. *"They create halos of shimmering aurora circling the northern and southern poles."*

Scientists directly observe the beginning of substorms using five THEMIS satellites and a network of 20 ground observatories located throughout Canada and Alaska. Launched in February 2007, the five identical satellites line up once every four days along the equator and take observations synchronized with the ground observatories. Each ground station uses a magnetometer and a camera pointed upward to determine where and when an auroral substorm will begin. Instruments measure the auroral light from particles flowing along Earth's magnetic field and the electrical currents these particles generate.

During each alignment, the satellites capture data that allow scientists to precisely pinpoint where, when, and how substorms measured on the ground develop in space. On Feb. 26, 2008, during one such THEMIS lineup, the satellites observed an isolated substorm begin in space, while the ground-based observatories recorded the intense auroral brightening and space currents over North America.



These observations confirm for the first time that magnetic reconnection triggers the onset of substorms. The discovery supports the reconnection model of substorms, which asserts a substorm starting to occur follows a particular pattern. This pattern consists of a period of reconnection, followed by rapid auroral brightening and rapid expansion of the aurora toward the poles. This culminates in a redistribution of the electrical currents flowing in space around Earth. <http://www.nasa.gov/themis>

PHOENIX TEAM OPENS WINDOW ON SCIENTIFIC PROCESS

Phoenix Mars mission scientists talked about research-in-progress, before conclusion are certain, concerning an ongoing investigation of perchlorate salts detected in soil analyzed by the wet chemistry laboratory aboard Phoenix Lander.

"Finding perchlorates is neither good nor bad for life, but it does make us reassess how we think about life on Mars," said Michael Hecht, lead scientist for the Microscopy, Electrochemistry and Conductivity Analyzer (MECA), the instrument that includes the wet chemistry laboratory.

If confirmed, the result is exciting, Hecht said, *"because different types of perchlorate salts have interesting properties that may bear on the way things work on Mars if -- and that's a big 'if' -- the results from our two teaspoons of soil are representative of all of Mars, or at least a significant portion of the planet."*

The Phoenix team had wanted to check the finding with another lander instrument, the Thermal and Evolved-Gas Analyzer (TEGA), which heats soil and analyzes gases driven off. But as that TEGA experiment was underway last week, speculative news reports surfaced claiming the team was holding back a major finding regarding habitability on Mars.

"The Phoenix project has decided to take an unusual step" in talking about the research when its scientists are only about half-way through the data collection phase and have not yet had time to complete data analysis or perform needed laboratory work, said Phoenix principal investigator Peter Smith. Scientists are still at the stage where they are examining multiple hypotheses, given evidence that the soil contains perchlorate.

"We decided to show the public science in action because of the extreme interest in the Phoenix mission, which is searching for a habitable environment on the northern plains of Mars," Smith added. *"Right now, we don't know whether finding perchlorate is good news or bad news for possible life on Mars."*

Perchlorate is an ion, or charged particle, that consists of an atom of chlorine surrounded by four oxygen atoms. It is an oxidant, that is, it can release oxygen, but it is not a powerful one. Perchlorates are found naturally on Earth at such places as Chile's hyper-arid Atacama Desert. The compounds are quite stable and do not destroy organic material under normal circumstances. Some microorganisms on Earth are fueled by processes that involve perchlorates, and some plants concentrate the substance. Perchlorates are also used in rocket fuel and fireworks.

Perchlorate was discovered with a multi-use sensor that detects perchlorate, nitrate and other ions. The MECA team saw the perchlorate signal in a sample taken from the Dodo-Goldilocks trench on June 25, or Sol 30, or the 30th Martian day of the mission after landing, and again in another sample taken from the Snow White trench on July 6, or Sol 41.

When TEGA heated a sample of soil dug from the Dodo-Goldilocks trench on Sol 25 to high temperature, it detected an oxygen release, said TEGA lead scientist William Boynton of the University of Arizona. Perchlorate could be one of several possible sources of this oxygen, he said.

Late last week, when TEGA analyzed another sample, this one from the Snow White trench, the TEGA team looked for chlorine gas. The instrument detected none.

"Had we seen it, the identification of perchlorate would be absolutely clear, but in this run we did not see any chlorine gas. We may have been analyzing a perchlorate salt that doesn't release chlorine gas upon heating," Boynton said. *"There's nothing in the TEGA data that contradicts MECA's finding of perchlorates."* As the Phoenix team continues its investigation of the arctic soil, the TEGA instrument will attempt to validate the perchlorate discovery and determine its concentration and properties.

JUPITER & SATURN ARE FULL OF LIQUID METAL HELIUM

A strange, metal brew lies buried deep within Jupiter and Saturn, according to a new study by researchers at the University of California, Berkeley, and in London.

The study demonstrates that metallic helium is less rare than was previously thought and is produced under the kinds of conditions present at the centers of giant, gaseous planets, mixing with metal hydrogen and forming a liquid metal alloy.

"This is a breakthrough in terms of our understanding of materials, and that's important because in order to understand the long-term evolution of planets, we need to know more about their properties deep down," said Raymond Jeanloz, professor of astronomy and of earth and planetary science and one of the authors of the study. *"The finding is also interesting from the point of view of understanding why materials are the way they are, and what determines their stability and their physical and chemical properties."*

Jeanloz studies pressures tens of millions of times greater than Earth's atmospheric pressure - the kinds of forces felt inside Jupiter and Saturn, so called "gas giants" that lack a solid surface. The core of the Earth, which is small and dense compared to the cores of these gas giants, contains pressures of about 3.5 million times atmospheric pressure. Pressures at Jupiter's core, for example, reach 70 million times Earth's atmospheric pressure, the planet's massive size more than offsetting its low density. The cores of Jupiter and Saturn are a balmy 10,000 to 20,000 degrees Celsius, two to four times hotter than the surface of the sun.

In this study, Jeanloz and Lars Stixrude, earth sciences professor, took a closer look at what happens to helium under such extreme conditions.

Most studies of materials in gaseous planets have focused on hydrogen, Jeanloz said, because it is the predominant element of both these planets and the universe. But even though hydrogen is the lightest element, its behavior is fairly complicated due to its tendency to form molecules of two bonded hydrogen atoms, Jeanloz said. Jeanloz and Stixrude wanted to study a simpler element, to more easily understand the effects of extreme temperatures and pressure.

So, they picked helium, the second most abundant element, which comprises five to 10 percent of the universe. They used theories based on quantum mechanics to calculate the behavior of helium under different pressures and temperatures. Although these equations are only approximations, Stixrude said, the researchers' predictions closely matched experimental results for lower pressures.

Under Earthly conditions, helium is a colorless, see-through, electrically insulating gas. But under the kinds of pressure and temperature found at the centers of Jupiter and Saturn, the researchers found that helium turns into a liquid metal, like mercury. *"You can imagine this liquid looking like mercury, only less reflective,"* Jeanloz said.

The finding was a surprise, as scientists had assumed that high pressures and high temperatures would make metallization of elements such as helium more difficult, not easier, Jeanloz said. He and his colleagues had previously found that helium starts to have some metal-like qualities in experiments at extremely high pressure, but they have not yet been able to experiment with helium under the conditions found inside giant planets.

A metal's key characteristic is its ability to conduct electricity, meaning electrons can flow through it like water flowing unimpeded down a riverbed.

"High temperatures make the atoms jiggle around, and so people thought that raising the heat would deflect the electrons, like putting enough rocks in a stream to block the flow of water," Jeanloz said. *"The scattering caused by atoms was thought to make it harder for the electrons to flow down the stream."*

But it turns out that the atoms' jostling also creates new ways for the electrons to move, almost as if new crevices had opened in the ground for the river's flow, Jeanloz said.

Scientists recently discovered that hydrogen metalizes under lower temperatures and pressures than was previously appreciated. The dogma in the field was that the characteristics of hydrogen and helium were different enough that the two wouldn't mix inside giant gaseous planets, Jeanloz said. The researchers' findings, however, indicate that the two elements probably do mix, forming a metal alloy like brass, but liquid.

This finding also speaks to one of the many mysteries of these large planets, Stixrude said. More energy is emitted from Jupiter and Saturn than they absorb from the sun, and scientists don't understand where it comes from. One of the prevailing theories is that droplets of helium condense out of the planets' outer atmospheres and fall to their centers as "helium rain," releasing gravitational energy. But Jeanloz and Stixrude's findings show that helium and hydrogen are probably a more homogenous mix than was previously suspected, meaning that helium rain is unlikely. *"Now, we have to look elsewhere for this energy source,"* Stixrude said.

worshiped in the form of sea birds, which were his incarnation. His material symbol was a man with a bird's head.

The IAU is the international astronomical organization that brings together almost 10,000 distinguished astronomers from all nations of the world. Its mission is to promote and safeguard the science of astronomy in all its aspects through international cooperation. The IAU also serves as the internationally recognized authority for assigning designations to celestial bodies and the surface features on them. Founded in 1919, the IAU is the world's largest professional body for astronomers.



http://www.iau.org/public_press/themes/pluto/

<http://www.iau.org/>

<http://arxiv.org/abs/astro-ph/0702538v1>

<http://www.iau.org/static/archives/images/screen/iau0806a.jpg>

STUDY SHOWS CLUMPS & STREAMS OF DARK MATTER IN INNER REGIONS OF THE MILKY WAY

Findings suggest GLAST mission could detect evidence of dark matter particles. Using one of the most powerful supercomputers in the world to simulate the halo of dark matter that envelopes our galaxy, researchers found dense clumps and streams of the mysterious stuff lurking in the inner regions of the halo, in the same neighborhood as our solar system.

"In previous simulations, this region came out smooth, but now we have enough detail to see clumps of dark matter," said Piero Madau, professor of astronomy and astrophysics.

The results may help scientists figure out what the dark matter is. So far, it has been detected only through its gravitational effects on stars and galaxies. According to one theory, however, dark matter consists of weakly interacting massive particles (WIMPs), which can annihilate each other and emit gamma rays when they collide. Gamma rays from dark matter annihilation could be detected by the recently launched Gamma-ray Large Area Space Telescope (GLAST). "That's what makes this exciting," Madau said. "Some of those clumps are so dense they will emit a lot of gamma rays if there is dark matter annihilation, and it might easily be detected by GLAST."

Juerg Diemand, a postdoctoral fellow, said the simulation is based on the assumptions of "cold dark matter" theory, the leading explanation for how the universe evolved after the Big Bang. In a separate paper that has been accepted for publication in the *Astrophysical Journal*, the researchers used their findings to make specific predictions about the gamma-ray signals that would be detectable by GLAST. The lead author of this paper is Michael Kuhlen.

"There are several candidate particles for cold dark matter, and our predictions for GLAST depend on the assumed particle type and its properties," Diemand said. "For typical WIMPs, anywhere

FOURTH DWARF PLANET NAMED MAKEMAKE

The International Astronomical Union (IAU) has given the name Makemake to the newest member of the family of dwarf planets -- the object formerly known as 2005 FY9 -- after the Polynesian creator of humanity and the god of fertility.

Members of the International Astronomical Union's Committee on Small Body Nomenclature (CSBN) and the IAU Working Group for Planetary System Nomenclature (WGPSN) have decided to name the newest member of the plutoid family Makemake, and have classified it as the fourth dwarf planet in our Solar System and the third plutoid.

Makemake (pronounced MAH-keh MAH-keh) is one of the largest objects known in the outer Solar System and is just slightly smaller and dimmer than Pluto, its fellow plutoid. The dwarf planet is reddish in color and astronomers believe the surface is covered by a layer of frozen methane.

Like other plutoids, Makemake is located in a region beyond Neptune that is populated with small Solar System bodies (often referred to as the transneptunian region). The object was discovered in 2005 by a team from the California Institute of Technology led by Mike Brown and was previously known as 2005 FY9 (or unofficially "Easterbunny"). It has the IAU Minor Planet Center designation (136472). Once the orbit of a small Solar System body or candidate dwarf planet is well determined, its provisional designation (2005 FY9 in the case of Makemake) is superseded by its permanent numerical designation (136472) in the case of Makemake. The discoverer of a Solar System object has the privilege of suggesting a name to the IAU, which judges its suitability. Mike Brown says: "*We consider the naming of objects in the Solar System very carefully. Makemake's surface is covered with large amounts of almost pure methane ice, which is scientifically fascinating, but really not easily relatable to terrestrial mythology. Suddenly, it dawned on me: the island of Rapa Nui. Why hadn't I thought of this before? I wasn't familiar with the mythology of the island so I had to look it up, and I found Makemake, the chief god, the creator of humanity, and the god of fertility. I am partial to fertility gods. Eris, Makemake, and 2003 EL61 were all discovered as my wife was 3-6 months pregnant with our daughter. I have the distinct memory of feeling this fertile abundance pouring out of the entire Universe. Makemake was part of that.*" WGPSN and CSBN accepted the name Makemake during discussions conducted per email.

Makemake holds an important place in the Solar System because it, along with Eris and 2003 EL61, was one of the objects whose discovery prompted the IAU to reconsider the definition of a planet and to create the new group of dwarf planets. Visually, it is the second brightest transneptunian object, following after Pluto, and is bright enough to be seen through a high-end amateur telescope (a peak magnitude of roughly 16.5). Mike Brown explains: "*The orbit is not particularly strange, but the object itself is big. Probably about 2/3 the size of Pluto.*"

The other three dwarf planets are Ceres, Pluto and Eris. However, Ceres is not a member of the distinctive plutoid group because its orbit is smaller than Neptune's (Ceres is located in the asteroid belt between Mars and Jupiter).

The word Makemake is Polynesian in origin and is the name of the creator of humanity and the god of fertility in the mythology of the South Pacific island of Rapa Nui or the Easter Island. He was the chief god of the Tangata manu bird-man cult and was

from a handful to a few dozen clear signals should stand out from the gamma-ray background after two years of observations. That would be a big discovery for GLAST."

Although the nature of dark matter remains a mystery, it appears to account for about 82 percent of the matter in the universe. As a result, the evolution of structure in the universe has been driven by the gravitational interactions of dark matter. The ordinary matter that forms stars and planets has fallen into the "gravitational wells" created by clumps of dark matter, giving rise to galaxies in the centers of dark matter halos.

According to the cold dark matter theory of cosmological evolution, gravity acted initially on slight density fluctuations present shortly after the Big Bang to pull together the first clumps of dark matter. These grew into larger and larger clumps through the hierarchical merging of smaller progenitors.

This is the process that Diemand and Madau's team simulated on the Jaguar supercomputer at Oak Ridge National Laboratory. The simulation took about one month to run and followed the gravitational interactions of more than a billion parcels of dark matter over 13.7 billion years. Running on up to 3,000 processors in parallel, the computations used about 1.1 million processor-hours.

"It simulates the dark matter distribution from near the time of the Big Bang until the present epoch, so practically the entire age of the universe, and focuses on resolving the halo around a galaxy like the Milky Way," Diemand said. *"We see a lot of substructure, even in the inner part of the halo where the solar system is."*

The simulation revealed numerous subhalos and streams of dark matter within the halo of the Milky Way, and more substructure appears within each subhalo, Madau said. *"Every substructure has its own sub-substructure, and so on. There are lumps on all scales,"* he said.

The most massive of the subhalos would be likely to host dwarf galaxies such as those observed orbiting the Milky Way. By studying the motions of stars within dwarf galaxies, astronomers can calculate the density of the dark matter in the subhalos and compare that with the densities predicted by the simulation.

"We can make comparisons with the dwarf galaxies and stellar streams associated with the Milky Way. The appearance of these stellar systems is closely linked to the substructure of the dark matter halo," Diemand said.

The central densities in the simulated dark matter subhalos are consistent with the observations of stellar motions in dwarf galaxies, he said. But there remains a discrepancy between the number of dark matter subhaloes in the simulation and the number of dwarf galaxies that have been observed around the Milky Way. Some subhalos may remain dark if, for example, they are not sufficiently massive to support star formation, Madau said.

THE FIRST STARS

The universe began with the Big Bang about 13.7 billion years ago. Very soon after that event, the first stars formed. Today, those stars are dead and gone leaving little evidence of their size and composition behind. Now, a new computer simulation now offers the most detailed picture yet of how these first stars came into existence. These findings will be published by the journal *Science* on Friday, 1 August. The composition of the early universe was quite different from that of today, and the physics that governed the early universe were also somewhat simpler. Dr. Naoki Yoshida, and co-author Dr. Lars Hernquist, incorporated these conditions of the early universe, sometimes referred to as

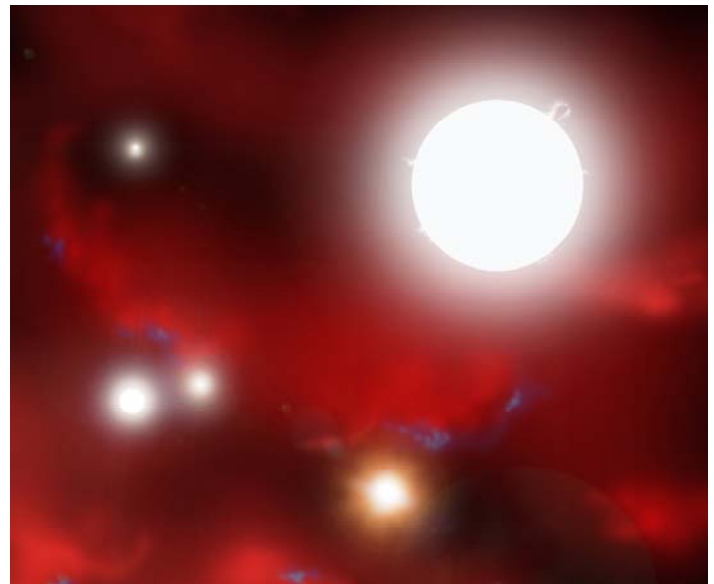
the "cosmic dark ages," to simulate the formation of an astronomical object that would eventually shine as a star.

According to their simulations, gravity acted on minute density variations in matter, gases, and the mysterious "dark matter" of the universe after the Big Bang in order to form the early stages of a star called a protostar. With a mass of just one percent of our Sun, Dr. Yoshida's simulation also shows that the protostar would likely evolve into a massive star capable of synthesizing heavy elements, not just in later generations of stars, but soon after the Big Bang. These stars would have been up to one hundred times as massive as our Sun and would have burned for no more than one million years.

"This general picture of star formation, and the ability to compare how stellar objects form in different time periods and regions of the universe, will eventually allow investigation in the origins of life and planets," said Hernquist.

"The abundance of elements in the Universe has increased as stars have accumulated," he says, *"and the formation and destruction of stars continues to spread these elements further across the Universe. So when you think about it, all of the elements in our bodies originally formed from nuclear reactions in the centers of stars, long ago."*

Their simulation of the birth of a protostar in the early universe signifies a key step toward the ambitious goal of piecing together the formation of an entire primordial star and of predicting the mass and properties of these first stars of the universe. More powerful computers, more physical data, and an even larger range will be needed for further calculations and simulations, but these researchers hope to eventually extend this simulation to the point of nuclear reaction initiation -- when a stellar object becomes a true star.



"Dr. Yoshida has taken the study of primordial star formation to a new level with this simulation, but it still gets us only to the halfway point towards our final goal. It is like laying the foundation of a skyscraper," said Volker Bromm, the author of a companion article. *"We must continue our studies in this area to understand how the initially tiny protostar grows, layer by layer, to eventually form a massive star. But here, the physics become much more complicated and even more computational resources are needed."* http://cfa-www.harvard.edu/press/2008/pr200814_images.html

prompting a rethinking of how our galaxy and others may have formed.

With powerful telescopes and sophisticated measurements, the team probed back in time to see the ancient universe as it existed some 8 to 9 billion years ago. Until now, a prevailing view in the astrophysical community has been that galactic magnetic fields gradually increased over cosmic time up to their present strengths and that in the nascent universe, magnetic fields were initially very weak. Astrophysicists explain this gradual growth of magnetism over time with the large-scale "galactic dynamo" model.

The current results extends a parallel, larger study of early magnetic fields. That study, whose contributors also included LANL colleagues David Higdon and Margaret Short, relied mostly on Faraday rotation measures (RM) taken at radio wavelengths, beyond what is visible to the human eye.

By measuring how far the radio waves were pulled toward the red end of the spectrum -- known as "redshift" -- Kronberg and his colleagues homed in on the location of magnetic fields in the distant universe.

What allowed the team to take a more detailed look at the ancient universe in this Nature letter was the addition of high-resolution optical spectra from the European Southern Observatory's 8-meter telescope, located in Chile's Atacama Desert. Their measurements at optical wavelengths of more than 70 quasars were combined with the RM data Kronberg has been collecting for more than 25 years -- data based on accurate radio RM measurements from several of the world's most powerful radio telescopes, including the Very Large Array near Socorro, New Mexico, and the 100-meter dish in Effelsberg, Germany.

"It was thought that, looking back in the past, earlier galaxies would not have generated much magnetic field," Kronberg said. *"The results of this study show that the magnetic fields within Milky Way-like galaxies have been every bit as strong over the last two-thirds of the Universe's age as they are now -- and possibly even stronger then."* Serving as a looking glass into the past, the powerful telescope at the European Southern Observatory, adding to the radio RM data, allowed the scientists to make observations of high magnetic fields between 8 billion and 9 billion years ago for 70 intervening galaxies whose faint optical absorption spectra revealed them as "normal" galaxies. That means that several billion years before the existence of our own sun, and within only a few billion years of the Big Bang, ancient galaxies were exerting the tug of these strong magnetic fields.

This research suggests that the magnetic fields in galaxies did not arise due to a slow, large-scale dynamo effect, which would have taken 5 billion to 10 billion years to reach their current measured levels. *"There must be some other explanation for a much quicker and earlier amplification of galactic magnetic fields,"* Kronberg said. *"From the time when the first stars and galaxies formed, their magnetic fields have probably have been amplified by very fast dynamos. One good possibility is that it happened in the explosive outflows that were driven by supernovae, and possibly even black holes in the very earliest generations of galaxies."* This realization brings a new focus on the broader question of how galaxies form. Instead of the commonly held view that magnetic fields have little relevance to the genesis of new galaxies, it now appears that they are indeed important players. If so, strong magnetic fields a long time ago are one of the essential ingredients that explain the very existence of our galaxy and others like it.

THE TRUE COLOR OF BLACK HOLE DISKS

A new observing technique reveals the spectral behavior of accretion disks around black holes in quasars. The central regions of active galaxies are thought to be powered by supermassive black holes accreting gas from their surrounds. An important ingredient of the so-called "standard model" of Active Galactic Nuclei or AGN is a massive accretion disk which is believed to be the source of most of the radiation from the AGN. Until recently, the presence of such accretion disks was only theoretically assumed. A team of astronomers, led by Makoto Kishimoto, found a clever way to get around observational problems caused by the dust environment of the nucleus. They could eliminate the influence of dust contamination by observing polarized emission directly from the central region of the AGN. Thus they could show that the spectrum of the central source is as blue as expected from theory, verifying a long-standing prediction about the intensely luminous radiation emitted by these accretion disks.

Quasars are the brilliant cores of remote galaxies, at the hearts of which lie supermassive black holes that can generate enough power to outshine the Sun a trillion times. These mighty power sources are fuelled by interstellar gas, thought to be sucked into the hole from a surrounding "accretion disk".

Such black holes and their accretion disks are thought to be in a messy environment -- surrounded by many clouds of dust. This has confused astronomers who tried to study the spectrum of the black hole vicinity -- the strong emission from these clouds badly contaminates their precious spectrum. *"Astronomers were puzzled by the fact that the most extensively studied models of these disks couldn't quite be reconciled with some of the observations, in particular, with the fact that these disks did not appear as blue as they should be,"* explains Makoto Kishimoto from MPIfR. However, an international team of astronomers, led by Kishimoto, found a clever way to get around this. Since the disk light is scattered in the vicinity of the disk and thus appears polarized, they could use the polarized light to separate the disk from the surrounding dust clouds.

For their observations in the infrared the researchers used polarizing filters at some of the largest telescopes on Earth -- one of the 8.2m VLT telescopes at the Paranal observatory of ESO in Chile as well as the United Kingdom Infrared Telescope (UKIRT) on Mauna Kea in Hawaii. This enabled them to get rid of emission from hot dust outside the accretion disk, and they could demonstrate that the disk spectrum is as blue as predicted.

Dr. Robert Antonucci, a fellow investigator, says: *"Our understanding of the physical processes in the disk is still rather poor, but now at least we are confident of the overall picture."* The disk behavior found in the paper is expected to originate in the outermost region of the disk, where important questions are yet to be answered: how and where the disk ends and how material is being supplied to the disk. *"In the near future, our new method may pioneer the way to address these questions,"* says Makoto Kishimoto.

ANCIENT GALACTIC MAGNETIC FIELDS STRONGER THAN EXPECTED

Mining the far reaches of the universe for clues about its past, a team of scientists including Philipp Kronberg of Los Alamos National Laboratory has proposed that magnetic fields of ancient galaxies like ours were just as strong as those existing today,

in front of it, to detect and study planets. This is followed up by extensive ground-based observations.

Monitoring COROT-exo-4b continuously over several months, the team tracked variations in its brightness between transits. They derived its period of rotation by monitoring dark spots on its surface that rotated in and out of view. It is not known whether COROT-exo-4b and its star have always been rotating in sync since their formation about 1000 million years ago, or if the star's rotation synchronized later. Studying such systems with COROT will help scientists gain valuable insight into star-planet interactions.

This is the first transiting exoplanet found with such a peculiar combination of mass and period of rotation. There is surely something special about how it formed and evolved.

The ground-based follow-up of the detection of COROT-exo-4b was carried out with the cross-dispersed echelle spectrograph, SOPHIE, on the 1.8-m telescope at the Observatoire de Haute Provence (France), the High Accuracy Radial velocity Planet Searcher, HARPS on the 3.6-m telescope at La Silla observatory (Chile) and the cross-dispersed echelle spectrograph, UVES on the 8.2-m Very Large Telescope at Paranal (Chile), the 1-m telescope at the Wise Observatory in Israel, the 1-m Euler telescope at La Silla, and the 3.6-m Canada-France-Hawaii telescope. COROT is a CNES project with ESA participation. The other major partners in this mission are Austria, Belgium, Brazil, Germany and Spain.

http://www.esa.int/esaCP/SEMSIFXIPF_index_1.html

SUN-LIKE STAR WITH EXOPLANET DISCOVERED

A team of scientists working with COROT spacecraft have discovered an exoplanet orbiting a star slightly more massive than the Sun. After just 555 days in orbit, the mission has now observed more than 50,000 stars and is adding significantly to our knowledge of the fundamental workings of stars.

The latest discovery, COROT-exo-4b is an exoplanet of about the same size as Jupiter. It takes 9.2 days to orbit its star, the second longest period for any transiting exoplanet ever found. The team has found that the star, which is slightly larger than our Sun, is rotating at the same pace as the planet's period of revolution. This is quite a surprise for the team, as the planet is thought to be too low in mass and too distant from its star, for the star to have any major influence on its rotation.



Launched in December 2006, COROT is the first space-based mission designed to search for exoplanets. Located outside Earth's atmosphere, the satellite is designed to detect rocky exoplanets almost as small as Earth. The satellite uses transits, the tiny dips in the light output from a star when a planet passes

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.

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In August's StarGazer:

- **** **ASTRO CALENDAR - UPCOMING ASTRONOMY EVENTS FOR 2008**
- **** **OBSERVER'S INFORMATION - SUN, MOON, AND PLANET VISIBILITY**
- **** **CONSTELLATIONS OF THE MONTH**
- **** **YOUNG ASTRONOMER'S CORNER**
- **** **ASTRONOMY "FUN FACTS"**
- **** **MIRROR IMAGES**
- **** **ASTRONOMY & TELESCOPE LINGO**
- **** **NEW PLUTO SCIENCE, TO BE CHECKED BY NEW HORIZONS WHEN IT ARRIVES AT PLUTO**
- **** **SPITZER REVEALS 'NO ORGANICS' ZONE AROUND PINWHEEL GALAXY M101**
- **** **CASSINI CONFIRMS LIQUID SURFACE LAKE ON TITAN - HYDROCARBON LAKE TRULY WET**
- **** **PHOENIX CONFIRMS MARTIAN WATER; MISSION IS EXTENDED**
- **** **MARS EXPRESS ACQUIRES SHARPEST-EVER IMAGES OF PHOBOS**
- **** **SATELLITES DISCOVER WHAT POWERS NORTHERN LIGHTS**
- **** **PHOENIX TEAM OPENS WINDOW ON SCIENTIFIC PROCESS**
- **** **JUPITER & SATURN ARE FULL OF LIQUID METAL HELIUM**
- **** **FOURTH DWARF PLANET NAMED MAKEMAKE**
- **** **THE FIRST STARS**
- **** **THE TRUE COLOR OF BLACK HOLE DISKS**
- **** **STREAMS OF DARK MATTER IN INNER REGIONS OF THE MILKY WAY**
- **** **ANCIENT GALACTIC MAGNETIC FIELDS STRONGER THAN EXPECTED**
- **** **SUN-LIKE STAR WITH EXOPLANET DISCOVERED**

<p>The next EAS Meeting is 7:00 P.M. Saturday August 16th at the 'Aurora Astro Products' store location at Silver Lake.</p>
