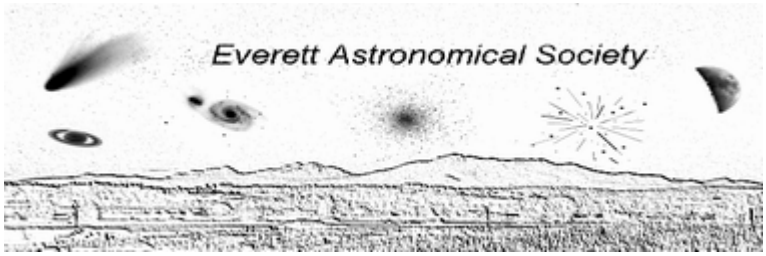
-

Volume MMVI. No. 4



The Stargazer

April 2006

President: Mark Folkerts	(425) 486-9733	folkerts at seanet.com	***The Stargazer***
VP & Librarian: Mike Locke	(425) 259-5995	mlocke at lionmts.com	**P.O. Box 12746**
Treasurer: Carol Gore	(360) 856-5135	janeway7C at aol.com	**Everett, WA 98206**
Newsletter co-editor: Bill O'Neil	(774) 253-0747	wonastrn at seanet.com	
Web assistance: Cody Gibson	(425) 348-1608	sircody01 at comcast.net	*See EAS website at:*
		(change 'at' to @ to send email)	http://members.tripod.com/everett_astronomy

EAS BUSINESS…

NEXT EAS MEETING - SATURDAY APRIL 22ND AT 3:00 PM AT THE EVERETT PUBLIC LIBRARY, IN THE AUDITORIUM (DOWNSTAIRS)

This month's presentation will be **'The Close Pass by Comet 73P-Schwassmann-Wachmann-3, and Spring Observing Targets'** by EAS president Mark Folkerts.

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

ASTRONOMY DAY 2006 INFO

Astronomy Day 2006:

We have lots of publicity with the announcement in the park catalog and other things this year, so expect a larger than average crowd. It will take almost everyone in the club to help out with Astronomy Day activities this year to handle this. We also are looking for anyone that may have a Hydrogen Alpha scope for daytime prominence viewing at the library.

http://www.members.tripod.com/everett_astronomy/astronomy_day.htm

Fri May 05 – Astronomy Day Friday Star Party at Harborview Park
Dusk (8:30 – midnight)

May 06 - Astronomy Day at the Everett Library
(10:00 am – 5:30 pm) - Solar Observing, displays, etc.

We really need volunteers here.

Sat May 06 – Astronomy Day Saturday Star Party at Harborview Park
Dusk (8:30 – midnight)

STAR PARTY INFO

Upcoming EAS star party schedule:

Fri May 05 – Astronomy Day Friday Star Party at Harborview Park
Sat May 06 – Astronomy Day Saturday Star Party at Harborview Park

People should send also mail to the mail list 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 Mike Locke at (425) 259-5995 for info or check the EAS website.) Members contact Mike Locke for scope borrowing.

Other Western US Star Parties this season:

Apr 27-30 – OAS Camp Delaney Spring Star Party
Camp Delaney – Sun Lakes State Park
http://www.olympicastronomicalsociety.com/
http://www.olympicastronomicalsociety.com/Documents/CAMP%20DELANY%20V2.pdf

Apr 23-30 - Texas Star Party (TSP)
http://www.texasstarparty.org/ Fort Davis TX

April 28-30 - Klickitat Messier Marathon 2006 Star Party
http://klickitatstarparty.net/ Goldendale WA

April 28-30 – Spring Star Quest 2006
at Quilchena Ranch, Quilchena, BC (north of Merritt)
http://www.merrittastronomical.com/fall2005.html

May 05 - ICAS May Monthly Star Party
Fort Nugent Park (2075 SW Fort Nugent Rd) Oak Harbor WA
Friday, dark-12 am
http://groups.msn.com/WashingtonICAS/2005starpartyschedule.msnw

May 06 - Rose City Astronomy Day - Rooster Rock State Park located 22 miles east of Portland on I-84 (east of Sandy River) at exit 25, starting at 7:30 pm. Parking is $3 per vehicle.
For possible weather cancellation, call (503) 797-4610 on May 6 after 3 PM for latest info.
http://www.omsi.edu/visit/planetarium/starparties.cfm

May 19 - Prineville Reservoir State Park Star Party
http://www.nightsky45.com/schedpage.html Prineville OR

May 26-28 - Klickitat May 2006 Star Party
http://klickitatstarparty.net/ Goldendale WA

May 26-29 – Fire In The Sky (FITS) 2006 Star Party
And Hi-Power rocket launching - Mansfield, WA
http://www.washingtonaerospace.org/fits2006.php

May 26-28 Riverside Telescope Makers Conference (RTMC)
http://www.rtmcastronomyexpo.org/ Riverside CA

Jun 10 – RCA Summer Solstice Celebration - Rooster Rock State Park located 22 miles east of Portland on I-84 (east of Sandy River) at exit 25, starting at 7:30 pm. Parking is $3 per vehicle. For possible weather cancellation, call (503) 797-4610 on June 10 after 3:00 PM to get the latest information.
http://www.omsi.edu/visit/planetarium/starparties.cfm

Jun 17-24 - Grand Canyon SP
http://www.tucsonastronomy.org/gcsp.html

Jun 21-26 - Shingletown Star Party 2006
http://www.shingletownstarparty.org/ Mt. Shasta, CA
Registration due May 1.

Jun 22-25 - The Rocky Mountain Star Stare (RMSS)
http://www.rmss.org/ Pike Nat Forest, Colorado Springs, CO

Jun 23-25 Craters Star Party
Craters of the Moon National Monument, ID
http://www.boiseastro.org/

Jul 08 – RCA Lunar Viewing - Rooster Rock State Park - located 22 miles east of Portland on I-84 (east of Sandy River) at exit 25, starting at 7:30 pm. Parking is $3 per vehicle. For possible weather cancellation, call (503) 797-4610 to get the latest information. http://www.omsi.edu/visit/planetarium/starparties.cfm

Jul 20-22 – Table Mt. Star Party (TMSP) 2006
http://www.tmspa.com/ Ellensburg WA

Jul 26-30 - Mt Bachelor Star Party (MBSP) 2006
http://www.mbsp.org/ Mt. Bachelor (Bend) OR

Jul 28-30 - Klickitat July 2006 Star Party
http://klickitatstarparty.net/ Goldendale WA

Jul 28-30 - Blue Mountain Star Party
http://www.tri-cityastronomyclub.org/bluemtn_starparty.htm Ukiah, OR

Aug 05-07 - Montana Starwatch, 2005 Great Falls, Montana
http://www.montana.edu/smasweb/swatch.html

Aug 11 - RCA Perseid Meteor Shower Watch - Rooster Rock State Park - located 22 miles east of Portland on I-84 (east of Sandy River) at exit 25, starting at 7:30 pm. Parking is $3 per vehicle. For possible weather cancellation, call (503) 797-4610 for latest info. http://www.omsi.edu/visit/planetarium/starparties.cfm

Aug 24-27 – Oregon Star Party (OSP) Ochocco NF
http://www.oregonstarparty.org/ Jul 28 reg deadline

Aug 19-Aug 27 - Mt. Kobau Star Party 2006
http://www.mksp.ca/ Mt. Kobau, BC

Aug 18-20 - Klickatat August 2006 Star Party
http://klickitatstarparty.net/ Goldendale WA

Aug 25-27 - Idaho Star Party
Bruneau Dunes State Park
http://www.boiseastro.org/

Sep 02 - RCA Autumnal Equinox Celebration - Rooster Rock State Park - located 22 miles east of Portland on I-84 (east of Sandy River) at exit 25, starting at 7:30 pm. Parking is $3 per vehicle. For possible weather cancellation, call (503) 797-4610 for latest info. http://www.omsi.edu/visit/planetarium/starparties.cfm

Sep 20-23 - The Enchanted Skies Star Party 2006
http://www.socorro-nm.com/starparty/ Socorro NM

Sep 22-24 - Klickatat September 2006 Star Party
http://klickitatstarparty.net/ Goldendale WA

Sep 22-24 - Craters Star Party -
Craters of the Moon National Monument, ID
http://www.boiseastro.org/

Sep 21-24 - Alberta Star Party 2006
http://calgary.rasc.ca/asp2006.htm

Sep 21-23 - California Star Party (CAS)
San Jose Astronomical Association 2
Lake San Antonio Park http://www.sjaa.net/

Oct 20-22 - Klickatat October 2006 Star Party
http://klickitatstarparty.net/ Goldendale WA

Oct 19-22 - Annual Nightfall (RTMC)
Riverside, CA

Nov 08 – RCA observing of the Mercury Transit
OMSI East Parking Lot, Portland OR
http://www.omsi.edu/visit/planetarium/starparties.cfm

$$ - FINANCIAL HEALTH - $$

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

CLUB SCOPES

SCOPE	LOAN STATUS	WAITING
10-INCH DOBSONIAN	ON LOAN	NO WAIT LIST

EAS members: contact Mike Locke at (425) 259-5995 or 'mlocke at lionmts.com' to borrow a scope.

ASTRO CALENDAR FOR 2005

April 2006

Apr 22 - Lyrids meteor shower peak
Apr 22 – April EAS Meeting – 3:00 PM at Everett Public Library
Apr 27-30 OAS Camp Delaney Spring Star Party – EAS invited
Apr 29 – SAS/UW Astronomy Open House – Talk by Dr.Brownlee

May 2006

May 04 - Jupiter at Opposition
May 05 – Astronomy Day Friday Star Party at Harborview Park
May 06 - Astronomy Day at the Everett Library
May 06 – Astronomy Day Saturday Star Party at Harborview Park
May 05 - Eta Aquarids meteor shower peak
May 14 - Griffith Observatory reopens
May xx – May EAS Meeting – 3:00 PM at Everett Public Library

June 2006

Jun 17 – June EAS Meeting – 3:00 PM at Everett Public Library
Jun 21 - Summer Solstice, 12:26 UT

UW Astronomy 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).

OVER THE AIRWAVES

"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 LIBRARY – BOOK & VIDEO LIST

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 mlocke at lioninc.com, to borrow or donate any materials. See list here: http://members.tripod.com/everett_astronomy/eas_library.htm

MEMBERSHIP BENEFITS & INFORMATION

Membership in the **Everett Astronomical Society** (EAS) will give you access to all the material in the lending library. The library, which is maintained by Mike Locke, consists of several VCR tapes, many books, magazines, and software titles. Membership includes invitations to all of the club meetings and star parties, plus the monthly newsletter, ***The Stargazer.*** In addition you will be able subscribe to ***Sky and Telescope*** for $7 off the normal subscription rate, contact the treasurer for more information. Link to registration form: 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 will renew your *Sky and Telescope* subscription for you. **Astronomy** magazine offers a similar opportunity to club members.)

EAS is a member of the **Astronomical League** and you will receive the Astronomical League's newsletter, ***The Reflector***. Being a member also allows you the use of the club's telescopes, an award winning 10 inch Dobsonian mount reflector. Contact Mike Locke (425) 259-5995 to borrow a telescope. EAS dues are $25.
Send your annual dues to the **Everett Astronomical Society**, P.O. Box 12746, Everett, WA 98206. Funds obtained from membership dues allows the Society to publish the newsletter, pay Astronomical League dues and maintain our library.

OBSERVER'S INFORMATION…

LUNAR FACTS

Apr 21	Last Quarter Moon
Apr 27	New Moon
May 05	First Quarter Moon
May 13	Full Moon
May 20	Last Quarter Moon
May 27	New Moon
Jun 03	First Quarter Moon
Jun 11	Full Moon
Jun 18	Last Quarter Moon
Jun 25	New Moon
Jul 03	First Quarter Moon
Jul 11	Full Moon

Digital Lunar Orbiter Photographic Atlas of the Moon

The Lunar and Planetary Institute has created a digital version of the Lunar Orbiter Photographic Atlas of the Moon, and Consolidated Lunar Atlas available online at:
http://www.lpi.usra.edu/research/cla/menu.html
http://www.lpi.usra.edu/research/lunar_orbiter

UP IN THE SKY -- THE PLANETS

Object	Rises	Transits	Sets	Con	Mag
Sun	**6:07 am**	**13:97**	**20:08**	**Ari**	**-27.5**
Mercury	5:35 am	Daylight	Daylight	**Cet**	**+0.1**
Venus	**04:44 am**	Daylight	Daylight	**Aqr**	**-4.2**
Mars	Daylight	Daylight	**1:36 am**	**Tau**	**+0.8**
Jupiter	**21:04**	**2:02 am**	6:55 am	Lib	**-2.5**
Saturn	Daylight	**20:31**	**3:13 am**	**Can**	**+0.2**
Uranus	**4:36 am**	Daylight	Daylight	Aqr	+5.9
Neptune	**3:31 am**	Daylight	Daylight	**Cap**	**+8.0**
Pluto	**00:02 am**	**4:53 am**	Daylight	**Ser**	**+13.9**

(times local time for Everett PST)

Transit times for Jupiter's Great Red Spot in 2006

http://skyandtelescope.com/observing/objects/planets/article_107_2.asp

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 –
http://spaceflight.nasa.gov/realdata/sightings/SSapplications/Post/SightingData/Seattle.html or also see link http://www.heavens-above.com/PassSummary.asp?lat=47.979&lng=-122.201&alt=0&loc=Everett&TZ=PST&satid=25544

MEMBER NEWS

Seattle Astro Society Trying To Get a Dark Sky Site

"We feel that we need to raise $25,000 in order to buy something appropriate on the other side of the mountains. We are making good progress within SAS. The deal basically is $250 for dark sky membership, and some relatively nominal sum for annual dark sky dues. One would have to be a SAS member to do this, but that is a rather nominal charge. We were wondering if anyone in your club would be interested in taking part. I personally think that the dark sky site is a necessary thing for SAS to do; otherwise, the club really has little tangible to offer its members. With a dark sky site, even city-bound members would have a place within a few hours where they could view from a dark site; even us suburban folks would benefit, I think. The SAS has reached about 60% of the goal so far, and the pace is picking up. Thanks for your consideration."
-- Mark de Regt, SAS.

The Northwest Region of the Astronomical League (NWRAL) is putting together a new website. We are in need of 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. NRWAL would like a brief history of the club

- Club established date
- Who started the club
- When club joined the Astronomical League.

Meade SCT Supergiant Field Tripod – For Sale

"I am a retired professional astronomer (Ph.D., U. of Washington, 1973) now living near Sequim on the Olympic Peninsula.
I am building an observatory to house a Meade LX-200 16" GPS telescope which was the demonstrator model at the Riverside Star Party in California last year. The telescope deal included the supergiant field tripod that I do not need, since the telescope will be mounted on a permanent steel pier. It is still situated in its original unopened shipping crate from Meade, and I would be willing to sell it for less than half of its original price."

- Dick Schwartz
  protostellarjet@yahoo.com
  (360) 683-2948

ASTRONOMY ANNUAL OPEN HOUSE

SATURDAY APRIL 29, 1 - 4 PM,
U.W.'S PHYSICS-ASTRONOMY BUILDING.

Astronomy Prof. Don Brownlee, Project Scientist for the Stardust Mission, will give a special talk on the exciting mission and his newest results. This will be popular, may need to register in advance..
April 29, **4-5:30 PM, Kane Hall 120**.

CONSTELLATIONS OF THE MONTH - ARA

ARA: Ara, "the Altar", is a Southern Hemisphere constellation, and borders on the constellations of Apus, Corona Australis, Norma, Pavo, Scorpius, Telescopium, and Triangulum Australe. There are no established asterisms within its borders, nor is the constellation known for any meteor showers; it also contains no Messier objects. Ara ranks 34th in overall brightness among the constellations, but only 63rd in size: it takes up approximately 237.06 square degrees (0.575%) of the sky. Ara is completely visible from latitudes South of +22 degrees, and completely invisible from latitudes North of +45 degrees. It has 19 stars brighter than magnitude 5.5, and its central point is at RA=17h18m, Dec.= -56.5 degrees. The midnight culmination date of Ara is June 10th, and the solar conjunction date is December 9th.

Some of the nearest stars to our Sun are contained within the borders of this small constellation. These include LFT 1351 (the 30th closest to our Sun; apparent magnitude of 9.4; absolute magnitude of 11.0; light-year distance: 15.09); 41 Ara A-B (103rd closest system: 41 Ara-A: apparent magnitude of 5.5; absolute magnitude of 6.1; light-year distance: 24.89; 41 Ara-B: apparent magnitude of 8.7; absolute magnitude of 9.3; light-year distance: 24.89); and LFT 1297 (167th closest: apparent magnitude of 14.4; absolute magnitude of 14.5; light-year distance of 31.05).

In addition to being known for many multiple and double (such as Gamma Arae) star systems, as well as many variable stars (such as the eclipsing binary R Arae and the long-period variable X Arae), Ara contains two special deep sky objects of note within its confines. Lying at a distance of "only" about 8,400 light years, and with a visual magnitude of 7.5, NGC-6397 is most likely the nearest globular cluster to our solar system. The other object of note, the beautiful diffuse nebula NGC 6188, is located near the central line of the Milky Way Galaxy. NGC-6188 is located about 7 degrees south and west of Zeta Scorpii. The brightest portion of the nebula, discovered by John Herschel in 1836, has an irregular triangular shape. The illumination for the entire nebula is supplied by the massive stars of the galactic star cluster NGC-6193, a grouping itself about 15 light years in diameter (the brightest star in this grouping is the visual double h4876, an O-type giant star with a probable actual luminosity of about 3,000 suns.) The dark areas of this nebula are bordered by brighter rims which appear to reflect the glare of the involved stars, making an entire scene reminiscent of the Horsehead Nebula in Orion. Some experts have proposed that these bright-rim nebulae mark the leading edge of advancing shock waves as the dark cloud expands and sweeps up interstellar gas and dust. First observed by Lacaille in 1755, NGC-6397 is located on the left edge of the Milky Way, about 10.5 degrees south of Theta Scorpii; again, studies indicate that it may be the closest of all globulars to our Solar System. This globular is easily resolved in smaller scopes because of its relatively scattered structure. Burnham states that this lesser known cluster actually resembles the much better-known M4 in Scorpius in structure, brightness, and apparent size. The integrated spectral type of this cluster is F5 and the radial velocity is about 6.5 miles per second in recession. An odd feature of NGC-6397 is the likely absence of short-period pulsating variables which are often found in globulars. For example, Omega Centauri contains over 160, and M3 has almost 200. The brightest members of NGC-6397 are red giants of about 500 times the luminosity of the Sun; the total luminosity of the cluster is about 8,000 times the light of the Sun, and is therefore much fainter than many other globular clusters. The true diameter of the cluster is somewhere around 50 light years.

TRIANGULUM AUSTRALE: The Southern Triangle. Also a Southern Hemisphere constellation, this constellation borders on Apus, Ara, Circinus, and Norma. The asterism of the "Three Patriarchs" exists within its borders. Its central point is at RA=15h59m and Dec.= -65 degrees. It has one fairly famous named star: Atria, and three bright stars (alpha, beta, and gamma), and no stars in close proximity to our Sun. This constellation contains no Messier objects or meteor showers; it is completely visible from latitudes South of + 20 degrees, and is completely invisible from latitudes North of +30 degrees. Its midnight culmination date is May 23, and its solar conjunction date is November.

YOUNG ASTRONOMER'S CORNER

The Young Astronomer's Corner periodically asks some questions that young people may be seeking an answer to. Here are some such questions about astronomy and space exploration:

Q. Why should we build a space station?

A. The simple answer is that if humans are going to explore outer space, we need to know a lot more information about it. Space has no air to breathe and a micro-gravity atmosphere. The space shuttle and space station missions allow astronauts and cosmonauts to conduct many useful experiments in the weightlessness of space; but because shuttle missions are only about 2 weeks in duration, the longer orbiting time for the space station would allow longer time for some important experiments to be conducted. These include the long-term effects of weightlessness on humans, certain medical and laboratory experiments (including crystal, food and plant growth) and the effects of living in close, cramped quarters over long periods of time. By studying issues such as these in space, we can prepare perhaps for a future colony on the Moon and perhaps on another planet, as well as gain a fuller appreciation and knowledge of our life here on Earth.

Q. How long do stars live?

A. When a star is born from a large cloud of gas and dust, its size determines how long it will live. In general, the smaller the star, the longer it will live. Smaller stars with very low mass make helium from hydrogen (also known as fusion) very slowly. These stars tend to be cooler and thus redder in appearance, and burn for trillions(!) of years before they use all of their hydrogen found in the core. Medium sized stars, like our Sun, burn faster however. Because they are larger, there is more pressure from gravity in their cores, which causes nuclear fusion reactions to happen more quickly: they use up their hydrogen fuel more quickly. Stars such as the size of our Sun live for a few billion years. The most massive stars are generally the hottest and most unstable; they 'die' from processes such as a collapse from their own weight to form supernovae, neutron stars, and/or pulsars for example; these largest stars die within 'only' a few million years. In general, when it comes to stars, the bigger you are, the shorter your life.

Q: Which planet has the largest moon?

A: Jupiter. The name of the moon is Ganymede, and it also happens to be the largest moon in the entire solar system. It is 3,166 miles in diameter, and is thus larger than the planets Mercury (2,930 miles diameter) and Pluto (1,380 miles diameter). By comparison, Earth's Moon is 2,086 miles in diameter.

ASTRONOMY AND TELESCOPE LINGO

ASTRONOMY LINGO: ***JUPITER-CROSSER:*** A very rare type of asteroid whose orbit crosses the orbit of Jupiter; the gravitational influence of Jupiter makes this type of orbit very short-lived.

TELESCOPE LINGO: ***RADIO HELIOGRAPH:*** A telescope designed for mapping the sun in radio wavelengths.

PLANETARY FOCUS

"Planetary Focus" is a periodic column that is published occasionally in the EAS "Stargazer". If you have a favorite planet that you would like similar information and/or statistics on, please contact newsletter co-editor Bill O'Neil. This column will return for the warm-weather months, beginning in May, in time for observing season.

ASTRONOMY FUN FACTS

★★ T-Tauri stars, named after the first to be discovered in the constellation Taurus, are newly born or created stars, and are always associated with giant gaseous nebulae from which they arise. The luminosities of these stars vary erratically, most probably because they are still growing and accumulating material before they reach the more stable main-sequence state. The prototype star T-Tauri is expected to evolve to main-sequence status about 10 million years from now, at about the same time when a long succession of earthquakes along the California San Andreas fault will have moved Los Angeles essentially to the latitude of San Francisco!!

★★ Sirius B (a companion of the brightest star in all the sky after the Sun: Sirius) is the first white dwarf to be discovered, and lies at a distance from Earth of about 9 light-years. Even though smaller than Earth, all its matter weighs almost as much as the Sun…as a matter of fact, just a handful of its matter would weigh about 500 tons!

★★ Any globular cluster that contains 1 million stars would have more stars packed within its volume than anywhere else in the Galaxy except the galactic core. If each star in the cluster could be represented by a 1-inch diameter golf ball, the entire cluster could be contained in a spherical volume with a diameter of 10,000 miles, and the average separation between golf balls could still be 100 miles. Even in the most densely packed globular cluster cores, the golf balls would still have 33 miles separation between them. This is comparable to your next-door neighbor living 40,000 miles away (if the Earth were big enough!!).

MIRROR IMAGES

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

CLASS OF OBJECT: B-STARS: Massive hot blue ultraviolet stars of spectral type B that have surface temperatures of about 10,000 to 28,000 Kelvin for main-sequence stars and up to 30,000 Kelvin for supergiants. Absorption lines of neutral helium (He-I) dominate the spectrum. Balmer lines of hydrogen intensify

from B-0 to B-9, with lines of ionized magnesium and silicon also present. Some B-stars – the B-E stars - have emission lines emanating from a circumstellar shell of gas. B-0, B-1, and B-2 stars are found in OB associations (groups of highly luminous and massive main-sequence stars of spectral types O and B) found in the gas and dust-rich areas of the spiral arms of galaxies.

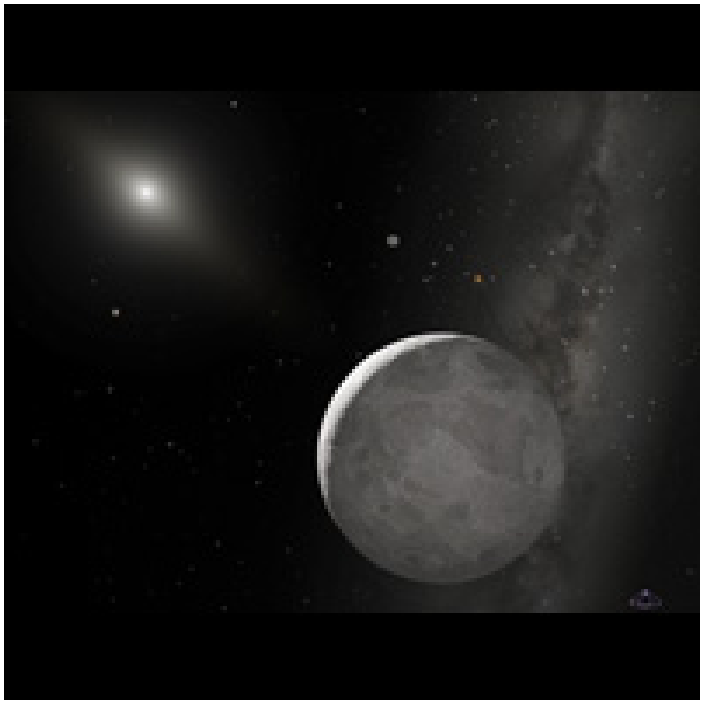
REPRESENTATIVE NORTHERN HEMISPHERE OBJECT: *BELLATRIX:* A remote very luminous blue-white giant that is the third brightest star in the constellation of Orion (as we face Orion and he "looks" at Earth, his sword (the Great Orion Nebula) hangs down on his right (our left); Bellatrix is thus the bright star we see in his opposite (to the sword), or left, shoulder (Betelgeuse is thus his *right* shoulder). Bellatrix has a visual magnitude of 1.6; spectral type B-2-III; and a distance of 110 parsecs.

REPRESENTATIVE SOUTHERN HEMISPHERE OBJECT: *ALPHA CRUCIS:* The brightest in the constellation Crux, this bright white star is actually a visual binary with a separation of 4"; both components are spectroscopic binaries. The visual magnitude of component A is 1.3; component B is 1.7; together their visual magnitude is 0.76. The spectral type of component A is B-1 (IV) and component B is B-1 (V); the distance to the system is 160 parsecs.

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

HUBBLE FINDS THAT THE 'TENTH PLANET' IS SLIGHTLY LARGER THAN PLUTO

The Hubble Space Telescope has resolved the "tenth planet," nicknamed "Xena," for the first time and has found that it is only just a little larger than Pluto. Though previous ground-based observations suggested that Xena was about 30 percent greater in diameter than Pluto, Hubble observations taken on Dec. 9 and 10, 2005, yield a diameter of 1,490 miles (with an uncertainty of 60 miles) for Xena. Pluto's diameter, as measured by Hubble, is 1,422 miles. Xena is officially catalogued as 2003 UB313.



http://hubblesite.org/news/2006/16 http://www.nasa.gov/hubble

SCIENTISTS ANALYZE SOLAR WIND FROM MOON ROCK

Scientists preparing for the analysis of solar wind samples from the Genesis mission believe they have already measured solar wind particles in an analysis of lunar soil.

In a recent issue of Nature, Dr Trevor Ireland and his team detail how they found particles in which oxygen isotope measurements did not fit those of the moon, the planets, or of the earliest of meteorites. *"It was a completely unexpected result for us. We are confident that this represents the solar wind, but by no means certain,"* Dr Ireland said. *"The real question our finding raises is why this solar composition appears unrelated to the composition of the planets, the largest rocky bodies in the solar system, or to refractory inclusions from meteorites which have been regarded as solar condensates. Further study of samples from the Genesis mission may have the answers."*

Dr Ireland said that it was likely the particles identified with the low oxygen abundance contained solar wind because the moon -- where these samples came from -- is continuously buffeted by the solar wind, which is essentially made up of charged particles ejected by the Sun. The composition of the Sun is expected to provide significant clues as to the history of the solar system. Our planetary system represents less than 1 per cent of the mass of the solar system and any differences between the planets and the Sun must represent processes that operated in the early solar system, or represent a different mix of components.

The Genesis mission has returned to Earth samples of the solar wind for analysis. It aims to obtain precise measure of solar isotopic abundances such as oxygen, nitrogen, and noble gases. To date, the isotopic composition of the Sun has been inferred for some elements from lunar samples, but not oxygen because of its high abundance in lunar minerals.

However, using the high-resolution, high-sensitivity ion microprobe developed at ANU, called SHRIMP, the team were able to get an accurate measurement of the solar oxygen isotopes in iron metal grains. "In many ways, our measurements were our first attempt at scoping the experimental difficulties we might have in measuring the Genesis samples and we had no way of knowing beforehand that they would be analytically so successful," Dr Ireland said.

Dr Ireland said further analysis of oxygen from other solar system bodies, such as from Jupiter's atmosphere and from comets, would provide a greater comparative base for studies of the composition of the Sun. "Perhaps the oxygen isotopes we found are simply telling us that the mix of components in the Sun is different to that in the planets, particularly in regard to the amount of dust versus gas. The Sun sources much of its oxygen from carbon monoxide, which is essentially lacking from the planetary bodies, which are derived from primordial dust," Dr Ireland said. http://info.anu.edu.au/mac/Media/Media_Releases/_2006/_images

A NEW SPIN ON VEGA; ONE OF BRIGHTEST STARS IS RAPIDLY ROTATING

Vega, the second brightest star in the northern sky, is a 'standard' that has been used to calibrate astronomical observations from the ultraviolet through to the infrared, and it is the main star against which models of stellar atmospheres are compared. But problems with its use as a standard led to the suggestion that it is rapidly rotating -- a theory that has now been confirmed by a researcher.

Deane Peterson and colleagues now confirm that Vega, the 5th brightest star overall in the universe, is rotating so fast that if it sped up by just 10 per cent it would spin to pieces, according to

research published in this week's edition of the scientific journal Nature. Vega is flattened significantly by the rotation, which means that the temperature at the star's surface varies hugely, being over 2,400 degrees Celsius hotter at the poles (around 10,000 degrees Celsius) than at the equator, because the equator is farther from the energy-generating center.

This behavior hasn't been obvious previously because it was obscured by Vega's orientation: its polar axis points more or less straight at the Earth. The new results imply that both Vega's elemental composition and its age may be rather different to what has been inferred until now. In addition, Peterson said the star is "*brighter than it should be*" and puts out more energy in the infrared than it should.

"*The large impact of this particular result is because Vega is the primary standard for a lot of different things in Astronomy*," Peterson said. "*Vega is observed more than any star except the Sun, mostly in the role of comparison. This won't change that role, but will affect how people think about the objects they compare to Vega. The changes will generally be subtle, but the use of Vega in this role is so pervasive that these results will ripple through most of the discipline*."

NEW LUNAR ROCK AGES INDICATE CATACLYSMIC METEORITE BOMBARDMENT OF MOON, EARTH

New age measurements of lunar rocks returned by the Apollo space missions have revealed that a surprising number of the rocks show signs of melting about 3.9 billion years ago, suggesting that the moon -- and its nearby neighbor Earth -- were bombarded by a series of large meteorites at that time. The idea that meteorites have hammered the moon's surface isn't news to scientists. The lunar surface is pock-marked with large craters carved out by the impact of crashing asteroids and meteorites, said Robert Duncan of Oregon State University. Results of the study are being published in the journal of the international Meteoritical Society. Co-authors with Duncan are Marc Norman and John Huard, also an oceanographer at OSU.

But the narrow range of the impact dates suggests to researchers that a large spike in meteorite activity took place during a 100-million year interval -- possibly the result of collisions in the asteroid belt with comets coming from just beyond our solar system.

Tiny melted fragments from the lunar rocks were dated at a noble gas geochronology laboratory at Oregon State. Duncan and Huard were able to use radiometric dating techniques to determine when the rocks had melted after being struck by meteorites. What is particularly intriguing, Duncan says, is that this apparent spike in meteorite activity took place about 3.8 to 4 billion years ago -- an era that roughly coincides with when scientists believe life first began on Earth, as evidenced by the fossil record of primitive one-cell bacteria.

It is possible that life was introduced to Earth from one of these meteorites, Duncan said. Or it could have developed spontaneously once the bombardment subsided, or developed beneath the ocean near life-nurturing hydrothermal vents. The lack of evidence on Earth makes the analysis of moon rocks much more compelling. The meteorite activity that bombarded the moon likely struck our planet as well. "*Unfortunately, we haven't found many very old rocks on Earth because of our planet's surface is constantly renewed by plate tectonics, coupled with erosion,"* Duncan said. "*By comparison, the moon is dead, has no atmosphere and provides a record of meteorite bombardment that we can only assume is similar to that on Earth.*"

When the solar system was formed, scientists say, it spun away from the sun like a huge, hot disk that subsequently condensed into planets. At least nine planets survived, sucking in loose space matter from around them. Those planets closer to the sun were more solid, while those farther away were comprised primarily of gases. Over time, the space debris has lessened, either being gravitationally collected into the planets, or smashed into cosmic dust through collisions with other objects. The discovery of this apparent spike in meteorite activity suggests to the authors that a major event took place. "*We may have had a 10th and 11th planet that collided*," Duncan said, "*or it's possible that the outward migration of Neptune may have scattered comets and small planet bodies, inducing collisions in the asteroid belt. The close passing of a neighboring star could have had a similar effect*."

Duncan and his colleagues examined about 50 different rock samples scooped up by astronauts on the Apollo missions. All but a few of them produced ages close to 3.9 billion years and they exhibited different chemical "fingerprints," indicating that they had melted from different meteorites and lunar surface rocks. "*The evidence is clear that there was repeated bombardment by meteorites*," Duncan said.

When meteorites collide with the moon, the surface rock and the meteorites partially melt, and then turn to glass. After the glasses quenched, they slowly began to accumulate argon gas that scientists can measure and calculate from the known isotopic decay rate (from potassium) to determine age.

"*The formation of glass from the melting is like starting a clock*," Duncan said. "*It resets the time for us to determine billions of years later*." Duncan and his colleagues say the intense bombardment ended about 3.85 billion years ago, and there has been a slowly declining pattern of meteorite activity since. Many of the prominent craters found on the moon date back to that era, including Imbrium, at 3.84 billion years; Serenitatis, 3.89 billion years; and Nectaris, 3.92 billion years. Many of the moon's craters are 10 to 100 kilometers across and scientists say that meteorites of that size or larger may have struck the Earth in the past. Such meteorites impacts may have been responsible for the extinction of dinosaurs 65 million years ago, and a mass extinction that wiped out an estimated 75 percent of the Earth's plant and animal species 250 million years ago.

However, Duncan said, these mass extinctions could also be linked to climate, disease and volcanism -- or a combination of such factors. "*It is clear that there was a spike of meteorite activity on the moon about 3.9 billion years ago, and that it lasted for roughly 100 million years*," Duncan said. "*The moon provides important information about the early history of our solar system that is missing from the Earth's geologic record*."

MERCURY'S FORMATION IMPACT SPLATTERED EARTH WITH MATERIAL

New computer simulations of Mercury's formation show the fate of material blasted out into space when a large proto-planet collided with a giant asteroid 4.5 billion years ago. The simulations, which track the material over several million years, shed light on why Mercury is denser than expected and show that some of the ejected material would have found its way to the Earth and Venus. "*Mercury is an unusually dense planet, which suggests that it contains far more metal than would be expected for a planet of its size. We think that Mercury was created from a larger parent body that was involved in a catastrophic collision, but until these simulations we were not sure why so little of the*

planet's outer layers were reaccreted following the impact," said Dr Jonti Horner.

To solve this problem, Dr Horner and his colleagues ran two sets of large-scale computer simulations. The first examined the behavior of the material in both the proto-planet and the incoming projectile; these simulations were among the most detailed to date, following a huge number of particles and realistically modeling the behavior of different materials inside the two bodies. At the end of the first simulations, a dense Mercury-like body remained along with a large swathe of rapidly escaping debris. The trajectories of the ejected particles were then fed in to a second set of simulations that followed the motion of the debris for several million years. Ejected particles were tracked until either they landed on a planet, were thrown into interstellar space, or fell into the Sun. The results allowed the group to work out how much material would have fallen back onto Mercury and investigate other ways in which debris is cleared up in the Solar System. The group found that the fate of the debris depended on whereabouts Mercury was hit, both in terms of its orbital position and in terms of the angle of the collision. While purely gravitational theory suggested that a large fraction of the debris would eventually fall back onto Mercury, the simulations showed that it would take up to 4 million years for 50% of the particles to land back on the planet and in this time many would be carried away by solar radiation. This explains why Mercury retained a much smaller proportion than expected of the material in its outer layers.

The simulations also showed that some of the ejected material made its way to Venus and the Earth. While this is only a small fraction, it illustrates that material can be transferred between the inner planets relatively easily. Given the amount of material that would have been ejected in such a catastrophe, it is likely that there is a reasonable amount (possibly as much as 16 million billion tons [1.65x10^19 kg]) of proto-Mercury in the Earth.
http://www.ras.org.uk/images/stories/press/protomercury_formation1.jpg
http://www.ras.org.uk/images/stories/press/protomercury_formation2.jpg
http://www.ras.org.uk/images/stories/press/protomercury_formation3.jpg

CASSINI IMAGE AT SATURN SHOWS 'A' RING CONTAINS MORE DEBRIS THAN ONCE BELIEVED

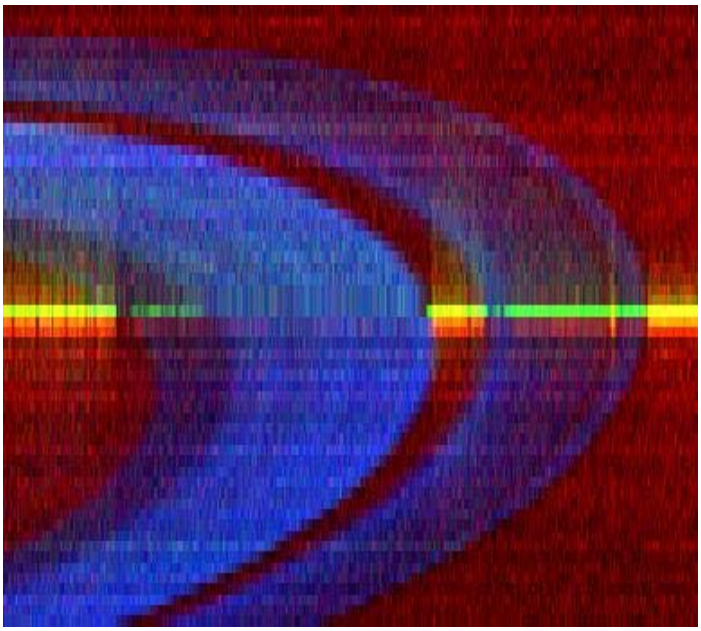
Views of Saturn's stunning ring system from above, by the Cassini-Huygens spacecraft now orbiting the planet, indicate the prominent A ring contains more debris than once thought, according to a new study. Previous observations with the Voyager spacecraft in the early 1980s found the ring was more transparent, indicating less material, said Joshua Colwell. But new calculations based on May 2005 observations with Cassini's Ultraviolet Imaging Spectrograph, or UVIS, indicates the opacity of the ring is up to 35 percent higher than previously reported. Because of the uneven distribution of the ring particles -- which range in size from dust grains to school buses -- the transparency of the rings depends on the angle from which they are viewed, he said. The particles are arranged essentially parallel in long stringy clumps as large as 60 feet across, 16 feet thick and 160 feet long, according to models produced from observation data, said Colwell.

A paper on the subject by Colwell, Larry Esposito and Miodrag Sremcevic appears in the April 1 issue of Geophysical Research Letters. Esposito is science team leader for UVIS, a $12.5 million instrument that is riding on the Cassini spacecraft.

A new image released by the team in conjunction with the paper shows the distribution of the ring material. The opaque B ring has more material than the A ring, located just outside it, and the A ring is densest near its inner edge, according to the team. The new clumps observed by Cassini mean a larger amount of material overall said Colwell, a UVIS science team member.

The particles are trapped in ever-changing clusters of debris that are regularly torn apart and reassembled by gravitational forces from the planet, Colwell said. The size and behavior of the clusters were deduced by observing flickering light as the ring passed in front of *a star in a process known as stellar occultation, he said. "The flickers are like a time-lapse movie of a car's headlights taken from the other side of a picket fence*," said Colwell. "*The flickering would provide us details about the pickets*."

The observations of the particle clusters indicate the A ring is primarily empty space. A close-up view of the rings would show as "*short, flattened strands of spiral arms with very few particles between them*," he said.



http://saturn.jpl.nasa.gov UV spectrograph home page
http://lasp.colorado.edu/cassini

NEW SOLAR TWIN COULD SHED LIGHT ON ANOTHER EARTH

Astronomers have discovered a nearby solar twin which may shed light on the search for planets that are similar to Earth and that may even support life. HD98618 is only the second star found so far that is almost identical to the Sun in age, size, temperature and chemistry, according to the researchers Dr Jorge Meléndez, Ms Katie Dodds-Eden and Mr José Robles. "*This solar twin doesn't only have the same mass as the Sun, it was also formed with the same 'chemical recipe'. So this star was equipped in the same way as the Sun to form Earth-like planets*," Mr Robles said. "*Hopefully, as new planet finding techniques are developed and refined, astronomers will find whether HD98618 hosts terrestrial planets, which may even contain life*." HD98618 lies a mere 126 light-years away in the northern constellation of Ursa Major (the 'Big Dipper'). It is bright enough to see in binoculars, but only in the Northern Hemisphere.

The researchers believe that HD98618 is about four billion years-old, about 10 per cent younger than our own Sun. Its chemical properties are almost identical to the Sun and to the other closest Sun twin, a star known as 18 Scorpii, which was discovered a decade ago. *"It means that hypothetical terrestrial planets around*

this solar twin may have had enough time to develop some kind of complex life, assuming the time-scale for complex life formation is similar to Earth's," Dr Meléndez said.

The team says that focused observations of the two stars by planet-hunter teams could reveal or rule out within a few years giant planets, such as our own Jupiter, around HD98618. "*18 Scorpii and HD98618 offer hope to find solar systems similar to our own in the Universe*," Dr Meléndez said.

The discovery also has implications for research in other areas. Solar twins are ideal for the absolute calibration of astronomical measuring instruments. They can provide data useful in modeling the solar phenomena that may affect climate change, and will help settle the argument about the uniqueness or otherwise of our Sun and Solar System. "*We had a number of candidates with similar properties to the Sun, but while we held out hope for each star that it would turn out to be really special, it was not at all certain to happen. HD 98618 was one of the last of our candidates to be analyzed, so it was quite a surprise when we discovered how it stood out from the other candidates, together with 18 Scorpii. It was very exciting -- I had to blink twice to be sure I wasn't imagining it*," Ms Dodds-Eden said.

The researchers made the discovery using the largest telescope in the world, the 10m Keck I telescope on the summit of Hawaii's dormant Mauna Kea volcano.

BLUE RING DISCOVERED AROUND URANUS

The outermost ring of Uranus, discovered just last year, is bright blue, making it only the second known blue ring in the solar system, according to a report in the journal 'Science'. Perhaps not coincidentally, both blue rings are associated with small moons. "*The outer ring of Saturn is blue and has Enceladus right smack at its brightest spot, and Uranus is strikingly similar, with its blue ring right on top of Mab's orbit*," said Imke de Pater. "*The blue color says that this ring is predominantly submicron-sized material, much smaller than the material in most other rings, which appear red*.".

The similarity between these outer rings implies a similar explanation for the blue color, according to the authors. Many scientists now ascribe Saturn's blue E ring to the small dust, gas and ice particles spewed into Enceladus' orbit by newly discovered plumes on that moon's surface. However, this is unlikely to be the case with Mab, a small, dead, rocky ball, about 15 miles across - one-twentieth the diameter of Enceladus. Instead, the astronomers suspect both rings owe their blue color to subtle forces acting on dust in the rings that allow smaller particles to survive while larger ones are recaptured by the moon. "*We know now that there is at least one way to make a blue ring that doesn't involve plumes, because Mab is surely too small to be internally active*," said Showalter. He and astronomer Jack Lissauer discovered Mab in HST images in 2003.

The likely scenario to explain Saturn's blue ring was proposed before plumes were discovered last November as the Cassini spacecraft flew by Enceladus. As modeled for the E ring, meteoroid impacts on the surface of Enceladus scatter debris into its orbit, probably in a broad range of sizes. While the larger pieces remain within the moon's orbit and eventually are swept up by the moon, smaller particles are subject to subtle forces that push them toward or away from the planet out of the moon's orbit. These forces include pressure from sunlight, magnetic torques acting on charged dust particles, and the influence of slight variations in gravity due to the equatorial bulge of Saturn.

The net result is a broad ring of smaller particles, most less than a tenth of a micron across - a thousandth the width of a human hair - that scatter and reflect predominantly blue light. "*This model can be transferred directly to what we now see in Uranus, although we still need to understand the details of the process*," de Pater said. All other rings - those around Jupiter, Saturn, Uranus and Neptune - are reddish. Though they contain particles of many sizes that reflect many wavelengths of light, red dominates not only because larger particles - many microns to meters across - are abundant, but also because the material itself may be reddish, perhaps from iron.

"*Arguing by analogy, the two outermost rings, the two rings that have satellites embedded in them, are both the blue rings. That can't be coincidental, there has to be a common thread of dynamics that is causing both of these phenomena*," Showalter said.

The discovery of the blue ring came after combining ground-based near-infrared observations by the Keck Telescope in Hawaii and visible-light photos taken by the Hubble Space Telescope. De Pater, Hammel and Gibbard have observed Uranus since 2000 with the second-generation NIRC2 infrared camera using the adaptive optics system on the Keck II telescope, and in August 2005 obtained 30 new images of the planet in hopes of seeing new features as the ring plane moves edge-on to Earth. Showalter and Lissauer, on the other hand, captured numerous visible-light images of Uranus between 2003 and 2005 with Hubble's Advanced Camera for Surveys.

Neither team realized it had captured pictures of new rings until an extensive analysis, basically piling image upon image until faint features stood out from the background. In December 2005, as Showalter and Lissauer reported finding two new rings - Uranus's 12th & 13th - and two new moons, Mab and Cupid, numbers 26 and 27, de Pater, Hammel and Gibbard reported seeing the red, innermost of the two new rings but not the outermost. The blue ring peaks in brightness about 97,700 kilometers from the planet's center, exactly at Mab's orbit. Further analysis proved to both teams that the outer ring seen in visible light was definitely not observable in the near-infrared, and so must be blue. The analysis also showed that Mab, which like its ring could not be seen in the infrared, is probably covered with water ice, like the other outer moons of Uranus, and is probably Uranus's smallest moon.

NASA'S NEW KIDS' CLUB WEB SITE IS ENTERTAINING AND EDUCATIONAL

NASA's new Kids' Club Web site features animated, colorful, entertaining and educational activities for children in kindergarten through fourth grade. Interactive games on the site teach children about exploring space, building and launching rockets, keeping airplanes on schedule and how a comet travels through the solar system. The site is located on the Web at: http://www.nasa.gov/kidsclub The site serves a dual purpose. Children can play games at home for entertainment, and educators can use it as a fun way to reach students in the classroom, the library, during after-school programs or anywhere children and computers are together.

"*Our goal with the Kids' Club is to provide a medium that encourages children's interest in exploring the subjects important to developing early skills in science, technology, engineering and mathematics*," said Angela Phillips Diaz, NASA's acting assistant administrator for education. "*The Kids' Club combines entertainment with NASA's unique mission content and educational resources*."

The Educational Technology Services team developed and maintains Kids' Club. The site was designed in accordance with the 2004 National Education Technology Plan "Toward a New Golden Age in American Education." Through the interactive site, content is aligned with educational standards that are customized to student's individual needs and interests. "*We've developed games, engaging multimedia visuals and educational activities at five different skill levels on the site,"* said Jeff Ehmen, education programs specialist at Marshall. "*We want students to explore and learn more about science, technology, engineering and mathematics. These materials support various national education standards in these subjects at each skill level*." The Kids' Club Web site was designed for easy student accessibility. The site is compatible with screen readers and other assistive technology, allowing use by disabled students. In addition to Flash-based games, the site features versions of content accessible in locations with slower Internet connections and computer equipment. NASA's education programs motivate and engage students to pursue careers in science, technology, engineering and mathematics by supporting activities in the nation's schools, and distributing information through instructional and outreach products. For information about NASA education programs on the Web, visit: http://www.nasa.gov/education

ASTEROIDS: TREASURES OF THE PAST AND FUTURE THREAT

If a large asteroid such as the recently identified 2004 VD17 -- about 500m in diameter with a mass of nearly 1000 million tons -- collides with the Earth it could spell disaster for much of our planet. ESA has been addressing the problem of how to prevent large Near-Earth Objects (NEOs) from colliding with the Earth for some time. In 1996 the Council of Europe called for the Agency to take action as part of a "long-term global strategy for remedies against possible impacts".

No reason for panic – yet. The risk is still small however, and may decrease even further when new observations are carried out. Still, if this or any other similar-sized object, such as 99942 Apophis, an asteroid that will come close enough to the Earth in 2029 to be visible to the naked eye, collided with our planet the energy released could be equivalent to a significant fraction of the world's nuclear arsenal, resulting in devastation across national borders. Luckily, impacts with very large asteroids are uncommon, although impacts with smaller asteroids are less unlikely and remote in time. In 1908 an asteroid that exploded over Siberia devastated an unpopulated forest area of more than 2000 km2; had it arrived just a few hours later, Saint Petersburg or London could have been hit instead.

Asteroids are a part of our planet's history. As anyone visiting the Barringer Meteor Crater in Arizona, or aiming a small telescope at the Moon can tell, there is plenty of evidence that the Earth and its cosmic neighborhood passed through a period of heavy asteroid bombardment. On the Earth alone the remains of more than 160 impacts have been identified, some as notorious as the Chicxulub crater located in Mexico's Yucatan peninsula, believed to be a trace of the asteroid that caused the extinction of the dinosaurs 65 million years ago. Collisions have shaped the history of our Solar System. Because asteroids and comets are remnants of the turbulent period in which the planets were formed, they are in fact similar to 'time capsules' and carry a pristine record of those early days. By studying these objects it is possible to learn more about the evolution of our Solar System as well as 'hints' about the origins of life on Earth.

Comet 67P/Churyumov-Gerasimenko is one of these primitive building blocks and will be visited by ESA's Rosetta spacecraft in 2014, as a part of a very ambitious mission -- the first ever to land on a comet. Rosetta will also visit two main belt asteroids (Steins and Lutetia) on its way to comet 67P/Churyumov-Gerasimenko. The mission will help to understand if life on Earth began with the help of materials such as water and organisms brought to our planet by 'comet seeding'. Asteroids and comets are fascinating objects that can give or take life on a planetary scale. Experts around the world are putting all their energy and enthusiasm into deciphering the mysteries they carry within them.

ESA's Science program is already looking at future challenges, and its Cosmic Vision 2015-2025 plan has identified an asteroid surface sample return as one of the key developments needed to further our understanding of the history and composition of our Solar System. With an early launch provisionally scheduled for 2011, the Don Quijote mission will serve as a 'technological scout' not only to mitigate the chance of the Earth being hit by a large NEO but also for the ambitious journeys to explore our solar system that ESA will continue to embark upon. Don Quijote is a NEO deflection test mission based entirely on conventional spacecraft technologies. It would comprise two spacecraft -- one of them (Hidalgo) impacting an asteroid at a very high relative speed while a second one (Sancho) would arrive earlier at the same asteroid and remain in its vicinity before and after the impact to measure the variation on the asteroid's orbital parameters, as well as to study the object. Secondary mission goals would involve the deployment of an autonomous surface package and several other experiments and measurements.

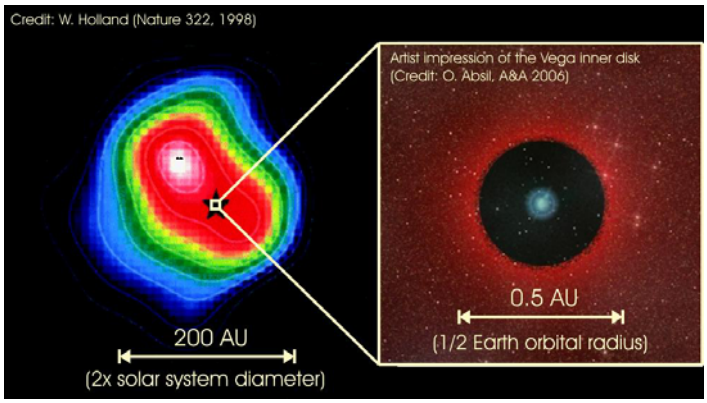
http://www.esa.int/esaCP/SEMC43NFGLE_index_1.html * NEOs
http://www.esa.int/SPECIALS/NEO/index.html * First International Conference on Impact Cratering in the Solar System
http://www.rssd.esa.int/index.php?project=TOP&page=craters *

VEGA: THE STAR WITH COMETS?

The observation of the immediate vicinity of a star other than the Sun has just been carried out for the first time. A debris disc made up of hot (1300 degrees) dust grains, residues of comet evaporation and collisions between asteroids, was indeed detected for the first time around Vega. Vega is an important star in astronomy in more than one way: the fifth brightest star of the night sky, one of the three "beauties of summer" (with Deneb and Altair) which forms a large triangle at the zenith of our latitudes on festival evenings; it was a long time considered as a reference star, to which is compared the brightness of all the other stars.

Located at 25 light-years, therefore relatively near the Sun, it is approximately three times larger and more massive, and 60 times more luminous than the Sun, and much younger (350 million years against 4.5 billion).

An international team detected in the vicinity of Vega a weak infra-red flux (78 times less important than that of the star) which would come from particles heated by the star to temperatures close to 1300 degrees C. It seems that these particles have a chemical composition different from those of the solar system, with a dominant carbonaceous material (like graphite), whereas our zodiacal cloud contains essentially silicates. They would be also on average smaller (of a diameter lower than the micron, equivalent to particles constituting cigarette smoke). Such small grains should normally be driven out by the pressure created by the intense radiation of Vega. Their abundance thus proves that they are produced continually, probably in a phase of intense meteoritic and cometary bombardment like those experienced by the Earth at the origins of the solar system. The dust production rate would correspond in the daily passing of 13 large comets in the environment of Vega. The presence of cold dust around Vega (-190 C), located at a distance three times larger than the orbit of Pluto, was known for a long time. This phenomenon is found also around a large number on stars similar to Vega. However, nothing was known on the internal part of these debris discs, where planets similar to the Earth are supposed to be formed. The observation of the internal part of the disc of Vega was made using the array of CHARA (Center for High Angular Resolution Astronomy), with six telescopes of 1 meter distributed on Mount Wilson in California, to simulating a giant telescope of almost 330 m, and thus distinguishing details of only 200 microseconds of arc, hardly larger than a soccer ball seen from the Moon! The light collected by CHARA is recombined by the instrument FLUOR (Fiber Linked Unit for Optical Recombination). This device also allowed to observe the atmosphere of Vega, and to confirm some astonishing properties of the star: its high speed of rotation on itself (12.5 hours) indeed confers it a lenticular form, flattened at the poles, the latter being brighter and hotter by 2300 C than the equator. http://www.obspm.fr/actual/nouvelle/apr06/vega-f1.jpg http://www.obspm.fr/actual/nouvelle/apr06/vega-f2.jpg



BUBBLE, BUBBLE: SEARCHING THROUGH THE RUBBLE OF SUPERNOVA REMNANTS

A study of supernova remnants -- material blown out into space during death throes of giant stars -- has shown that a bubble of gas enveloping our Solar System is being shoved backwards by the debris of another, more recent, supernova. Over the last few million years, several stars have exploded within the Milky Way and they have left behind bubbles of expanding, hot gas that radiate low-energy X-rays. The Solar System sits within one of these shells, known as the "Local Hot Bubble". The Local Hot Bubble is a cool, old supernova remnant that envelopes the solar system and much more besides. It is not spherical, more like the shape of a bent hourglass or a peanut shell. The edge of the bubble is at least 91 light years away in the Northern fields, rising to 358 light years in the Southern fields. The Loop 1 Superbubble is a big, young, hot supernova remnant that is located approximately 684 light years away from the Sun and is about 895 light years in diameter. A study using data from the XMM-Newton Space Telescope has shown that the "Loop 1 Superbubble", the remnants of some more recent supernova explosions, is expanding faster than the Local Hot Bubble and is compressing an area of cool dense gas, known as the Wall, that lies between the two shells. Although astronomers have known for some time that the Local Hot Bubble has an hourglass shape, pressure and density measurements from this new study provide evidence that Loop 1's compression of the Wall is causing the hourglass's "waist". "*The X-ray radiation from the bubbles is very faint. In order to see them, we've had to remove all the light from stars, nebulae and cosmic rays the images, leaving only the weak X-ray signal. It's the astronomical equivalent of looking at an aquarium, ignoring the fish and looking only at the water*," said Michelle Supper. "*We've taken long-exposure images of ten small areas of sky in the direction of the Loop 1 Superbubble, then removed all the bright objects and studied what's left. Each structure emits a unique x-ray signal, like a fingerprint, that reflects its temperature and chemical composition. This means that, when we come to analyze the images, we can tell which bits of radiation originated from Loop 1, the Wall or the Local Hot Bubble*," Supper explained. Together with Dr Richard Willingale, Supper developed mathematical models to represent each of the structures and then produced a geometrical model from which she could work out the distances to the structure boundaries and the pressure and density of the interstellar plasma within the structures. Loop 1 is thought to be expanding because it is being inflated by winds originating from a group of stars known as the Scorpius-Centaurus Association. Supper's measurements of physical properties of the Wall showed that its density increases fourfold, reaching a peak near the most indented region of the Local Hot Bubble. The pressures also peak around this point, indicating that the Wall is pushing into the bubble at in this region. The chemical analysis showed that the highest concentrations of gases are found at the centre of the Loop 1 Superbubble and levels decrease dramatically in the expanding shell of the bubble. "*Not many astronomers are looking at these structures at present but this study has shown there are many more mysteries to solve!*" adds Supper. "*We found that X-ray emissions in an area near the galactic plane are much higher in energy than expected but we don't know yet whether we've discovered a new X-ray source or whether its an extension of the very high energy radiation coming from the centre of the galaxy. We hope that this study will also give us an insight into the distribution of the Galactic Halo, a mysterious X-ray signal that can be detected faintly above and below the disc of the Milky Way*."

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 before the 1st of the month of publication, for example, material for May's newsletter should be received May 1st. 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 April's Stargazer:

The next EAS Meeting is 3:00 P.M. SATURDAY, April 22nd 2006 at the Everett Public Library Auditorium.