



The Stargazer

February 2005

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The Stargazer
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See EAS website at:

http://members.tripod.com/everett_astronomy

EAS BUSINESS...

NEXT EAS MEETING -
SATURDAY FEBRUARY 19TH AT 4:00 PM (NEW TIME)
AT THE EVERETT PUBLIC LIBRARY, (NEW PLACE)
IN THE AUDITORIUM (DOWNSTAIRS) –
NOTE NEW TIME AND PLACE !!!

★ February meeting topic – Amateur astronomer Jim Bachesta will talk about his activity in working cooperatively with a local park to promote astronomy and establish an astronomy-friendly neighborhood park – the PLUTO group.

Map and directions to the **EAS meeting at the Everett Public Main Library** are available at:

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



The Main Library is located at:
2702 Hoyt Avenue
Everett, WA 98201

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

Driving Directions to the Main Library

Directions from the North on I-5

- Take the Everett Avenue exit 194,
- Turn right onto Everett Avenue, drive west for 16 blocks,
- The library is at the intersection of Hoyt and Everett Avenues.

Directions from the South on I-5

- Take the Pacific Avenue exit 193,
- Turn left onto Pacific Avenue, drive west 15 blocks,
- Turn right onto Hoyt Avenue, drive north 4 blocks,
- The library is at the intersection of Hoyt and Everett Avenues.
- Parking is available in the library garage. Enter from Everett or Rucker Avenues.

Scheduled Meeting Dates:

Feb 19 - EAS MEETING - Saturday 4:00 PM at Everett Public Library
 Mar 19 - EAS MEETING - Saturday 4:00 PM at Everett Public Library
 Apr 15/16 - Astronomy Day Public Star Party
 Apr 16 - Astronomy Day
 Apr 30 - EAS MEETING - Saturday 4:00 PM at Everett Public Library

MEMBER NEWS

★ **NOTE NEW MEETING TIME AND PLACE – EVERETT LIBRARY !!!**

★ **"You are invited to attend a Sammamish City Star Party March 5th 2005** - The PLUTO group is an independent group, working with the City of Sammamish to create opportunities for people of all ages, knowledge levels and interest to learn and participate in Astronomy. The event will be at Pine Lake Park on Saturday March 5th. If we have overcast skies we have a rain date of Saturday March 12th. The City will be extending the hours of the park to facilitate this event. We will stargaze starting at 7 PM and finish around 10 PM. We will open up a number of large privately owned telescopes brought by our volunteers. These telescopes are as large as 12 inches in diameter. Knowledgeable people will be at each scope to answer questions and share their knowledge. You will be able to see first hand objects such as galaxies, planets, nebulas and much more. If you have your own telescope, bring it along. The featured celestial event will be observing the fleeting inner planet Mercury. Mercury is only visible at dusk, so come early. We will also have an opportunity to see Saturn the moon, galaxies, nebulas, star clusters and Jupiter and Jupiter's moons late in the evening. To participate, all you need to do is to show up at the baseball field at Pine Lake Park. Pine Lake Park is located at 228th Avenue and 24th Ave SE in the City of Sammamish."

CLUB STAR PARTY INFO

Upcoming star party schedule:

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.

FINANCIAL HEALTH

The club maintains a \$500+ balance. We try to keep approximately a \$500 balance to allow for contingencies. Emailing a digital copy of the newsletter has been suggested to reduce printing and postage costs, and speed up delivery, please email Mark if electronic copy would be OK for you.

CLUB SCOPES' STATUS

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

February 2005

Feb 07 - Mars 0.7 deg N of M8 (Lagoon) nebula
 Feb 09 - Chinese New Year
 Feb 10 - New Moon
 Feb 12 - Potential Saturday star party night, location TBD
 Feb 16 - Moon 1.5 deg S of Pleiades for western US
Feb 19 - EAS MEETING - Saturday 4:00 PM at Everett Public Library
 Feb 26 - Look for Zodiacal light in evening western sky next 2 weeks
 Feb 26 - SAS Amateur Telescope Makers – Peter Hirtle's place
 Feb 27 - Moon Jupiter conjunction – 1.9 deg. S of Moon for western US

March 2005

Mar 02 - Comet Machholz 2 Perihelion (0.753 AU)
 Mar 03 - Moon occults Antares
 Mar 08 - New Moon
 Mar 09 - Potential Saturday star party night, location TBD
 Mar 11-13 - South Pacific Star Party – Wiruna NSW Australia
 Mar 11-13 - Rose City Messier Marathon Kah-Nee-Ta hot springs resort
 Mar 12 - Mercury Greatest Eastern Elongation (18 Degrees)
Mar 19 - EAS MEETING - Saturday 4:00 PM at Everett Public Library
 Mar 20 - Vernal Equinox, 12:33 UT – First day of Spring in N hemisphere
 Mar 26 - Moon occults Jupiter
 Mar 27 - Easter Sunday
 Mar 30 - Mercury passes 4.2 degrees from Venus

April 2005

Apr 01 - Mars occults PPM 237883 (8.7 Magnitude Star)
 Apr 03 - Daylight Saving - set clock ahead 1 Hour (North America)
 Apr 03 - Jupiter at opposition
 Apr 08 - New Moon
 Apr 09 - Potential Saturday EAS star party night, location TBD
 Apr 08 - Hybrid solar eclipse (Visible From Pacific, Central America)
 Apr 09 - Moon occults Venus
Apr 11-17 - Astronomy Week
Apr 15, 16 - Astronomy Day Public Star Parties
Apr 16 - Astronomy Day
 Apr 22 - Lyrids meteor shower peak
 Apr 22 - Moon occults Jupiter
 Apr 24 - Lunar eclipse
 Apr 26 - Mercury at Greatest Western Elongation (27 degrees from Sun)
Apr 30 - EAS MEETING - Saturday 4:00 PM at Everett Public Library

May 2005

May 05 - Eta Aquarids Meteor Shower Peak

May 6-8 - Olympic Astronomy club – Dry Falls Spring Star Party

May 07 - Potential Saturday EAS star party night, location TBD
 May 08 - New Moon
 May 19 - Moon Occults Jupiter
May 21 - EAS MEETING* - Saturday 4:00 PM at Everett Public Library
 May 27-29 - Riverside Telescope Makers Conference Astronomy Expo
 May 27-29 - Memorial Day Weekend
 May 31 - Moon Occults Mars

June 2005

Jun 04 - Potential Saturday EAS star party night, location TBD
 Jun 06 - New Moon
 Jun 09 - Two moon shadows visible on Jupiter for USA – 10:30 pm
 Jun 13 - Pluto at opposition
 Jun 16 - Moon occults Jupiter
 Jun 17 - Two moon shadows visible on Jupiter for USA – 12:57 am
 Jun 21 - Summer Solstice, 06:46 UT – first day of N hemisphere summer
 Jun 26 - Mercury passes 1.4 degrees from Saturn
 Jun 27 - Mercury passes 0.1 degrees from Venus
Jun 25 - EAS MEETING - Saturday 4:00 PM at Everett Public Library

July 2005

Jul 02 - Potential Saturday EAS star party night, location TBD
 Jul 03 - Venus 0.4 deg. North of M44 Beehive cluster
 Jul 04 - Deep Impact, Comet Tempel 1 impact/flyby
 Jul 04 - Earth at aphelion (1.017 AU From Sun)
Jul 6-10 - Mt Bachelor Star Party
Jul 6-10 - Shingleton Star Party – Redding California
 Jul 09 - Mercury Greatest Eastern Elongation (26 Degrees)
 Jul 09 - Potential Saturday EAS star party night, location TBD
 Jul 12 - Asteroid 3259 Brownlee closest approach to Earth (2.19 AU)
 Jul 13 - Moon occults Jupiter
 Jul 18 - Moon occults Antares from southern US, near for north.
 Jul 21 - Largest full moon for 2005
 Jul 23 - 10th Anniversary (1995), Alan Hale's & Tom Bopp's Discovery of Comet Hale-Bopp
 Jul 27-29 - South Delta-Aquarids meteor shower peak
Jul 30 - EAS MEETING - Saturday 4:00 PM at Everett Public Library
 Jul 30-Aug 07 Mt. Kobau Star Party – Osoyoos BC

August 2005

Aug 01 - Alpha Capricornids Meteor Shower Peak
Aug 4-6 - Table Mountain Star Party
 Aug 04 - Furthest lunar apogee of 2005
 Aug 05 - Neil Armstrong's 75th birthday (1930)
 Aug 06 - Southern Iota Aquarids meteor shower peak
 Aug 08 - Moon 1.0 right of Venus
 Aug 08 - Neptune at opposition – visible all night
 Aug 11 - Perseid meteor watch - Rooster Rock St Park - Columbia Gorge
 Aug 12 - Perseids meteor shower peak
 Aug 24 - Mercury at Greatest Western Elongation (18 degrees from Sun)
 Aug 25 - Northern Iota Aquarids meteor shower peak
Aug 27 - EAS MEETING - Saturday 4:00 PM at Everett Public Library
 Aug 31 - Uranus at opposition – visible all night

September 2005

Sep 01 - Uranus at opposition
 Sep 01 - Venus passes 1.2 degrees from Jupiter
 Sep 03 - New Moon
 Sep 03 - Potential Saturday EAS star party night, location TBD
Sep 1-4 - Oregon Star Party
Sep 2-5 - Olympic Astronomy – Dry Falls Star Party
 Sep 05 - Labor Day holiday
 Sep 07 - Moon occults Venus
 Sep 22 - Autumnal Equinox (22:23 UT) – 1st day of autumn N hemisphere
Sep 24 - EAS MEETING - Saturday 4:00 PM at Everett Public Library

October 2005

Oct 01 - Potential Saturday EAS star party night, location TBD
 Oct 03 - New Moon
 Oct 03 - Annular Solar Eclipse, Visible From Africa
 Oct 04 - Moon occults Mercury
 Oct 05 - Mercury passes 1.3 degrees From Jupiter

Oct 09 - Draconids meteor shower Peak
 Oct 16 - Venus occults PPM 265560 (7.7 Magnitude Star)
 Oct 17 - Partial Lunar eclipse
 Oct 21 - Orionid meteor shower peak
Oct 29 - EAS MEETING - Saturday 4:00 PM at Everett Public Library
 Oct 30 - Daylight Saving - set clock back 1 Hour

November 2005

Nov 01 - New Moon
 Nov 05 - Potential Saturday EAS star party night, location TBD
 Nov 03 - Taurids meteor shower peak
 Nov 03 - Mercury at its Greatest Eastern Elongation (23 Degrees)
 Nov 03 - Venus at its Greatest Eastern Elongation (47 Degrees)
 Nov 07 - Mars at opposition
Nov 19 - EAS MEETING - Saturday 4:00 PM at Everett Public Library

December 2005

Dec 02 - 10th anniversary (1995), SOHO Launch
 Dec 12 - Moon occults Mars
 Dec 12 - Mercury at its Greatest Western Elongation (21 Degrees)
 Dec 13 - Geminids meteor shower peak
 Dec 21 - Winter Solstice, 18:35 UT
 Dec 22 - Ursids meteor shower peak
Dec 10th or 17th - EAS Dinner - Saturday 7:00 PM

UW 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).

Feb 24 - Pat McCarthy - Carnegie Observatories
'Old Stars in the Young Universe'

Mar 3 - TBA

Mar 10 - Tim Beers - Michigan State University
'Mining the Milky Way Galaxy with the Sloan Digital Sky Survey'

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 8:58 A.M. and 5:58 P.M. Saturday and Sunday). 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.

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 Scott Gibson, 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 to subscribe to *Sky and Telescope* for \$7 off the normal subscription rate, contact the treasurer for more information. **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, built as a club project or the 60mm refractor. Contact Bob Lyons (425) 337-1510 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

Feb 02	Last Quarter Moon
Feb 08	New Moon
Feb 16	First Quarter Moon
Feb 24	Full Moon
Mar 03	Last Quarter Moon
Mar 10	New Moon
Mar 17	First Quarter Moon
Mar 25	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

Mercury is not easily seen in February.

Venus is not easily seen in February.

Mars is low in southeast at dawn, somewhat higher as February progresses.

Jupiter rises in east before midnight, south-southwest at dawn.

Saturn was at opposition on January 13th, rising SE before sunset, sets WSW before dawn.

Object	Rises	Transits	Sets	Constellation
Sun	7:07 am	12:23	17:39	Aquarius
Mercury	Daylight	Daylight	17:58	Aquarius
Venus	Daylight	Daylight	Daylight	Capricornus
Mars	4:40 am	Daylight	Daylight	Sagittarius
Jupiter	21:40	3:21 am	Daylight	Virgo
Saturn	Daylight	21:40	5:30 am	Gemini
Uranus	Daylight	Daylight	18:02	Aquarius
Neptune	6:34 am	Daylight	Daylight	Capricornus
Pluto	2:53 am	Daylight	Daylight	Serpens

(times local time for Everett PST)

Transit times for Jupiter's Great Red Spot in 2005

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.srb.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>

'PHOTON' – ASTRONOMY EZINE

Issue 6 of 'Photon' PDF astronomy ezine is now available for download from: <http://www.photonezine.com> Here's what's in this issue: Book Review: Deep Sky Wonders [George Reynolds] RoboScoping! [Tom Nicolaidis] The Ancient Astronomers of Newgrange [Anthony Murphy] The Sikhote-Alin Meteorite [Mark Bostick] Solstices Are Milestones of Civilization [Von Del Chamberlain] Aerial Explorations of Terrestrial Meteorite Craters - Sudbury Crater [Charles O'Dale] RTGUI Freeware for Telescope Control [Rod Mollise] Canon EOS "Digital Rebel" [Phil Harrington] Some Images Through the "Digital Rebel" [Phil Harrington] Thoughts About Astronomical Image Processing for Digital Cameras [Tom Licha] Great Astronomers [Tim Carr] Showcase [Astrophotos] Plus a peppering of short stories and anecdotes.

CONSTELLATIONS OF THE MONTH: HYDRA

HYDRA: The Water Snake, as this constellation is also known, borders on the constellations of Antlia, Cancer, Canis Minor, Centaurus, Corvus, Crater, Leo, Libra, Monoceros, Puppis, Pyxis, Sextans, and Virgo, and ranks 71st in overall brightness among the constellations, containing, ironically enough, 71 stars brighter than magnitude 5.5. Its central point is located at RA=11h,33m and Dec.= -14 degrees. It is completely visible from latitudes +55 degrees to -83 degrees, with portions visible worldwide. This constellation ranks 1st in overall size; the largest constellation takes up over three percent of the entire sky. One of the most famous stars in the sky is Alphard (alpha Hydra), an orange giant with a K4-III spectral type. Hydra has one associated meteor shower: the sigma Hydriids (11 Dec.), and three Messier objects (M48 (open cluster), M68 (globular cluster), and M83 (spiral galaxy). M83 is a nearly face on spiral, and has been called the finest face-on Sc-type spiral in the sky. It has a combined magnitude of 8, and appears photographically to be about 10 X 8 minutes of arc in angular size, with a bright nucleus. Its distance to us is approximately 4.5 megaparsecs, making it one of the closest spiral galaxies outside our Local Group. Interestingly, at least five supernovae have occurred within the confines of M-83 in the last 70 years or so, making M-83 a very good target for patient supernovae hunters!! Perhaps most well known of all the other phenomena associated with this constellation is the fact that in September, 1965, one of the most famous comets of the 20th century was discovered near Alphard. Comet Ikeya-Seki, a sungrazer, was, one month later in October, visible in daylight when only two degrees from the sun!! Another interesting point of this constellation is that one of its stars, V Hydrae, is a variable star which is often considered the reddest star known. Another variable, U Hydrae, is somewhat brighter (4.7-6.2), and is almost as red as the former. Hydra has a midnight culmination date of March 15th, so try to get out and enjoy some of the beauties of this famous constellation this winter and spring.

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

TWIN MARS ROVERS CONTINUE EXPLORATION

The Spirit rover found a new class of water-affected rock, while its twin, Opportunity, finished inspecting its own heat shield and set a new Martian driving record. The rovers successfully completed their three-month primary missions in April 2004 and are working on extended exploration missions.

"This is probably the most interesting and important rock Spirit has examined," said Dr. Steve Squyres, principal investigator for the rovers. The rock, dubbed "Peace," is an exposure of bedrock in the Columbia Hills. The rock is in the Gusev Crater, where Spirit landed 13 months ago. *"This may be what the bones of this mountain are really made of; it gives us even more compelling evidence for water playing a major role for altering the rocks here,"* Squyres added.

Peace contains more sulfate salt than any other rock Spirit has examined. Dr. Ralf Gellert, said, *"Usually when we have seen high levels of sulfur in rocks at Gusev, it has been at the very surface. The unusual thing about this rock is that deep inside; the sulfur is still very high. The sulfur enrichment at the surface is correlated with the amount of magnesium, which points to magnesium sulfate."*

Observations by Spirit show the rock contains significant amounts of the minerals olivine, pyroxene and magnetite, all of which are common in some types of volcanic rock. The rock's texture appears to be sand-size grains coated with a material loosely binding the rock together. Spirit's rock abrasion tool dug about 1 centimeter (0.4 inch) deep in two hours.

"It looks as if you took volcanic rocks that were ground into little grains, and then formed a layered rock with them cemented together by a substantial quantity of magnesium-sulfate salt," Squyres said. *"Where did the salt come from? We have two working hypotheses we want to check by examining more rocks. It could come from liquid water with magnesium sulfate salt dissolved in it, percolating through the rock, then evaporating and leaving the salt behind. Or it could come from weathering by dilute sulfuric acid reacting with magnesium-rich minerals that were already in the rock. Either case involves water,"* he said.

Opportunity used its microscopic imager last week to examine a cross section of the heat shield that protected the spacecraft as it slammed into Mars' atmosphere. This is the first time experts have been able to examine a heat shield after it entered another planet's atmosphere. Engineers expect the findings to aid design for future missions. *"We've identified each broken piece of the heat shield. We know there's a lot of data there, but we still need to analyze it,"* said Ethiraj Venkatapathy. Christine Szalai, a spacecraft engineer, said, *"We are examining the images to determine the depth of charring in the heat shield material. In the initial look, we didn't see any surprises. We will be working for the next few months to analyze the performance of the heat shield,"* Szalai said.

Since leaving the heat shield, Opportunity has been traveling south to explore new sites. The rover set a single-day Martian driving record, covering 154.65 meters (507.4 feet) on Jan. 28. Two days later, it drove even farther, 156.55 meters (513.6 feet). The first 90 meters (295 feet) of each drive was performed in blind-drive mode, following a route planners created from stereo images from the rover and maps created from orbital imagery. The rest was autonomous driving, with the rover choosing its own route to avoid any hazards it perceived in stereo images taken along the way.

"The terrain we're crossing is so flat we can see a long way ahead," said JPL rover planner Frank Hartman, who teamed with Jeff Biesiadecki to plot the drive. "Opportunity has paused for some trenching, but in a few days we'll put the pedal to the metal again." For additional information about the rovers visit: http://www.nasa.gov/vision/universe/solarsystem/mer_main.html

SPACECRAFT HELP SOLVE SATURN'S MYSTERIOUS AURORAS

The dancing light of Saturn's auroras behaves in ways different from how scientists thought possible. New research has overturned theories, accepted for the past 25 years, about how Saturn's magnetic field behaves and how auroras are generated.

Researchers choreographed the instruments aboard Hubble Space Telescope and the Cassini spacecraft to help solve the long-standing saturnian mystery.

The researchers, led by John Clarke, found the planet's auroras, long thought of as a cross between those of Earth and Jupiter, are fundamentally unlike those observed on either of the other two planets. The ruby-colored lights that occasionally paint the sky over Saturn may be a phenomenon unique within our solar system.

In Clarke's experiment, Hubble snapped ultraviolet pictures of Saturn's auroras over several weeks. Cassini recorded radio emissions from the same regions, while measuring the solar wind, a stream of charged particles that trigger auroras. The observations showed Saturn's auroras differ in character day to day, as they do on Earth. They move around on some days and remain stationary on others. Unlike Earth, where auroras can last for hours, Saturn's can last for days. Surprisingly, the observations also indicated the sun's magnetic field and solar wind may play a much larger role in Saturn's aurora than previously suspected. Hubble images, when combined with Cassini measurements of the solar wind, show it is the pressure of the solar wind that appears to drive auroral storms on Saturn. In Earth's case, it is mainly the sun's magnetic field, carried into the solar wind that drives auroral storms.

Seen from space, an aurora appears as a ring of light circling a planet's polar region, where magnetic poles typically reside. Auroral displays are initiated when charged particles in space collide with a planet's magnetic field and stream into the upper atmosphere. Collisions with gases in the planet's atmosphere produce flashes of glowing energy in the form of light and radio waves. When Saturn's auroras become brighter and more powerful, the ring of energy encircling the pole shrinks in diameter. When Earth's auroras become brighter, the polar region is filled with light for several minutes. Then the ring of light dims and begins to expand. Jupiter's auroras are not influenced by the solar wind, becoming brighter about once a month. Saturn's aurora displays also become brighter on the sector of the planet where night turns to day as the storms increase in intensity, unlike either of the other two planets.

With Cassini orbiting Saturn, researchers will be able to take a more direct look at how the planet's auroras are generated. Researchers will probe how the sun's magnetic field may fuel Saturn's auroras and study what role the solar wind may play.

SLOAN DIGITAL SKY SURVEY NEW GALAXY ATLAS

In a presentation whimsically titled "A whole lot of nearby galaxies," astronomers David W. Hogg and Michael Blanton presented a new atlas of galaxies at the winter meeting of the American Astronomical Society. The atlas shows about 4,000 galaxy images taken from the Sloan Digital Sky Survey (SDSS),

the most ambitious astronomical survey project ever undertaken. With more than 200 researchers from 14 institutions around the world, the SDSS (www.sdss.org) is mapping in detail about one-quarter of the sky, determining the positions and brightnesses of hundreds of millions of celestial objects. It will also measure the distances to about a million galaxies and quasars.

Combining computer-aided data analysis with manual, subjective human visual classification, the new galaxy compendium is based on ages, masses, and other physical properties. In time, this may become the largest and most useful visual atlas of galaxies ever produced. The atlas uses quantitative physical parameters measured from the galaxy images and spectra, and presents the images for easy visual classification of the galaxies into spirals and ellipticals. This two-pronged approach allows researchers to understand the relationship between the two classification methods. "Some properties of galaxies are straightforward to measure with computer analysis of the SDSS data," explains Blanton, "while others can only be reliably determined by human inspection. We are trying to understand the relationships between these two different kinds of properties." This visual inspection for the purposes of galaxy classification started with Edwin Hubble in the 1920s and led to an understanding that galaxies fall into two broad types, spirals and ellipticals. Within these there are physically important subclasses.

The spirals, including the Milky Way, have young stars arranged in a large, thin, rotating disk with the stars, gas and dust arranged in spiral patterns. The ellipticals have older stars arranged in a dense, spheroidal blob. Both kinds of galaxies are clearly visible in Hogg and Blanton's atlas, with the spirals tending to be bluer, less dense, and in regions of space with relatively few companion galaxies. The ellipticals tend to be redder, more dense and surrounded by many other galaxies.

Hogg and Blanton originally made the charts -- dense grids of small color pictures of galaxies -- as a research and data visualization tool for quality-checking the SDSS data set, but quickly found that the charts were interesting and beautiful, and yielded real insight into galaxy properties, making them appropriate for presentation to the whole scientific community. The color pictures -- using a technique pioneered by SDSS astronomer Robert Lupton -- convey far more information than the traditional rendering of astronomical images. This color rendering technique, combined with the very high quality of the SDSS images, make this galaxy atlas more scientifically powerful, and much more beautiful, than its predecessors.

Hogg explains that: "We spend a lot of time searching data for patterns that might lead to new directions for research. We have generally found that when we make a useful and informative presentation of the data for these investigations, that presentation is also beautiful and scientifically compelling on its own." The full, technical description of the American Astronomical Society presentation is available as a PDF file at <http://cosmo.nyu.edu/hogg/aas205/aas205.pdf>

ASTEROID COLLISIONS MAY ACCOUNT FOR STAR'S ODD APPEARANCE

The recent collision of two huge asteroids or tiny planets may be the cause of the mysterious lopsided appearance of the most famous of the universe's planet-forming stars, a team of astronomers says.

Relying on observations from the Gemini South telescope in Chile, the team has concluded that differences in brightness in the dust disc surrounding a star known as Beta Pictoris stem from an extra bright clump on one side of the disc. This clump,

the astronomers say, is composed of dust particles that are consistently smaller than particles elsewhere in the disc - likely evidence of a collision of two massive asteroids or tiny developing planets known as planetismals that may have occurred as recently as in the past few decades.

"What we're proposing is that a planetesimal - either a very small planet or a very large asteroid -- has collided with another similar object and has been catastrophically destroyed," said Charlie Telesco, the lead author. *"It's a cloud now, but what we're proposing is that this cloud represents the debris of a major collision."*

The findings are of interest because they suggest a new explanation for a phenomenon -- asymmetries or lopsided appearances in star dust discs --- that has long puzzled astronomers, Telesco said. The results also continue to help refine the evolving science of planet-finding, an endeavor that has turned up more than 100 planets outside our solar system since the first was discovered in 1995.

Stars are thought to form when gravity causes a rotating cloud of gas to contract. Before the actual star is formed, the gas collapses into a rotating disk of gas and dust particles ranging in size from tiny grains to household-sized dust to rocks and boulders. Astronomers had long predicted that some of this material may coagulate into planets as it rotates around the core, but Beta Pictoris, first detected by the Infrared Astronomy Satellite in 1983, was the first such "circumstellar" star to be imaged.

Beta Pictoris is about 63 light years from Earth in the southern constellation known as Pictor, or Painter's Easel. It barely clears the horizon on the southern edges of the Northern Hemisphere, where it is seen most easily from Hawaii.

Like other planet-forming stars, Beta Pictoris, which is between 10 million and 20 million years old, is extremely young by stellar standards, with mature stars living billions of years. Also like some other young stars, it has an attribute that has long proved puzzling to astronomers: One side, or "wing," of the star's 200-billion-mile diameter dust disc is both brighter and longer than the other. Some astronomers theorized that this anomaly was caused by the presence of a large planet orbiting the star. But the UF-led team came to a different conclusion after observing Beta Pictoris during six nights in December 2003 and last January using the Gemini telescope. The telescope had been specially equipped with a UF-designed and -built observational camera called the Thermal Region Camera and Spectograph, or T-ReCS, according to Telesco. T-ReCS allows astronomers to detect faint sources of thermal or infrared radiation by isolating them from the far more powerful and more obvious radiation generated by the Earth's atmosphere, the telescope and the star itself.

"We're able to see sources that are at least a million times fainter than the background," Telesco said. *"It's like trying to detect a match when you're actually holding the match up to the sun."* What Telesco characterized as *"the most complete and the best resolution imaging at multiple wavelengths"* of the star revealed that the wing's brightness stemmed from a "knot" of emissions, or clump. Further examination showed this clump contained a higher concentration of smaller, finer dust particles than elsewhere, suggesting a violent and recent collision of asteroids or tiny planets.

"Many of us remember pounding chalk dust out of erasers at school," said Scott Fisher, an astronomer at Gemini South and a co-author of the paper. *"After you sneeze a few times, you open a window and the fine dust blows away. In Beta Pictoris, the*

radiation from the star should blow away the fine particles from the collision quite rapidly. The fact that we still see them in our observations means that the collision probably happened in the past 100 years or so."

An alternative explanation of the clump may be the "collisional grinding" of two planets located closely together in orbit, Telesco said. *"Over time, the planets bang into each other, and when they do they actually produce debris,"* he said.

The findings suggest a possible explanation for other observed lopsided discs, Telesco said. They also may help astronomers weed out planets from other possible sources of brightness.

"One of the problems for astronomers is if there are clumps in the disc associated with planetismals, it's hard to tell the difference between those clumps and a planet," he said. *"So we're hoping to use these results to understand how we can distinguish these structures from planets until the time comes when we have sensitivity to see the planet itself."*

BEGINNINGS OF 'MINI' SOLAR SYSTEM DISCOVERED

Moons circle planets, and planets circle stars. Now, astronomers have learned that planets may also circle celestial bodies almost as small as planets.

The Spitzer Space Telescope has spotted a dusty disc of planet-building material around an extraordinarily low-mass brown dwarf, or "failed star." The brown dwarf, called OTS 44, is only 15 times the mass of Jupiter. Previously, the smallest brown dwarf known to host a planet-forming disc was 25 to 30 times more massive than Jupiter.

The finding will ultimately help astronomers better understand how and where planets - including rocky ones resembling our own - form.

"There may be a host of miniature solar systems out there, in which planets orbit brown dwarfs," said Dr. Kevin Luhman, lead author of the new study. *"This leads to all sorts of new questions, like 'Could life exist on such planets?' or 'What do you call a planet circling a planet-sized body? A moon or a planet?'"*

Brown dwarfs are something of misfits in the astronomy world. These cool orbs of gas have been called both failed stars and super planets. Like planets, they lack the mass to ignite and produce starlight. Like stars, they are often found alone in space, with no parent body to orbit.

"In this case, we are seeing the ingredients for planets around a brown dwarf near the dividing line between planets and stars. This raises the tantalizing possibility of planet formation around objects that themselves have planetary masses," said Dr. Giovanni Fazio, a co-author of the new study.

Planet-forming, or protoplanetary, discs are the precursors to planets. Astronomers speculate that the disc circling OTS 44 has enough mass to make a small gas giant planet and a few Earth-sized, rocky ones. This begs the question: Could a habitable planet like Earth sustain life around a brown dwarf?

"If life did exist in this system, it would have to constantly adjust to the dwindling temperatures of a brown dwarf," said Luhman. *"For liquid water to be present, the planet would have to be much closer to the brown dwarf than Earth is to our Sun."*

"It's exciting to speculate about the possibilities for life in such a system, of course at this point we are only beginning to understand the unusual circumstances under which planets arise," he added.

Brown dwarfs are rare and difficult to study due to their dim light. Though astronomers recently reported what may be the first-ever image of a planet around a brown dwarf called 2M1207, not much is understood about the planet-formation process around these odd balls of gas. Less is understood about low-mass brown dwarfs, of which only a handful are known.

OTS 44 was first discovered about six months ago by Luhman and his colleagues using the Gemini Observatory in Chile. The object is located 500 light-years away in the Chamaeleon constellation. Later, the team used Spitzer's highly sensitive infrared eyes to see the dim glow of OTS 44's dusty disc. These observations took only 20 seconds. Longer searches with Spitzer could reveal discs around brown dwarfs below 10 Jupiter masses.

ASTRONOMERS IDENTIFY LARGEST STARS KNOWN

Astronomers are announcing the identification of three red supergiants that have the largest diameters of any normal stars known, more than a billion miles across. The report is being presented by Ms. Emily Levesque. The group studied a sample of 74 red supergiant stars in the Milky Way. This research is significant in finally reconciling theory and observation for these stars. Red supergiants, massive stars nearing the ends of their lifetimes, are extremely cool and luminous -- and very large.

The three stars with the largest known sizes are KW Sagittarii (distance 9,800 light-years), V354 Cephei (distance 9,000 light-years), and KY Cygni (distance 5,200 light-years), all with radii about 1500 times that of the Sun, or about 7 astronomical units (AU). For comparison, the well-known red supergiant star Betelgeuse in the constellation Orion is known from other work to have a radius about 650 times that of the Sun, or about 3 AU. If one of these stars were

placed in the sun's location, its outer layers would extend to midway between the orbits of Jupiter (5.2 AU) and Saturn (9.5 AU).

The previous record holder, Herschel's "Garnet Star" (also known as "mu Cephei") comes in a close fourth in size in the study. The only other star for which a very large size has been claimed is the binary star system VV Cephei, which consists of a red supergiant and a hot companion orbiting within a common gaseous envelope, in which the gravitational forces of the companion have distended the surface of the supergiant and the meaning of the size of the star is therefore fuzzy. None of the stars in the new study are believed to be binaries, and thus their properties tell us about the extreme sizes that normal stars reach.

The study used the National Science Foundation's 2.1-meter (84-inch) telescope at Kitt Peak National Observatory, located outside of Tucson, Arizona, and the 1.5-m (60-inch) telescope at Cerro Tololo Inter-American Observatory, located outside of La Serena, Chile, in the foothills of the Andes. The new observations were combined with state-of-the-art computer models that contain improved data on the molecules that are found in the outer layers of these cool stars. The analysis yielded the most accurate temperatures yet found for this type of object. The temperatures of the coolest red supergiants are about 3450 Kelvins, or about 10 percent warmer than previously thought. Combined with modern estimates of the distances of these stars, the group was able to determine the stellar sizes as well.

"The significance of this study is that for the first time in many decades there is good agreement between the theory of how large and cool these stars should be, and how large and cool we

actually observe them to be," explained Dr. Philip Massey, Astronomer at Lowell Observatory, the project's leader. "For the past two decades there has been a significant disagreement. The problem in this case turned out NOT to be the theory, but the 'observations' -- the conversion between the observed qualities (brightness and spectral type) and the deduced properties (temperature and luminosity and/or size) needed improvement." The team's new analysis provides a better means of converting between these properties.

"These stars are not the most massive known," noted Levesque. "They are only 25 times the mass of the sun, while the most massive stars may have as much material as 150 suns. Nor are they the most luminous, as they are only about 300,000 times the luminosity of the sun, not the factor of 5 million or so attributed to the most luminous stars. They aren't even the coldest stars known -- brown dwarfs have such low temperatures that they can't even fuse hydrogen. But the combination of modestly high luminosities and relatively low temperatures DOES mean that they are the biggest stars known, in terms of their stellar diameters."

'BULLET STAR' SHINES 350 TIMES BRIGHTER THAN THE SUN

For decades, scientists have observed that Regulus, the brightest star in the constellation Leo, spins much faster than the sun. But thanks to a powerful new telescopic array, astronomers now know with unprecedented clarity what that means to this massive celestial body.

A group of astronomers, led by Hal McAlister, have used the center's array of telescopes to detect for the first time Regulus' rotationally induced distortions. Scientists have measured the size and shape of the star, the temperature difference between its polar and equatorial regions, and the orientation of its spin axis. The researchers' observations of Regulus represent the first scientific output from the CHARA array, which became routinely operational in early 2004.

Most stars rotate sedately about their spin axes, McAlister says. The sun, for example, completes a full rotation in about 24 days, which means its equatorial spin speed is roughly 4,500 miles per hour. Regulus' equatorial spin speed is nearly 700,000 miles per hour and its diameter is about five times greater than the sun's. Regulus also bulges conspicuously at its equator, a stellar rarity.

Regulus' centrifugal force causes it to expand so that its equatorial diameter is one-third larger than its polar diameter. In fact, if Regulus were rotating about 10 percent faster, its outward centrifugal force would exceed the inward pull of gravity and the star would fly apart, says McAlister, CHARA's director.

Because of its distorted shape, Regulus, a single star, exhibits what is known as "gravity darkening" -- the star becomes brighter at its poles than at its equator -- a phenomenon previously only detected in binary stars. According to McAlister, the darkening occurs because Regulus is colder at its equator than at its poles. Regulus' equatorial bulge diminishes the pull of gravity at the equator, which causes the temperature there to decrease. CHARA researchers have found that the temperature at Regulus' poles is 15,100 degrees Celsius, while the equator's temperature is only 10,000 Celsius. The temperature variation causes the star to be about five times brighter at its poles than at its equator. Regulus' surface is so hot that the star is actually nearly 350 times more luminous than the sun.

CHARA researchers discovered another oddity when they determined the orientation of the star's spin axis, says McAlister.

"We're looking at the star essentially equator-on, and the spin axis is tilted about 86 degrees from the north direction in the sky," he says. "But, curiously enough, the star is moving through space in the same direction its pole is pointing. Regulus is moving like an enormous spinning bullet through space. We have no idea why this is the case."

Astronomers viewed Regulus using CHARA's telescopes for six weeks last spring to obtain interferometric data that, combined with spectroscopic measurements and theoretical models, created a picture of the star that reveals the effects of its incredibly fast spin. The results will be published this spring in *The Astrophysical Journal*.

The CHARA array, located atop Mt. Wilson in southern California, is among a handful of new "super" instruments composed of multiple telescopes optically linked to function as a single telescope of enormous size. The array consists of six telescopes, each containing a light-collecting mirror one meter in diameter.

The telescopes are arranged in the shape of a "Y," with the outermost telescopes located about 200 meters from the center of the array. A precise combination of the light from the individual telescopes allows the CHARA array to behave as if it were a single telescope with a mirror 330 meters across. The array can't show very faint objects detected by telescopes such as the giant 10-meter Keck telescopes in Hawaii, but scientists can see details in brighter objects nearly 100 times sharper than those obtainable using the Keck array. Working at infrared wavelengths, the CHARA array can see details as small as 0.0005 arcseconds. (One arcsecond is 1/3,600 of a degree, equivalent to the angular size of a dime seen from a distance of 2.3 miles.)

EVIDENCE BUILDS FOR SUPERNOVA'S ROLE IN SOLAR SYSTEM CREATION

Clear evidence in a Chinese meteorite for the past presence of chlorine-36, a short-lived radioactive isotope, lends further support to the controversial concept that a nearby supernova blast was involved in the formation of our solar system, according to a report forthcoming in the February 1 issue and published online Jan. 24, of the *Proceedings of the National Academy of Sciences*.

Known as the Ningqiang carbonaceous chondrite, the primitive meteorite is a space relic that formed shortly after the solar system's creation. It contains pockets of still older materials or "inclusions" that contain calcium, aluminum and sodalite, a chlorine-rich mineral.

A Chinese-American team of scientists including Yangting Lin, Ziyuan Ouyang, Daode Wang, and Yunbin Guan and Laurie Leshin found the rare isotope sulfur-36 in association with the sodalite. Though it can be formed in various ways, sulfur-36 is a natural decay product of chlorine-36. Its association with the chlorine in the sodalite is strong evidence for the past presence of chlorine-36, which has a half-life of only 300,000 years, in the early solar system.

The solar system's chlorine-36 could have formed in two different ways -- either in the explosion of a supernova or in the irradiation of a nebular cloud near the forming Sun. The irradiation explanation is unlikely in this case, however, since the mineral the chlorine-36 was discovered in must have formed a significant distance from the sun.

"There is no ancient live chlorine-36 in the solar system now," said Leshin, who is director of ASU's Center for Meteorite Studies. "But this is direct evidence that it was here in the early solar system. We have now discovered the first solid evidence for two different short-lived radionuclides in the GeoSIMS Lab at ASU -- iron-60 and chlorine-36 -- and both of them provide evidence for where the solar system's short-lived radionuclides came from. It's producing a really strong argument that these radionuclides were produced in a supernova that exploded near the forming solar system and seeded the solar system with these isotopes."

In a "Perspectives" article in the journal *Science* last spring, Leshin and others argued that the presence of iron-60 was evidence that the solar system formed as a result of violent star-creation processes in a dense nebula rife with short-lived, high-mass stars and supernovas -- a very different creation story than the traditional view that the solar system formed from a slowly condensing molecular cloud. (To see the release on the *Science* paper, see http://www.asu.edu/asunews/research/sun_earth_creation.htm)

TITAN WIND SPEEDS

Radio telescopes "save the day," and produce data on Titan's winds. In what some scientists termed "a surprising, almost miraculous turnabout," providing data needed to measure the winds encountered by the Huygens spacecraft as it descended through the atmosphere of Saturn's moon Titan last month -- measurements feared lost because of a communication error between Huygens and its "mother ship" Cassini.

A global network of radio telescopes, including the National Radio Astronomy Observatory's (NRAO) Robert C. Byrd Green Bank Telescope (GBT) in West Virginia and eight of the ten antennas of the Very Long Baseline Array (VLBA), recorded the radio signal from Huygens during its descent on January 14. Measurements of the frequency shift caused by the craft's motion, called Doppler shift, are giving planetary scientists their first direct information about Titan's winds. "When we began working with our international partners on this project, we thought our telescopes would be adding to the wind data produced by the two spacecraft themselves. Now, with the ground-based telescopes providing the only information about Titan's winds, we are extremely proud that our facilities are making such a key contribution to our understanding of this fascinating planetary body," said Dr. Fred K.Y. Lo, director of the NRAO.

Early analysis of the radio-telescope data shows that Titan's wind flows from west to east, in the direction of the moon's rotation, at all altitudes. The highest wind speed, nearly 270 mph, was measured at an altitude of about 75 miles. Winds are weak near Titan's surface and increase in speed slowly up to an altitude of about 37 miles, where the spacecraft encountered highly-variable winds that scientists think indicate a region of vertical wind shear. The ground-based Doppler measurements were carried out and processed jointly by scientists from the JPL, and the Joint Institute for VLBI in Europe (JIVE, The Netherlands) working within an international Doppler Wind Experiment team. The GBT made the first detection of Huygens' radio signal during the descent, and gave flight controllers and scientists the first indication that the spacecraft's parachute had deployed and that it was "alive" after entering Titan's atmosphere. The radio-telescope measurements also indicated changes in Huygens' speed when it exchanged parachutes and when it landed on Titan's surface.

The original plan for gauging Titan's winds called for measuring the Doppler shift in the probe's signal frequency both by Cassini and by ground-based radio telescopes in the U.S., Australia, Japan and China. Cassini was best positioned to gain information on the east-west component of the winds, and the ground-based telescopes were positioned to help learn about the north-south wind component. Unfortunately, the communications error lost all the wind data from Cassini. *"I've never felt such exhilarating highs and dispiriting lows than those experienced when we first detected the signal from the GBT, indicating 'all's well,' and then discovering that we had no signal at the operations center, indicating 'all's lost.' The truth, as we have now determined, lies somewhat closer to the former than the latter."* said Michael Bird of the University of Bonn. In addition to measuring the motion-generated frequency shift of Huygens' radio signal, radio telescopes also were used to make extremely precise measurements of the probe's position (to within three-quarters of a mile, or one kilometer) during its descent. This experiment used the VLBA antennas, along with others employing the technique of Very Long Baseline Interferometry (VLBI). Combination of the Doppler and VLBI data will eventually provide a three-dimensional record of motion for the Huygens Probe during its mission at Titan. Huygens was built by the European Space Agency.

Strong westerly winds of up to about 400 kilometers per hour (250 miles per hour) buffeted the Huygens probe as it descended through Titan's upper atmosphere last month, according to NASA-led observations of the probe transmissions with Earth-based radio telescopes. The winds eased to a mild breeze near the surface of Titan, Saturn's largest moon.

A preliminary estimate of the wind variations with altitude from about 110 kilometers (68 miles) down to the surface has been recovered by a team of researchers from JPL, collaborating with the Huygens Doppler wind experiment team led by Dr. Michael Bird in Bonn, Germany, and with the ground-based European Very Long Baseline Interferometry team led by Dr. Leonid Gurvits.

A network of radio telescope facilities, located around the world, received the radio signals transmitted by the Huygens probe to the Cassini orbiter during the probe's descent and landing on Titan on Jan. 14. *"The information from the radio telescopes was originally intended to supplement similar wind data received from the Huygens Doppler wind experiment. However, the onboard experiment failed to return data."* said Dr. William Folkner, the JPL principal investigator for the ground-based Doppler wind experiment.

"Our ground-based work salvaged the Doppler wind experiment," said Sami Asmar, a JPL co-investigator on the Huygens Doppler wind experiment. *He had reported detecting the signal on the ground from the Green Bank Telescope facility in West Virginia. "The signal from the Huygens probe was not designed to be detected on Earth -- sometimes it pays to eavesdrop,"* said Asmar.

Winds are determined by the "Doppler shift" of the signal. Doppler shift is a change in the frequency when received at Earth due to the probe's motion in Titan's atmosphere, similar to the change in pitch of a passing train whistle.

"We provided the only real-time confirmation that the probe transmitted a signal at the expected time, released the stabilizer parachute and then impacted the surface," said Asmar. *"We did this by monitoring the Doppler shift in the frequency of the signal received at the Green Bank Telescope and the Parkes Telescope in Australia."*

CASSINI'S RADAR SPOTS GIANT CRATER ON TITAN

A giant impact crater the size of Iowa was spotted on Saturn's moon Titan by NASA's Cassini radar instrument during Tuesday's Titan flyby. Cassini flew within 1,577 kilometers (980 miles) of Titan's surface and its radar instrument took detailed images of the surface. This is the third close Titan flyby of the mission, which began in July 2004, and only the second time the radar instrument has examined Titan. Scientists see some things that look familiar, along with scenes that are completely new.

The new radar images are available at: <http://saturn.jpl.nasa.gov> and <http://www.nasa.gov/cassini>

"It's reassuring to look at two parts of Titan and see similar things," said Dr. Jonathan Lunine, Cassini interdisciplinary scientist. *"At the same time, there are new and strange things."*

This flyby is the first time that Cassini's radar and the imaging camera overlapped. This overlap in coverage should be able to provide more information about the surface features than either technique alone. The 440-kilometer-wide (273-mile) crater identified by the radar instrument was seen before with Cassini's imaging cameras, but not in this detail.

A second radar image shows features nicknamed "cat scratches". These parallel linear features are intriguing, and may be formed by winds, like sand dunes, or by other geological processes.

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.

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In February's Stargazer:

**** **OBSERVER'S INFORMATION**

**** **ASTRO CALENDAR**

**** **CONSTELLATION(S) OF THE MONTH:**

**** **TWIN MARS ROVERS CONTINUE EXPLORATION**

**** **SPACECRAFT HELP SOLVE SATURN'S MYSTERIOUS AURORAS**

**** **SLOAN DIGITAL SKY SURVEY NEW GALAXY ATLAS**

**** **ASTEROID COLLISIONS MAY ACCOUNT FOR STAR'S ODD APPEARANCE**

**** **BEGINNINGS OF 'MINI' SOLAR SYSTEM DISCOVERED**

**** **ASTRONOMERS IDENTIFY LARGEST STARS KNOWN**

**** **'BULLET STAR' SHINES 350 TIMES BRIGHTER THAN THE SUN**

**** **TITAN WIND SPEEDS**

**** **EVIDENCE BUILDS FOR SUPERNOVA'S ROLE IN SOLAR SYSTEM CREATION**

**** **CASSINI'S RADAR SPOTS GIANT CRATER ON TITAN**

**The next EAS Meeting is 4:00 P.M. Saturday, February 19th at the
Everett Public Library Auditorium. (Note new time / location !!!)**