



# The Stargazer

March 2006

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

See EAS website at:

[http://members.tripod.com/everett\\_astronomy](http://members.tripod.com/everett_astronomy)

## EAS BUSINESS...

**NEXT (THE MARCH) EAS MEETING - SATURDAY  
 MARCH 25<sup>TH</sup> AT 3:00 PM AT THE EVERETT PUBLIC  
 LIBRARY, IN THE AUDITORIUM (DOWNSTAIRS)**

**March 25<sup>th</sup> (March's) meeting – 3:00 PM**

**Our speaker is Victor P. Debattista, Brooks Fellow from the University of Washington Astronomy department, who does research is focused on galaxy formation, dynamics, evolution and modeling. He will present a talk on his supercomputer dynamical modeling of Barred Spiral Galaxies.**

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>

## CLUB STAR PARTY INFO

**Upcoming star party schedule – In hibernation for the winter.**

**People should send 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.

## Goldendale Observatory Messier Marathon Time

During the last half of the 18<sup>th</sup> century, French comet hunter Charles Messier discovered 13 comets. While comet hunting he found other things in the night sky. From 1758 – 1781 he kept a list of these non comets. We now know that these objects are really star clusters, nebulas and galaxies. Messier spent 23 years adding observations to his list.

You can see these objects in much less time than Messier did. During the month of March near the time of New Moon you can observe all but

one of the Messier Objects in ONE night. Amateur astronomers who wish to do so are welcome to come with your portable telescopes to Goldendale Observatory on Friday, March 24<sup>th</sup> and engage in the Messier Marathon. From dusk until dawn on the morning of March 25<sup>th</sup> you can scan the skies from the Observatory grounds to find these dim, fuzzy objects. You are encouraged to find accommodations before coming to the Observatory at either nearby State Park campgrounds or motels in Goldendale because the Observatory grounds must be vacated after the Messier Marathon is finished. See the following web site for maps and driving directions to Goldendale Observatory State Park: <http://www.perr.com/gosp.html>.

Clear Dark Skies and Good Seeing to You!

Stephen R. Stout  
 Interpretive Specialist  
 Goldendale Observatory  
[goldendale.observatory@parks.wa.gov](mailto:goldendale.observatory@parks.wa.gov)

## \$\$ - 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

### March 2006

Mar 13 - 20th Anniversary (1986), Giotto, Comet Halley Flyby  
 Mar 14 - Penumbral Lunar Eclipse  
 Mar 20 - Vernal Equinox, 18:26 UT  
 Mar 20 - Earth Day  
 Mar 24 – Goldendale Observatory Messier Marathon  
 Mar 25 - 10th Anniversary Comet Hyakutake Near-Earth Flyby (0.1 AU)  
**Mar 25 – March EAS Meeting – 3:00 PM at Everett Public Library**  
**Mar 25/26 – YVAS Messier Marathon Star Party - Ahtanum Park**  
 Mar 29 - Solar Eclipse (Visible From North Africa & Central Asia)

### April 2006

Apr 16 - Easter Sunday  
 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 - Eta Aquarids meteor shower peak  
**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 14 - Griffith Observatory reopens

### June 2006

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@lioninc.com](mailto:mlocke@lioninc.com), to borrow or donate any materials. See list here: [http://members.tripod.com/everett\\_astronomy/eas\\_library.htm](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 to 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](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

|        |                    |
|--------|--------------------|
| Mar 06 | First Quarter Moon |
| Mar 14 | Full Moon          |
| Mar 22 | Last Quarter Moon  |
| Mar 29 | New Moon           |
| Apr 05 | First Quarter Moon |
| Apr 13 | Full Moon          |
| 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           |

### 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](http://www.lpi.usra.edu/research/lunar_orbiter)

### UP IN THE SKY -- THE PLANETS

| Object         | Rises           | Transits       | Sets           | Con        | Mag          |
|----------------|-----------------|----------------|----------------|------------|--------------|
| <b>Sun</b>     | <b>6:06 am</b>  | <b>12:15</b>   | <b>18:26</b>   | <b>Psc</b> | <b>-27</b>   |
| <b>Mercury</b> | 5:22 am         | Daylight       | <b>19:15</b>   | <b>Psc</b> | <b>+1.5</b>  |
| <b>Venus</b>   | <b>04:18 am</b> | Daylight       | Daylight       | <b>Aqr</b> | <b>-4.4</b>  |
| <b>Mars</b>    | Daylight        | <b>17:42</b>   | <b>2:10 am</b> | <b>Tau</b> | <b>+0.8</b>  |
| <b>Jupiter</b> | <b>22:17</b>    | <b>3:11 am</b> | Daylight       | <b>Lib</b> | <b>-2.3</b>  |
| <b>Saturn</b>  | Daylight        | <b>20:31</b>   | <b>4:11 am</b> | <b>Can</b> | <b>-0.1</b>  |
| <b>Uranus</b>  | <b>5:31 am</b>  | Daylight       | Daylight       | <b>Aqr</b> | <b>+5.4</b>  |
| <b>Neptune</b> | <b>4:37 am</b>  | Daylight       | Daylight       | <b>Cap</b> | <b>+8.0</b>  |
| <b>Pluto</b>   | <b>01:01 am</b> | <b>5:52 am</b> | Daylight       | <b>Ser</b> | <b>+13.9</b> |

(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](http://skyandtelescope.com/observing/objects/planets/article_107_2.asp)

### RS Ophiuchi Outburst

This is a rare event - The last time RS Oph went nova was 1985. It has a very unusual spectrum. It has brightened from Magnitude 11 to 5. RS Oph is a close-orbiting binary pair: a red giant star, and a small blue star. Matter from the diffuse red star has been accreting on the surface of the dense blue star, and periodically builds up and explodes. RS Oph may produce light echoes like those captured by Hubble from V838 Monocerotis a few years back.

### Supernova in Messier 100

A Type 1A supernova was detected in the nearby galaxy M100 in the Virgo Cluster of Galaxies. It's expected to brighten up to Magnitude 12, which will make it visible in 6-inch telescopes. Type 1A supernovae are important "standard candles" for judging the scale of the universe, and Messier 100 is close enough to us for the Hubble Space Telescope to image Cepheid variable stars and compare their brightness to that of the supernova

## 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&all=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.

### 12" SCT Scope For Sale

12" Meade LX200 Schmidt-Cassegrain Telescope  
Purchased in 2001. 64K object GoTo controller.  
3048 mm f/10, BK7 super clear corrector plate,  
High Precision Pointing – 1 arc minute accuracy, 5.75"  
worm, Heavy-duty fork mount and giant field tripod.  
Also includes some accessories  
50MM Wide-Field, 15MM Super Plossl eyepiece -  
Purchased for \$4424+tax, asking \$3000  
It is still in the box, although he did use it a few times...

#### Contact information:

JoAnn Wilcox  
[jwilcox@mahlum.com](mailto:jwilcox@mahlum.com)  
w 206.816.1172  
h 206.932.3616

## 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.

**April 29, 4-5:30 PM, Kane Hall 120.**

## CONSTELLATIONS OF THE MONTH , YOUNG ASTRONOMER'S CORNER , ASTRONOMY AND TELESCOPE LINGO, PLANETARY FOCUS, ASTRONOMY FUN FACTS, AND MIRROR IMAGES

These columns will return next month.

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

### SCIENTISTS ISSUE UNPRECEDENTED FORECAST OF NEXT SUNSPOT CYCLE

The next sunspot cycle will be 30-50% stronger than the last one and begin as much as a year late, according to a breakthrough forecast using a computer model of solar dynamics developed by scientists at the National Center for Atmospheric Research (NCAR). Predicting the Sun's cycles accurately, years in advance, will help societies plan for active bouts of solar storms, which can slow satellite orbits, disrupt communications, and bring down power systems. The scientists have confidence in the forecast because, in a series of test runs, the newly developed model simulated the strength of the past eight solar cycles with more than 98% accuracy. The forecasts are generated, in part, by tracking the subsurface movements of the sunspot remnants of the previous two solar cycles. "Our model has demonstrated the necessary skill to be used as a forecasting tool," says NCAR scientist Mausumi Dikpati, the leader of the forecast team at NCAR's High Altitude Observatory that also includes Peter Gilman, and Giuliana de Toma.

Understanding the cycles - The Sun goes through approximately 11-year cycles, from peak storm activity to quiet and back again. Solar scientists have tracked them for some time without being able to predict their relative intensity or timing. Forecasting the cycle may help society anticipate solar storms, which can disrupt communications and power systems and affect the orbits of satellites. The storms are linked to twisted magnetic fields in the Sun that suddenly snap and release tremendous amounts of energy. They tend to occur near dark regions of concentrated magnetic fields, known as sunspots.

The team's computer model, known as the Predictive Flux-transport Dynamo Model, draws on research by scientists indicating that the evolution of sunspots is caused by a current of plasma, or electrified gas, that circulates between the Sun's equator and its poles over a period of 17 to 22 years. This current acts like a conveyor belt of sunspots.

The sunspot process begins with tightly concentrated magnetic field lines in the solar convection zone (the outermost layer of the Sun's interior). The field lines rise to the surface at low latitudes and form bipolar sunspots, which are regions of concentrated magnetic fields. When these sunspots decay, they imprint the moving plasma with a type of magnetic signature. As the plasma nears the poles, it sinks about 200,000 kilometers (124,000 miles) back into the convection zone and starts returning toward the equator at a speed of about one meter (three feet) per second or slower. The increasingly concentrated fields become stretched and twisted by the internal rotation of the Sun as they near the equator, gradually becoming less stable than the surrounding plasma. This eventually causes coiled-up magnetic field lines to rise up, tear through the Sun's surface, and create new sunspots.

The subsurface plasma flow used in the model has been verified with the relatively new technique of helioseismology, based on observations from NASA instruments. This technique tracks sound waves reverberating inside the Sun to reveal details about

the interior, much as a doctor might use an ultrasound to see inside a patient.

Predicting Cycles 24 and 25 - The Predictive Flux-transport Dynamo Model is enabling NCAR scientists to predict that the next solar cycle, known as Cycle 24, will produce sunspots across an area slightly larger than 2.5% of the visible surface of the Sun. The scientists expect the cycle to begin in late 2007 or early 2008, which is about 6 to 12 months later than a cycle would normally start. Cycle 24 is likely to reach its peak about 2012. By analyzing recent solar cycles, the scientists also hope to forecast sunspot activity two solar cycles, or 22 years, into the future. The NCAR team is planning in the next year to issue a forecast of Cycle 25, which will peak in the early 2020s. "*This is a significant breakthrough with important applications, especially for satellite-dependent sectors of society,*" explains Peter Gilman. High Altitude Observatory <http://www.hao.ucar.edu/>

### GO STAR HUNTING WITH "GLOBE AT NIGHT" PROGRAM -- MARCH 22- 29

What does it mean to REALLY see the stars? When you look at the night sky, are you awed by an endless swath of glittering jewels set against a deep velvet-black sky? Or do you see only a dozen or so pinpricks of light doggedly shining through the soft amber glow of streetlamps? How can light "pollution" make such a difference in the way the sky looks?

Classrooms, museums, and observatories in Tucson and elsewhere in Arizona will be joining thousands of other students, families, educators, and citizen-scientists by participating in "GLOBE at Night" -- an international event designed to observe and record how the constellation Orion looks from different locations as a means of measuring the brightness of the sky at a variety of urban and rural sites. Participation is open to anyone -- anywhere in the world -- who can get outside and look skyward in the evening during the week of March 22-29, 2006. This week was chosen because the Moon does not rise until after midnight.

Media are invited to interview Tucson-area teachers and students, and to join them in making their observations during that week.

*"The quality of the night sky for astronomy observations is affected by human activities. In turn, artificial lights with appropriate fixtures are necessary for safety and commerce,"* says Dr. Connie Walker, a senior education specialist and scientist at the National Optical Astronomy Observatory (NOAO) in Tucson, one of the event's co-sponsors. *"By locating specific constellations in the sky, students from around the world will learn how extensively the lights in their community may contribute to light pollution."*

*"In many parts of the world, a tremendous amount of precious electrical energy is being wasted through poorly designed and shielded streetlights. This program will help us better understand how we can more safely light our streets, save energy, and enjoy the night sky,"* says Dr. Stephen Pompea, manager of science education and scientist at NOAO. *"One of the program's goals is to record 5,000 observations from around the world. We hope and expect that a fair fraction will come from Tucson, a city famous for its night-sky friendly streetlights and for being the headquarters of the International Dark-Sky Association."*

Students will explore the different light sources in their community to learn about the relationship between science, technology and society, and report their observations online through a central database, allowing for authentic worldwide research and analysis. The observations made during GLOBE at Night will help students and scientists together assess how the quality of the night sky

varies around the world. There is no cost to participate in GLOBE at Night. Here's How to Participate in GLOBE at Night!

\* Visit <http://www.globe.gov/globeatnight>

- \* Download the GLOBE at Night Activity Packet
- \* Choose a clear night during the week of March 22-29, 2006
- \* Find the constellation Orion
- \* Compare what you see to the Magnitude Charts
- \* Report your observations on the Web site
- \* Sign up for the GLOBE at Night mailing list to receive the results of this international event!

What Students Will Learn:

- \* How to locate and identify constellations in the night sky
- \* How their view of the night sky is impacted by light pollution
- \* How science and technology have produced local and global challenges
- \* How light energy is distributed at local and global scales
- \* How effective and efficient different light sources are in their environment
- \* Some of the economic factors involved in light pollution in their community
- \* How to understand patterns of human population distribution

### STARDUST FINDINGS MAY ALTER VIEW OF COMET FORMATION

Samples from comet Wild (pronounced 'vilt') 2 have surprised scientists, indicating the formation of at least some comets may have included materials ejected by the early sun to the far reaches of the solar system. Scientists have found minerals formed near the sun or other stars in the samples returned to Earth by the Stardust spacecraft in January. The findings suggest materials from the center of the solar system could have traveled to the outer reaches where comets formed. This may alter the way scientists view the formation and composition of comets. *"The interesting thing is we are finding these high-temperature minerals in materials from the coldest place in the solar system,"* said **Donald Brownlee, Stardust principal investigator from the University of Washington, Seattle.**

Scientists have long thought of comets as cold, billowing clouds of ice, dust and gases formed on the edges of the solar system. But comets may not be so simple or similar. They may prove to be diverse bodies with complex histories. Comet Wild 2 seems to have had a more complex history than thought.

*"We have found very high-temperature minerals, which supports a particular model where strong bipolar jets coming out of the early sun propelled material formed near to the sun outward to the outer reaches of the solar system,"* said Michael Zolensky, Stardust curator and co-investigator at Johnson Space Center. *"It seems that comets are not composed entirely of volatile rich materials but rather are a mixture of materials formed at all temperature ranges, at places very near the early sun and at places very remote from it."*

One mineral found in the material brought back by Stardust is olivine, a primary component of the green sand found on some Hawaiian beaches. It is among the most common minerals in the universe, but scientists were surprised to find it in cometary dust. Olivine is a compound of iron, magnesium and other elements. The Stardust sample is primarily magnesium. Along with olivine, the dust from Wild 2 contains high-temperature minerals rich in calcium, aluminum and titanium.

Stardust passed within 149 miles of comet Wild 2 in January 2004, trapping particles from the comet in an exposed gel. Its return capsule parachuted to the Utah desert on Jan. 15. The

science canister with the Wild 2 sample arrived at Johnson on Jan. 17. Samples have been distributed to approximately 150 scientists for study. *"The collection of cometary particles is greater than we ever expected,"* said Deputy Principal Investigator Peter Tsou. *"The collection includes about two dozen large tracks visible to the unaided eye."* The grains are tiny, most smaller than a hair's width. Thousands of them appear to be embedded in the glass-like aerogel. A single grain of 10 microns, only one-hundredth of a millimeter (.0004 inches), can be sliced into hundreds of samples for scientists.

In addition to cometary particles, Stardust gathered interstellar dust samples during its seven-year journey. The team at Johnson's curatorial facility hopes to begin detailed scanning of the interstellar tray within a month. They will initiate the Stardust at Home project. It will enable volunteers from the public to help scientists locate particles.

After registering, Stardust at Home participants may download a virtual microscope. The microscope will connect to a server and download "focus movies." The movies are images of the Stardust Interstellar Dust Collector from an automated microscope at the Cosmic Dust Lab at Johnson. Participants will search each field for interstellar dust impacts.

Comet from coldest spot in solar system has material from hottest places - scientists analyzing the samples of comet dust have discovered minerals that formed near the sun or other stars. That means materials from the innermost part of the solar system could have traveled to the outer reaches, where comets formed. *"The interesting thing is we are finding these high-temperature minerals in materials from the coldest place in the solar system,"* said Brownlee.

Among the finds in material brought back by Stardust is olivine, a mineral that is the primary component of the green sand found on some Hawaiian beaches. It is among the most common minerals in the universe, but finding it in comet Wild 2 could challenge a common view of how such crystalline materials form.

Olivine is a compound of iron, magnesium and other elements, in which the iron-magnesium mixture ranges from being nearly all iron to nearly all magnesium. The Stardust sample is primarily magnesium. Many astronomers believe olivine crystals form from glass when it is heated close to stars, Brownlee said. One puzzle is why such crystals came from Wild 2, a comet that formed beyond the orbit of Neptune when the solar system began some 4.6 billion years ago. *"It's certain such materials never formed inside this icy, cold body,"* Brownlee said.

The comet traveled the frigid environs of deep space until 1974, when a close encounter with Jupiter brought it to the inner solar system. Besides olivine, the dust from Wild 2 also contains exotic, high-temperature minerals rich in calcium, aluminum and titanium. *"I would say these materials came from the inner, warmest parts of the solar system or from hot regions around other stars,"* Brownlee said. *"The issue of the origin of these crystalline silicates still must be resolved. With our advanced tools, we can examine the crystal structure, the trace element composition and the isotope composition, so I expect we will determine the origin and history of these materials that we recovered from Wild 2."*

Stardust's captured dust from comet Wild 2 in January 2004, and the sample-return capsule parachuted to the Utah desert on Jan. 15 to complete the seven-year mission. The samples from Wild 2 were taken to the National Aeronautics and Space Administration's Johnson Space Center in Houston, and from there they have been sent to about 150 scientists around the world, who are using a variety of techniques to determine the

properties of the comet grains. The grains are very tiny, most much smaller than a hair's width. But there appear to be thousands of them embedded in the unique glassy substance called aerogel that was used to snare the particles propelled from the body of the comet. A grain of 10 microns -- one-hundredth of a millimeter -- can be sliced into hundreds of samples for scientists to study. *"It's not much, but still it's so much that we're almost overwhelmed,"* Brownlee said, noting that his lab has only worked on two particles so far. *"The first grain we worked on, we haven't even cut into the main part of the particle yet."*

The material, which came from the very outer edges of the solar system, has been preserved since the start of the solar system in the deep freeze of space 50 times farther away from the sun than Earth is. Brownlee believes the material will provide key information about how the solar system was formed. *"A fundamental question is how much of the comet material came from outside the solar system and how much of it came from the solar nebula, from which the planets were formed,"* he said. *"We should be able to answer that question eventually."*

### WEIRD SATURN RING SPOKES MAY REAPPEAR IN JULY

Unusual spokes that appear fleetingly on the rings of Saturn only to disappear for years at a time may become visible again by July, according to a new study spearheaded by the University of Colorado at Boulder. The spokes, which are up to 6,000 miles long and 1,500 miles in width, were first spotted 26 years ago by the Voyager spacecraft, said Professor Mihaly Horanyi. But when the Cassini spacecraft arrived at Saturn in July of 2004, the striking radial features that cut across Saturn's ring plane were nowhere to be found -- an event that disappointed and puzzled many scientists, he said.

The Hubble Space Telescope occasionally observed the ring spokes in the late 1990s, said Horanyi. But the spokes gradually faded, a result of Saturn's seasonal, orbital motion and its tilted axis of rotation that altered the light-scattering geometry. *"The spokes were switched off by the time Cassini arrived,"* said Horanyi. *"We think it is a seasonal phenomena related to the sun rising and setting over the ring plane that changes the physical environment there, making it either friendly or hostile to their formation."*

The spokes are made up of tiny dust particles less than a micron in width -- about 1/50th the width of a human hair -- that collect electrostatic charges in the plasma environment of the rings and become subject to electrical and magnetic forces, said Horanyi. The right conditions cause them to gain an extra electron, allowing them to leap en masse from the surface of ring debris for brief periods, collectively forming the giant spokes that appear dark against the lit side of the rings and bright against the unlit side of the rings. The researchers hypothesize that the conditions for the spokes to form are correlated to a decrease in the angle of the ring plane to the sun. *"Because the rings are more open to the sun now than when Voyager flew by, the charging environment above the rings has prevented the formation of the spokes until very recently,"* the researchers wrote in Science. Cassini first imaged a "puny version" of Saturn's spoke rings from a distance of 98,000 miles in early September that were only about 2,200 miles in length and about 60 miles wide, said Horanyi. The team believes the spoke sighting may have been an "early bird" event. As the ring plane angle decreases when Saturn is near its two seasonal equinoxes, the conditions appear to become more suitable for the formation of the eerie spokes, said Horanyi. Although Cassini currently is orbiting too close to the ring plane to make observations, the researchers expect the spoke activity to

have returned by the time the spacecraft increases its inclination in July 2006.

Once the spokes are visible again, the research team believes there will be spoke activity for about eight years, based on the fact that it takes Saturn about 30 Earth-years to complete one orbit around the sun, said Horanyi. The eight-year period should be followed by about six-to-seven years of a spoke hiatus, he said. The dust grains levitated by plasma during spoke-forming periods are probably hovering less than 50 miles above the rings themselves and they scatter light from the sun differently than do the rings themselves, he said. But there are still many questions about the spokes, said Horanyi. *"We don't know if they form by rapidly expanding, or if they form all at once,"* he said. During the Voyager mission, they were absent during one observation, but fully developed in a follow-up observation made just five minutes later, Horanyi said. *"This is a weird phenomena; we don't have the full story on it yet,"* he said.

<http://www.colorado.edu/news/releases/2006/images/102.jpg>

### WATER MAY NOT HAVE FORMED MARS' RECENT GULLIES

If you're a scientist studying the surface of Mars, few discoveries could be more exciting than seeing recent gullies apparently formed by running water. And that's what scientists believed they saw in Mars Orbital Camera (MOC) images five years ago. They published a paper in Science on MOC images that show small, geologically young ravines. They concluded that the gullies are evidence that liquid water flowed on Mars' surface sometime within the last million years. A word of caution, though: The moon has gullies that look like that, a researcher has found. And water certainly didn't form gullies on the waterless moon.

Gwendolyn Bart said *"We'd all like to find liquid water on Mars,"* *"That would be really, really exciting. If there were liquid water on Mars, humans wouldn't have to ship water from Earth when they go to explore the planet. That would be an enormous cost savings. And liquid water near the surface of Mars would greatly increase the chances for native life on Mars."*

The 2000 Science paper was provocative, Bart said. *"But I was skeptical. I wondered if there is another explanation for the gullies."* Then last year she heard a talk by Allan Treiman of the Lunar and Planetary Institute. Treiman suggested the Martian gullies might be dry landslides, perhaps formed by wind and not formed by water at all.

Recently, Bart was studying the lunar landscape in high-resolution images taken in 1969, prior to the Apollo landings, for her research on processes that modify the lunar surface. *"Totally by accident, I saw gullies that looked strikingly like the gullies on Mars,"* she said. *"If the dry landslide hypothesis for the formation of Martian gullies is correct, we might expect to see similar features on the moon, where there is no water,"* she said. *"We do."* Gullies in the moon's 10-mile-diameter (17 kilometer) crater Dawes are similar in structure and size to those in a Martian crater that MOC photographed. Micrometeorites hitting the smooth slopes and crater on the airless moon could easily trigger small avalanches that form gullies, Bart said. However, the Martian gullies also resemble gullies on Earth that were formed by water, she noted. *"My point is that you can't just look at the Mars gullies and assume they were formed by water. It may be, or may be not. We need another test to know."*

### NEW TECHNIQUE GIVES FIRST FULL VIEW OF FAR SIDE OF SUN

The hidden face of the sun is fully visible for the first time, thanks to a new technique developed at Stanford University. Only half of

the sun -- the near side -- is directly observable. The far side always faces away from Earth and is therefore out of view. But the new technology allows anyone with a computer to download images of the entire solar surface -- an important advance with practical applications, say researchers, because potentially damaging solar storms that form on the far side now can be detected days, or even weeks, before they wreak havoc on Earth.

*"Sunspots, solar flares and other active regions on the surface of the sun emit radiation that can interfere with orbiting satellites, telecommunications and power transmission,"* says Philip Scherrer. *"This new method allows more reliable warning of magnetic storms brewing on the far side that could rotate with the sun and threaten the Earth."* It takes about 27 days for the sun to rotate on its axis, so an active region that forms on the far side can remain hidden for up to 13 days and surprise Earth-bound observers when it finally rotates into view. That's what happened in October 2003, when active regions from the back side suddenly appeared on the eastern edge of the sun, spewing X-rays, ultraviolet radiation and high-energy particles into space. *"We were not able to make a public prediction about the intensity of that activity, because at the time we could only image about a quarter to a third of the far side,"* Scherrer says. *"The new method allows us to see the entire far side, including the poles."*

Scherrer and his Stanford colleagues study the sun using data from the Solar and Heliospheric Observatory (SOHO), a research satellite launched in 1995. On board SOHO is the Michelson Doppler Imager (MDI), an electronic instrument that creates images of the sun's interior by measuring the velocity of sound waves produced by hot, bubbling gases that well up to the surface -- a technique called acoustic helioseismology. *"Helioseismology works on the same principle as medical ultrasound, which can create an image of a fetus inside a pregnant woman,"* Scherrer explains. *"In this case, we're looking through a star with sound waves."*

Positioned about 1 million miles above Earth, the SOHO satellite always faces the visible side of the sun. In 2000 and 2001, scientists Charles Lindsey and Doug Braun developed two techniques that resulted in the first pictures of the sun's back side. However, both techniques had limitations. One method only produced images near the center of the far side, while the other was restricted to views at the edges. To get a complete image, researchers would have to combine both methods, but that proved to be a major technical challenge. The problem was finally overcome last summer when a new computer algorithm was developed by the Stanford SOHO/MDI team in collaboration with Kenneth Oslund. Their work resulted in the MDI Farside Graphics Viewer, which displays the first full images of the far side of the sun. See many images and explanations at [http://soi.stanford.edu/press/farside\\_Feb2006/web/](http://soi.stanford.edu/press/farside_Feb2006/web/)

Solar max - *"This new method is a vast improvement,"* Scherrer says. *"It should be especially important during the next solar maximum, which should begin in 2011, when solar activity will be at its peak."* He points out that during the last "solar max," which lasted from 2000 to 2003, solar storms temporarily knocked out power in the northern parts of Sweden and Canada and destroyed a satellite that was used to verify credit card payments at numerous gas stations in the United States. Air transportation also can be disrupted when solar radiation interferes with the operation of Global Positioning System satellites, or when aircraft that take shortcuts over the North Pole have to take longer routes to prevent passengers and crew from being exposed to intense X-ray radiation.

"Our goal is to give pilots and air traffic controllers a day or two notice of a possible solar event," Scherrer says, adding that missions to Mars and other planets also can be affected when solar storms interfere with satellite communications to Earth. Last week, researchers at the National Center for Atmospheric Research in Colorado released new computer models predicting that the next solar cycle will be 30 to 50 percent stronger than last time. In 2008, SOHO is scheduled to be replaced by NASA's Solar Dynamics Observatory (SDO), a more advanced satellite designed to provide new data about the magnetic forces inside the sun that drive the 11-year solar cycle. *"With cell phones and other devices, we've gotten more and more dependent on the space environment, so there are real economic reasons for missions like SOHO and SDO,"* Scherrer says. Videos and high-resolution images of the far side of the sun are available at <http://sohowww.nascom.nasa.gov/>

### HUBBLE IMAGES SHOW SIMILAR COLORS FOR PLUTO'S MOONS

Using new Hubble Space Telescope observations, a team led by Dr. Hal Weaver and Dr. Alan Stern has found that Pluto's three moons are essentially the same color -- boosting the theory that the Pluto system formed in a single, giant collision. The team determined that Pluto's two "new" satellites, discovered in May 2005 and provisionally called S/2005 P1 and S/2005 P2, have identical colors to one another and are essentially the same, neutral color as Charon, Pluto's large moon discovered in 1978. All three satellites have surfaces that reflect sunlight with equal efficiency at all wavelengths, which means they have the same color as the Sun or Earth's moon. In contrast, Pluto has more of a reddish hue.

The new observations were obtained March 2 with the high-resolution channel of the Hubble's Advanced Camera for Surveys. The team determined the bodies' colors by comparing the brightness of Pluto and each moon in images taken through a blue filter with those taken through a green/red filter. The images are available on the Hubble Web site at <http://hubblesite.org/newscenter/newsdesk/archive/releases/2006/15/>

*"The high quality of the new data leaves little doubt that the hemispheres of P1 and P2 that we observed have essentially identical, neutral colors,"* says Weaver. The new results further strengthen the hypothesis that Pluto and its satellites formed after a collision between two Pluto-sized objects nearly 4.6 billion years ago. *"Everything now makes even more sense,"* says Stern. *"If all three satellites presumably formed from the same material lofted into orbit around Pluto from a giant impact, you might well expect the surfaces of all three satellites to have similar colors."*

The researchers hope to make additional Hubble color observations, in several more filters, to see if the similarity among the satellites persists to longer (redder) wavelengths. They have proposed to obtain compositional information on the new satellites by observing them at near-infrared wavelengths, where various ice and mineral absorptions are located. The researchers also hope to better refine the orbits of P1 and P2 and measure the moons' shapes and rotational periods.

### ASTRONOMERS DISCOVER ORIGINS OF 'EXTREME HELIUM STARS'

An group of astronomers including Dr. David Lambert, has used Hubble Space Telescope to determine the origin of a very unusual and rare type of star. The group's studies indicate that the so-called "extreme helium stars" are formed by the merger of two white dwarf stars. *"It's taken more than 60 years after the first*

*discovery at McDonald to get some idea of how these formed,"* Rao said. He has been studying these types of stars for more than 30 years. *"We are now getting a consistent picture."* The nature of the first extreme helium star, HD 124448, was discovered at McDonald Observatory in 1942 by Daniel M. Popper. Since then, fewer than two dozen of these stars have been identified. They are supergiant stars -- less massive than the Sun but many times larger and hotter -- and remarkable for their strange compositions. They contain almost no hydrogen, the most abundant chemical element in the universe, and the most basic component of all stars. Instead, they are dominated by helium, with significant amounts of carbon, nitrogen, and oxygen, and traces of all other stable elements.

The origin of extreme helium stars cannot be traced back to formation in a cloud of helium gas, since no such clouds exist in our Milky Way galaxy. Nuclear reactions in a star like the Sun convert hydrogen to helium to provide sunlight or starlight. Since the helium is confined the hot core of a star, the star must lose vast amounts of gas before the helium is at the star's surface -- and thus detectable by telescopes. No known mechanism inside the star can drive off the overlying layers to expose the helium.

Two decades ago, astronomers Ronald Webbink and Icko Iben introduced the theory that extreme helium stars formed from the merger of two white dwarfs. White dwarfs are the end product of the evolution of stars like the Sun. They don't contain much hydrogen. Some are rich in helium, and others in carbon and oxygen. A pair of white dwarfs can result from the evolution of a normal binary star (two normal stars in orbit around each other). Webbink and Iben supposed that, in some cases, one star in the binary may evolve as a helium-rich white dwarf, and the other as a carbon-oxygen-rich white dwarf. Over billions of years of orbiting each other, the two stars lose energy and move steadily closer to each other. Eventually, the helium white dwarf is consumed by the more massive carbon-oxygen white dwarf. The resultant single star swells up to become a helium-rich supergiant star.

To test this theory, astronomers needed to uncover the exact chemical composition of extreme helium stars. This is what Pandey, Lambert, and their colleagues set out to do. They obtained crucial observations with NASA's Hubble Space Telescope, and made supporting observations from the 2.7-meter Harlan J. Smith Telescope at McDonald Observatory and the 2.3-meter Vainu Bappu Telescope in India. *"As an aside,"* Lambert said, *"it's interesting to note that the namesakes of these two telescopes, Harlan J. Smith and Vainu Bappu, were the very best of friends in graduate school at Harvard."* Later, Smith served as director of McDonald Observatory from 1963 to 1989. Vainu Bappu founded the Indian Institute of Astrophysics. *"Today, with collaborations like this project,"* Lambert said, *"we're maintaining the important international and personal ties that astronomy thrives upon."*

The group made detailed studies of the ultraviolet light coming from seven extreme helium stars with Hubble Space Telescope's STIS instrument (the Space Telescope Imaging Spectrograph) and of the optical light from the telescopes in Texas and India. This data provided them with the specific amounts of at least two dozen different chemical elements present in each star they studied.

According to Rao, it is the advance in technology of being able to observe the spectra of these stars in ultraviolet light with Hubble that made this breakthrough study possible more than 60 years after extreme helium stars were discovered. The Hubble results match up well with predicted compositions from models of the composition of a star formed through the merger of two white

dwarf stars in which the helium-core white dwarf is torn apart, and forms a thick disk around the carbon-oxygen white dwarf. Then, in a process taking only a few minutes, the disk is gravitationally pulled into the carbon-oxygen white dwarf. What happens next depends on the mass of the new, resulting star. If it is above a certain mass, called the Chandrasekar limit, it will explode (specifically, it will explode as a Type Ia supernova). However, if the mass is below this limit, the new merged star will balloon up into a supergiant, eventually becoming an extreme helium star. Pandey, Lambert, Jeffery, and Rao plan to continue their research on extreme helium stars, using both the Smith and Hobby-Eberly Telescopes at McDonald Observatory. They hope to identify more extreme helium stars, and discover even more chemical elements in these stars.

### CHANDRA FINDS EVIDENCE FOR QUASAR IGNITION

Scientists using the Chandra X-ray Observatory have detected an extensive halo of hot gas around a quiescent spiral galaxy. This discovery is evidence that galaxies like our Milky Way are still accumulating matter from the gradual inflow of intergalactic gas. *"What we are likely witnessing here is the ongoing galaxy formation process,"* said Kristian Pedersen, lead author of a report on the discovery.

Chandra observations show that the hot halo extends more than 60,000 light years on either side of the disk of the galaxy known as 4C37.43. The detection of such a large halo alleviates a long-standing problem for the theory of galaxy formation. Spiral galaxies are thought to form from enormous clouds of intergalactic gas that collapse to form giant, spinning disks of stars and gas. One prediction of this theory is that large spiral galaxies should be immersed in halos of hot gas left over from the galaxy formation process. Hot gas has been detected around spiral galaxies in which vigorous star formation is ejecting matter from the galaxy, but until now hot halos due to infall of intergalactic matter have not been detected.

*"Our observations solve the mystery of the missing hot halos around spiral galaxies,"* said Pedersen. *"The halos exist, but are so faint that an extremely sensitive telescope such as Chandra is needed to detect them."* 4C37.43 is a massive spiral galaxy about a 100 million light years from Earth. Its disk of stars and gas is viewed almost edge-on. The galaxy shows no signs of unusual star formation, or energetic activity from its nuclear region, making it unlikely that the hot halo is produced by gas flowing out of the galaxy. *"We targeted 4C37.43 because we thought its distance and orientation would give us the best chance to detect a hot halo caused by the infall of intergalactic gas,"* said Jesper Rasmussen, a coauthor of the report. *"What we found is in good agreement with computer simulations in which galaxies are built up gradually from the merger of smaller clouds of hot gas and dark matter."*

### THE SUN'S NEW NEIGHBOR - VERY COOL BROWN DWARF DISCOVERED AROUND STAR IN THE SOLAR NEIGHBORHOOD

Using the Very Large Telescope in Chile, a team of researchers discovered a brown dwarf belonging to the 24th closest stellar system to the Sun. Brown dwarfs are intermediate objects that are neither stars nor planets. This object is the third closest brown dwarf to the Earth yet discovered, and one of the coolest, having a temperature of about 750 degrees Centigrade. It orbits a very small star at about 4.5 times the mean distance between the Earth and the Sun. Its mass is estimated to be somewhere between 9 and 65 times the mass of Jupiter. At a time when astronomers are peering into the most distant Universe, looking at objects as far as 13 billion light-years away, one may think that our close neighborhood would be very well known. Not so.

Astronomers still find new star-like objects in our immediate vicinity. Using the VLT, they just discovered a brown dwarf companion to the red star SCR 1845-6357, the 36th closest star to the Sun.

*"This newly found brown dwarf is a valuable object because its distance is well known, allowing us to determine with precision its intrinsic brightness,"* said team member Markus Kasper (ESO). *"Moreover, from its orbital motion, we should be able in a few years to estimate its mass. These properties are vital for understanding the nature of brown dwarfs."*

To discover this brown dwarf, the team used the high-contrast adaptive optics NACO Simultaneous Differential Imager (SDI) on the Very Large Telescope, an instrument specifically developed to search for extrasolar planets. The SDI camera enhances the ability of the VLT and its adaptive optics system to detect faint companions that would normally be lost in the glare of the primary star. In particular, the SDI camera provides additional, often very useful spectral information which can be used to determine a rough temperature for the object without follow-up observations. Located 12.7 light-years away from us, the newly found object is nevertheless not the closest brown dwarf. This honor goes indeed to the two brown dwarfs surrounding the star Epsilon Indi, located 11.8 light years away.

However, this newly discovered brown dwarf is unique in many aspects. *"Besides being extremely close to Earth, this object is a T dwarf -- a very cool brown dwarf -- and the only such object found as a companion to a low-mass star,"* said Beth Biller, a graduate student and lead author of the paper reporting the discovery. *"It is also likely the brightest known object of its temperature because it is so close."* The discovery of this brown dwarf hints that, at least close to the Sun, cool brown dwarfs prefer to be part of a couple with a star or another brown dwarf, rather than wandering alone in the cosmic emptiness. Indeed, of the seven cool brown dwarfs that reside within 20 light years of the Sun, five have a companion. *"This has wide-ranging implications for theories of brown dwarf formation, which, until now, tend to favor the production of single brown dwarfs,"* said team member Laird Close. <http://www.eso.org/outreach/press-rel/pr-2006/phot-11-06.html>

The NACO SDI camera is a unique type of camera using adaptive optics, which removes the blurring effects of Earth's atmosphere to produce extremely sharp images. SDI splits light from a single star into four identical images and then passes the resulting beams through three slightly different (methane-sensitive) filters. Only cool low-mass objects will have methane in their atmospheres and so only these objects will change brightness in the SDI filters. When the filtered light beams hit the camera's detector array, astronomers can subtract the images so the bright star disappears, revealing a fainter, cooler object otherwise hidden in the star's scattered light halo ("glare").

### MINI-COMETES APPROACHING EARTH

A cometary "string-of-pearls" will fly past Earth in May closer than any comet has come in almost 80 years. In 1995, Comet 73P/Schwassmann-Wachmann 3 did something unexpected: it fell apart. For no apparent reason, the comet's nucleus split into at least three "mini-comets" flying single file through space. Astronomers watched with interest, but the view was blurry even through large telescopes. "73P" was a hundred and fifty million miles away. We're about to get a much closer look. In May 2006 the fragments are going to fly past *Earth closer than any comet has come in almost eighty years.* *"This is a rare opportunity to watch a comet in its death throes—from very close range,"* says Don Yeomans, head of NASA's Near Earth Object Program at

JPL. *There's no danger of a collision. "Goodness, no," says Yeomans. "The closest fragment will be about six million miles away--or twenty-five times farther than the Moon."* That's close without actually being scary.

The flyby is a big deal. *"The Hubble Space Telescope will be watching,"* says Yeomans. *"Also, the giant Arecibo radar in Puerto Rico will 'ping' the fragments to determine their shape and spin."* Even backyard astronomers will be able to take pictures as the mini-comets file through the constellations Cygnus and Pegasus on May 12, 13 and 14. Ironically these comets, so nearby, will not be very bright. The largest fragments are expected to glow like 3rd or 4th magnitude stars, only dimly visible to the unaided eye. *"Remember,"* says Yeomans, *"these are mini-comets."* They're not like the Great Comets Hayutake and Hale-Bopp of 1996 and 1997. Those could be seen with the naked eye from light-polluted cities. The fragments of 73P, on the other hand, are best viewed from the countryside--and don't forget your binoculars.

The number of fragments is constantly changing. When the breakup began in 1995 there were only three: A, B and C. Astronomers now count at least eight: big fragments B and C plus smaller fragments G, H, J, L, M and N. *"It looks as though some of the fragments are themselves forming their own sub-fragments,"* says Yeomans, which means the number could multiply further as 73P approaches. No one knows how long the "string of pearls" will be when it finally arrives.

Bonus: There could be a meteor shower, too.

This is very uncertain, indeed, forecasters consider it unlikely. But an expanding cloud of dust from the 1995 break-up of the comet could brush past Earth in May 2006 producing a display of meteors.

Astronomer Paul Wiegert has studied the possibility: *"We believe the cloud is expanding too slowly to reach Earth only eleven years after the break-up,"* he says, *"but it all depends on what caused the comet to fly apart--and that we don't know."* "The most likely explanation is thermal stress, with the icy nucleus cracking like an ice cube dropped into hot soup: the comet broke apart as it approached the Sun after a long sojourn the frigid outer solar system," he explains. *"If this is truly what happened, then the debris cloud should be expanding slowly, and there will be no strong meteor shower."*

Clouds of comet dust from Comet 73P are expected to miss Earth in 2006. On the other hand, what if "the comet was shattered by a hit from a small interplanetary boulder?" A violent collision could produce faster-moving debris that would reach Earth in 2006. Wiegert expects to see nothing, but he encourages sky watchers to be alert. It wouldn't be the first time a dying comet produced a meteor shower: *"One outstanding example is comet Biela, which was seen to split in 1846, and had completely broken apart by 1872,"* he says. *"At least three very intense meteor showers (3000-15000 meteors per hour) were produced by this dying comet in 1872, 1885 and 1892."* Assuming a thermal breakup for 73P, Wiegert and colleagues have calculated the most likely trajectory of its dust cloud. Their results: dust should reach Earth in 2022, *"producing a minor meteor shower--nothing spectacular. However,"* he adds, *"the ongoing splitting of the comet means new meteoroids are being sent in new directions, so a future strong meteor shower from 73P remains a real possibility."* The watch begins on May 12<sup>th</sup>

## **GALAXY ON FIRE! SPITZER TELESCOPE REVEALS STELLAR 'SMOKE' IN M82**

Where there's smoke, there's fire - even in outer space. A new infrared image from the Spitzer Space Telescope shows a burning hot galaxy whose fiery stars appear to be blowing out giant billows of smoky dust. The galaxy, called Messier 82, or the "Cigar galaxy," in Ursa Major (easily visible in amateur scopes) was previously known to host a hotbed of young, massive stars. The new Spitzer image reveals, for the first time, the "smoke" surrounding those stellar fires. *"We've never seen anything like this,"* said Dr. Charles Engelbracht. *"This unusual galaxy has ejected an enormous amount of dust to cover itself with a cloud brighter than any we've seen around other galaxies."* The false-colored view, online at <http://www.spitzer.caltech.edu/Media>, shows Messier 82, an irregular-shaped galaxy positioned on its side, as a diffuse bar of blue light. Fanning out from its top and bottom like the wings of a butterfly are huge red clouds of dust believed to contain a compound similar to car exhaust. The smelly material, called polycyclic aromatic hydrocarbon, can be found on Earth in tailpipes, barbecue pits and other places where combustion reactions have occurred. In galaxies, the stuff is created by stars, whose winds and radiation blow the material out into space. *"Usually you see smoke before a fire, but we knew about the fire in this galaxy before Spitzer's infrared eyes saw the smoke,"* said Dr. David Leisawitz, Spitzer program scientist at NASA.

These hazy clouds are some of the biggest ever seen around a galaxy. They stretch out 20,000 light-years away from the galactic plane in both directions, far beyond where stars are found. Previous observations of Messier 82 had revealed two cone-shaped clouds of very hot gas projecting outward below and above the center of galaxy. Spitzer's sensitive infrared vision allowed astronomers to see the galaxy's dust.

*"Spitzer showed us a dust halo all around this galaxy,"* said Engelbracht. *"We still don't understand why the dust is all over the place and not cone-shaped."* Cone-shaped clouds of dust around this galaxy would have indicated that its central, massive stars had sprayed the dust into space. Instead, Engelbracht and his team believe stars throughout the galaxy are sending off the "smoke signals."

Messier 82 is located about 12 million light-years away in the Ursa Major constellation. It is undergoing a renaissance of star birth in its middle age, with the most intense bursts of star formation taking place at its core. The galaxy's interaction with its neighbor, a larger galaxy called Messier 81, is the cause of all the stellar ruckus. Our own Milky Way galaxy is a less hectic place, with dust confined to the galactic plane.

### **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 March's Stargazer:**

- \*\*\*\* OBSERVER'S INFORMATION**
- \*\*\*\* ASTRO CALENDAR**
- \*\*\*\* SCIENTISTS ISSUE UNPRECEDENTED FORECAST OF NEXT SUNSPOT CYCLE**
- \*\*\*\* GO STAR HUNTING WITH "GLOBE AT NIGHT" PROGRAM -- MARCH 22- 29**
- \*\*\*\* STARDUST FINDINGS MAY ALTER VIEW OF COMET FORMATION**
- \*\*\*\* WEIRD SATURN RING SPOKES MAY REAPPEAR IN JULY**
- \*\*\*\* WATER MAY NOT HAVE FORMED MARS' RECENT GULLIES**
- \*\*\*\* NEW TECHNIQUE GIVES FIRST FULL VIEW OF FAR SIDE OF SUN**
- \*\*\*\* HUBBLE IMAGES SHOW SIMILAR COLORS FOR PLUTO'S MOONS**
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- \*\*\*\* CHANDRA FINDS EVIDENCE FOR QUASAR IGNITION**
- \*\*\*\* MINI-COMETES APPROACHING EARTH**
- \*\*\*\* GALAXY ON FIRE! SPITZER TELESCOPE REVEALS STELLAR 'SMOKE' IN M82**

**The next EAS Meeting is 3:00 P.M. SATURDAY, March 25<sup>th</sup> 2006  
at the Everett Public Library Auditorium.**