

SIDEREAL TIMES

The Official Publication of the
Amateur Astronomers Association of Princeton

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From the Director

Dec 13 AAAP Meeting (Peyton Hall, Princeton Campus, 8:00 PM). Our astronomical excursion through the realm of high science continues with this month's presentation, featuring cutting edge research from one of NASA's brighter stars. Program Chair Ken Kremer has invited **Dr. Kimberly Weaver** of the Goddard Space Flight Center in Maryland, who will present "*New Eyes on the Universe: Observing Beyond Hubble with the Chandra and Spitzer Space Telescopes*". In pursuing interests in extragalactic astrophysics using the NASA orbiting observatories, Dr. Weaver has authored a new book "*The Violent Universe: Joyrides through the X-ray Cosmos* (reviewed in Sky and Telescope Dec 2005, p.102). She'll participate in a book signing at the lecture, and with help from the Princeton Bookstore copies will be available for sale. For more information please see Ken's article in this issue, and the AAAP website.

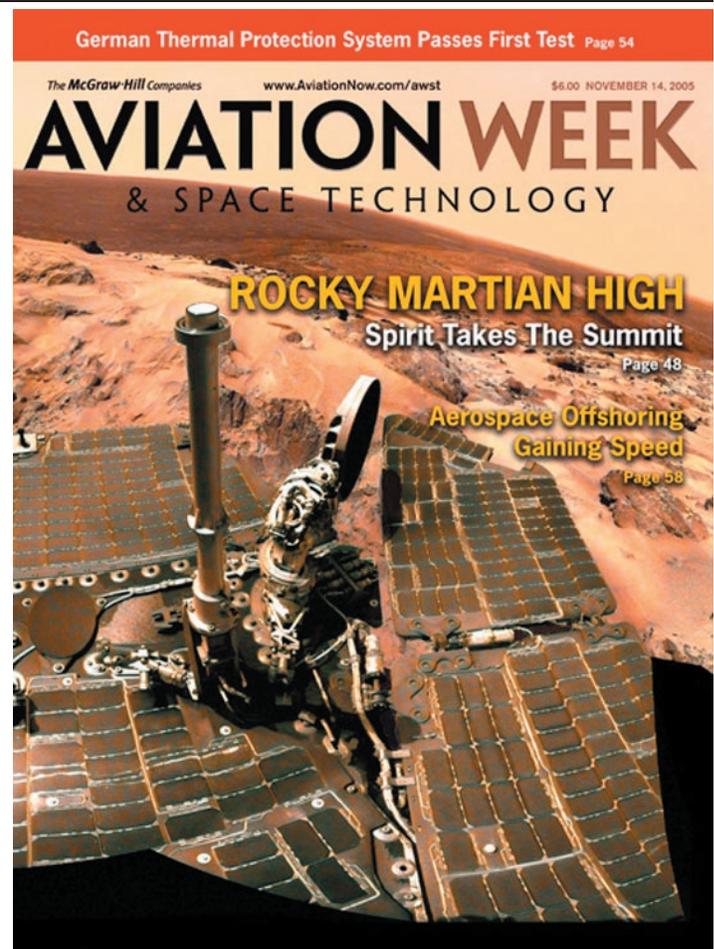
AAAP Board Meeting Dec 8 (Tigers Tale Restaurant, Princeton, 5:30 PM). All members are welcome to participate in creating the future of our club. As designated in our by-laws, the AAAP has five Board positions elected by members in May (Director, Asst. Director, Secretary, Treasurer, and Program Chair). Together with committee chairs and other active members, we hold quarterly Board of Trustee meetings to map out the AAAP's future directions. Please let me know if you'd like to attend the next meeting Dec 8 (contact info Sidereal Times masthead).

Call for Member "10 Minute Talks". A good way to share your astronomy experiences and help develop members' knowledge and interests is the "10 Minute Member Talk" section at our regular meetings. Examples of recent talks include visits to astronomy retreats and observatories in the Southwest, new telescopes and related astro-equipment, a vintage sextant collection, astrophotography, and new software. Please give it some thought and step forward to share your favorite topic with club members (contact me or other Board members to discuss possible dates).

The Great Nebula in Orion Shines for the Holidays! One of the most beautiful sights in any telescope, M42 in Orion's sword is

(Director, Continued on page 2)

Simpson Observatory (609) 737-2575



"Spirit" Cover on Aviation Week and Space Technology: 14 November 2005. The image was derived by an international team of Mars enthusiasts. Picture credit: Marco Di Lorenzo, Doug Ellison, Bernhard Braun and Ken Kremer (AAAP Program Chair).

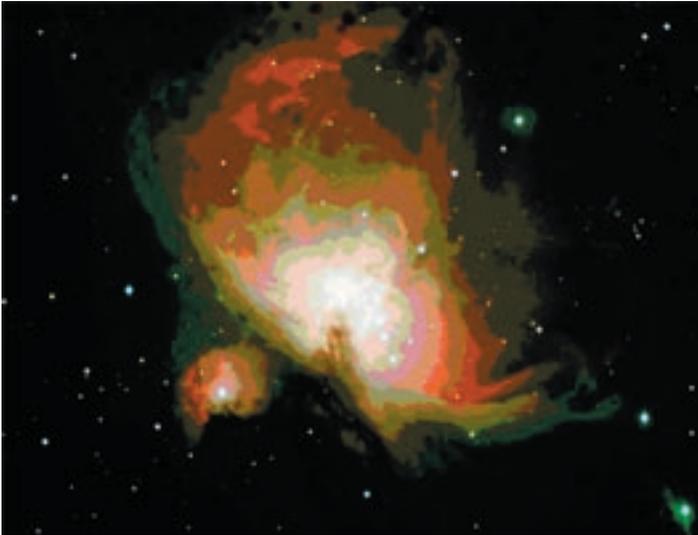
Rocky Martian High

Spirit Takes the Summit The "*SPIRITS SOAR*" self portrait at the Summit of Husband Hill appears as the Cover image for the 14 November 2005 issue of Aviation Week and Space Technology

(Martian, Continued on page 7)

(Director, Continued from page 1)

again becoming well positioned for early evening observing. The LRGB image below (taken with my Tak FS-128 refractor with ST-10XME CCD camera) shows detail in M42 which you can also see visually: the interstellar gas clouds enriched in ionized oxygen (green) and hydrogen-alpha (red) shining by fluorescence from the hot young UV-emitting stars in the Trapezium.



**Happy Holiday Season to all
AAAP members as we spin
on towards Winter Solstice!
Dark Skies, Rex**

Minutes of the General Meeting
Amateur Astronomers Association of Princeton
November 8, 2005

The meeting started at 8 PM with Rex Parker (Director) giving a short introduction.

Ken Kremer (Program Chair) then introduced the guest speaker, Dr. Mario Livio. His talk was "Hubbles Top Ten Scientific Discoveries". The lecture hall was almost full to capacity, and there was a book signing after Dr. Livio's question and answer session. All the books brought by the Princeton University Store were sold.

There was a short break, then the member meeting was called to order by John Miller (Assistant Director).

John Miller announced the Board of Directors meeting was set for Thursday, December 8, 2005 at 7:30 PM at Peyton Hall in the basement meeting room. (At the time of this writing, the director's meeting was changed to meet at The Tigers Tale restaurant at 5:30 PM on December 8th). All members are invited to attend to provide their input and ideas on the direction of the AAAP.

Ludy D'Angelo (Secretary) asked for approval of the last meeting minutes, which were approved. Ludy also reported that as of November 8th, there were 85 paid up members and several Keyholders who had not renewed. One new member joined tonight as a result of Vic Belanger's intro to astronomy course that he offers every year. A discussion on Sidereal costs and whether or not to extend non-paying members for a period of time

before dropping them from the membership. Ludy said it was his intention to drop anyone not paid up on dues as of December 1, 2005 (A follow up reminder letter was sent out in mid- November to those who had not paid).

Ron Mittelstaedt (Treasurer) reported that the club had \$XXXX in the bank.

John Miller asked for ideas about the Membership Committee Chair that was vacated by Jane Lanahan last month. It was decided that a description needed to be written about the position and that more details will be discussed at the Board meeting.

The next deadline for the Sidereal Times will be December 2, 2005. Vic Belanger mentioned the contribution of Ken Levy's pictures from Spain that showed up in the November issue.

John mentioned that there were 2300 hits on the AAAP website last month, 350 from Iraq, and many from other countries. John continues to improve the website.

John Church was going to arrange the winterizing of the observatory at Washington Crossing. Ludy had gone out to the observatory and measured the back roof that needs replacing. He estimated materials to be \$150-\$250 depending on the quality of roofing material used. A work party would need to be arranged to do this, possibly next spring.

Brian VanLiew reported that he, Gene Ramsey, and Ludy D'Angelo brought their scopes for the Plainsboro Preserve viewing night a week ago. It was well attended by about 40 children and parents. There will be Keyholder training the next 2 Saturdays for anyone interested.

Meeting adjourned at 10:10 PM

Submitted by
Ludovico D'Angelo, Secretary

Telescope for Sale Attention all Astronomy Club members, just in time for the holidays, a brand new telescope for sale!

My son bought a Meade DS 2114-ATS exactly two years ago, but the story goes back before this event:

Boy gets girl, girl likes the stars, boy buys telescope to impress girl, girl moves on, boy never get to see the stars, doesn't know how to work telescope, loses interest, ... end of story, except we now have a brand new, never been used, telescope for sale. He paid \$316 for it, and will sell it to you for \$216. (Go to Meade.com to check out the specs for this particular model.) We live in Sussex County, New Jersey, can easily be picked up, possible delivery, depending on where you are located, or you pay the shipping charges which would probably be in the \$35 to \$50 area, depending on your location and insurance charges. We were going to post on Ebay, but decided to go right to the source first. If we do not hear from anyone in your club by the end of the week, we will post for sale on the internet. Thanks for taking the time to read this info, do pass along to anyone who might be interested and have a Happy Holiday!

Michele and Brandon Van Allen sluggers@warwick.net

**Deadline for the January '06 Issue
December 30, 2005**

Tri-Spectra Solar Observatory

Well here it is November 23rd and Thanksgiving or Christmas came early to my house. Barlow Bob is here and he brought the new 70mm dedicated SolarMax Calcium K line Solar telescope for first light. We set it up and WOW! I saw as much detail at 393.4 Nanometers as in any photograph that I have ever previously seen. I am told that with the plastic UV blocking inserts in my eyeballs my eyes are now much more sensitive to the blue end of the spectrum and I am seeing much more than I ever expected. The scope was initially purchased to use with an Adirondack Stellacam video camera and a newly acquired Nikon Coolpix 995 digital camera but I guess that I can just keep on sketching every day. The fit and finish is what you would expect from a \$3,000.00 instrument I really like the helical fine focuser. The scope came with a Coronado CEMAX 25mm eyepiece with special h-alpha high transmission coatings. Bob and I have both had much negative experience with this product on many occasions with many different h-alpha setups but surprise, surprise! In the Calcium K-line band there is at least a 30% increase in contrast and detail over a 26mm quality Plossl and many different premium multi-element eyepieces. Bob and I just came in from a lucky one hour clearing of sky conditions while waiting for our Thanksgiving guests to arrive and it was just as good as yesterday. Bob was so impressed with my success with his new scope that he gave it to me to keep and he will take my ordered but not yet delivered PST CaLK in



trade I will get a CEMAX eyepiece for Bob for the new PST. Bob always uses a heavy black cloth to block out extraneous light and that procedure works twice as well with the Calcium scope. The serial number of the scope is #46 and Bob purchased the telescope directly from Coronado as with his 90mm h-alpha Bob O Scope I believe that he gave him "the pick of the litter." Now with this scope added to my double stacked 40mm .6A PST and my 4 inch APO with APM Herschel wedge, I have a "tri-spectra" Solar Observatory. And we said that there was nothing left to buy.

Ralph

Science Outreach and Exploration Update

Science Outreach

29th International Electric Propulsion Conference: Mars at Opposition Star Party: Princeton, NJ, Mon, Oct 31, 7:30 PM. We began the evening at a Halloween party with a sumptuous feast in the elegant Firestone Common Room with its paneled walls, leaded windows, and expanse of marble flooring at Rockefeller College.

Six AAAP volunteers then provided a thrilling evening of telescope viewing to an overflow crowd of more than 150 of "the greatest minds in electric propulsion" on All-Hallows Eve. They came from 16 countries around the world and from all across the US.

The setting was the glorious courtyard of Richardson Beach bounded by Alexander Hall and the gothic architecture of Witherspoon Hall. The University kindly extinguished the courtyard lights and the Martian weather gods arranged for perfectly clear skies and moderate temperatures (following the deluge of the previous week), thus enabling an unimpeded dark skies view of the heavens above.

AAAP volunteers Nick Hillman, Larry Kane, John Miller, Ron Mittelstaedt, Rex Parker and myself set up an array of telescopes which included a 16" short tube Newtonian, TeleVue 102 Refractor

(APO Doublet Vixen Mount/Tripod), 8" Newtonian, Meade ETX-90, 8" SCT and Celestron Ultima C-9.25 with a laptop running The Sky. Rex showed CCD images of Mars, galaxies (M33, M31) and a supernova remnant (M1).

We began with Mars at Opposition, with an absolutely brilliant reddish hue (20.2", mag -2.3) and much higher in the sky compared to 2003. Contemplating the continuing adventures of those Martian astrophotographers "Spirit" and "Opportunity", still alive, expanding the envelope in the quest for science and looking towards the heavens as we gazed upon them.

As the enthusiastic crowd wandered amongst us, additional targets included The Pleiades, Andromeda Galaxy M31, NGC 457, Owl Cluster in Cassiopeia, Globular Cluster in Pegasus, M15, Orion Nebula M42 and the double cluster. The constellation of Orion and the Trapezium has never been more magnificent and breathtaking for me as they rose up mightily in a perfectly sized clearing between the trees and the gothic Witherspoon Hall with belt and arrow pointing skywards straight up vertically.

And just look (link below) at the near simultaneous image of Orion from "Spirit" as she explored the "Rocky Martian High" summit area shown in the Aviation Week pictures reprinted elsewhere in this issue.

(Outreach, continued on page 4)

(Outreach, continued from page 3)

<http://photojournal.jpl.nasa.gov/catalog/PIA03070>

Our host, Princeton Professor Edgar Chouiere and the conference goers were ecstatic with our participation which lasted until past 11 PM.

New Jersey Astronomical Group (NJAG): Montclair State University, Montclair, NJ, Wed, Nov 9, 2005 at 8 PM. The occasion of my first visit to Montclair University was a presentation of *“Exploring Mars and the Search for Life”* at the invitation of Professor Mary Lou West. The atmosphere was friendly and cozy with lots of excellent questions about the discoveries of the “blue collar” and “princess” rovers. Afterwards, Mary Lou showed us her exquisite meteorite collection and club members suggested meteorite and solar research speakers to me. The AAAP lecture schedule and Planetary Society magazines/bookmarks were distributed. All were invited to attend our next seminar by NASA scientist Kim Weaver on Dec 13. Coincidentally, Mary Lou and myself were dressed as *“Martian Twins”*, see picture below. I also enjoyed meeting custom telescope builder and AAAP friend Rob Teeter, who recently joined NJAG. Rob is a graduate student at Montclair, and at his request I taped a short video segment for his Environmental Communication graduate school project on *“Light Pollution”* as it relates to astronomy and quality of life issues. Rob will give a short telescope talk to AAAP in December. NJAG website: <http://www.njastro.org>

Professor Mary Lou West will be the AAAP guest speaker on Tuesday, Feb 14, 2006 at 8 PM.



Martian Twins: AAAP Program chair Ken Kremer and Prof. Mary Lou West at NJAG, 9 Nov 2005.

JASON Expedition Conference: “Mysteries of Mars and Earth”: BOCES Educational Center, Garden City, LI, NY, Thur, Nov 10, 2005 from 9 AM to 3 PM. Over 90 Long Island science teachers from Nassau County were in attendance at this local JASON educational conference devoted to Mars. My invited presentations on *“Exploring Mars and the Search for Life”* and *“Mars in 3D”* covered the adventures of *“Spirit”* and *“Opportunity”* as they have journeyed many miles across the surface of Mars. The enthusiastic crowd asked wide ranging questions about not just Mars, but also many aspects of astronomy and space exploration and were particularly keen on hearing about Pluto and the controversial debate on defining *“what is a planet”* and *“planetary demotion”*. They were astonished to hear of the

brand new finding by Hubble of two potential new moons orbiting Pluto. The crowd was eager to learn about the new 10th planet (2003 UB 313) and moon, nicknamed Xena and Gabriella, and Kuiper Belt objects Sedna and Quaoar. And, I informed them of the first mission being launched to Pluto, New Horizons, in January 2006.

Many of the teachers photographed my display items to show their students, especially the scale model “RAT” science drill from Honeybee Robotics and the Lego MER rover and Sojourner rover models.

Check this website for the complete agenda and my list of online Mars educational resources.

<http://www.nassauboces.org/jason/resources.htm>

Afterwards, Juliann Muller, the Director of Education of the nearby *“Cradle of Aviation Museum”*, gave me an in-depth and personally guided tour of the museum. The exquisite collection highlights the numerous contributions of Long Island’s aerospace industry (Grumman, Republic, Sperry and more) to the history of aviation and space exploration. Included is an immaculate display of the actual Lunar Module (LM-13) intended for launch (1973) on the ultimately cancelled Apollo 18 moon landing mission to Copernicus Crater and built by Grumman Aircraft Corporation.

Museum Website: <http://www.cradleofaviation.org/>



JASON: Teachers view “Mars in 3D” on 10 Nov 2005

Rockland Astronomy Club (RAC): Blauvelt, NY, Sat, Feb 11, 2006 at 6 PM. The Rockland club has kindly invited me to present a space exploration lecture at their annual dinner meeting. RAC Website: <http://www.rocklandastronomy.com/>

MVAS: Our good friend Barlow Bob called to say that his friends at the Mohawk Valley Astronomical Society enjoyed my Mars info packet.

Please contact me for schools, museums or community groups interested in science outreach presentations.

Email: ken@princetonastronomy.org

Outreach for AAAP, JPL and The Planetary Society

Ken Kremer

Robotic Mission Exploration Update

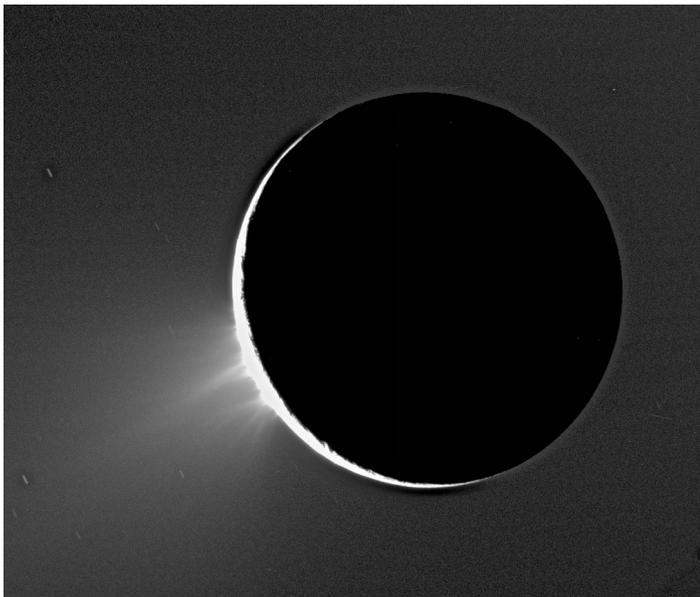
(Update, continued on page 5)

(Update, continued from page 4)

Spirit and Opportunity on Mars: The rovers have now made observations for all four seasons and spent an entire *Martian Year on Mars*, equivalent to 687 Earth days or 670 Martian days (Sols). Spirit celebrated on November 21 and Opportunity on December 11. Summer is ending and fall is approaching. After exploring the Husband Hill summit, Spirit is well into its descent along Haskin ridge on the way towards Home Plate. Opportunity continues southward around Erebus crater. Meanwhile, JPL has released 3 synthetic images depicting how Spirit would appear on several beautiful landscapes.

<http://marsrovers.jpl.nasa.gov/gallery/specialEffects/spirit/>

Spirit has taken a new Phobos "lunar" eclipse image. Prof. Jim Bell, Pancam leader at Cornell, suggests naming it a "Phobal" to better ID the moon involved.



<http://marsrovers.jpl.nasa.gov/gallery/press/spirit/20051115a.html>

Mars Reconnaissance Orbiter (MRO): The spacecraft is now halfway to Mars and will collect more data than all previous mars missions combined.

Mars Express (ESA): The Planetary Fourier Spectrometer (PFS), used to identify the gaseous components of the martian atmosphere, such as methane, is now back in operation after an earlier malfunction. The MARSIS radar experiment is actively investigating the upper atmosphere or "ionosphere". Analysis of the initial subsurface soundings to search for water is continuing.

Venus Express Orbiter (ESA): Successfully launched on Nov 9 by a Soyuz Fregat Booster from the Baikonor Cosmodrome for a 5 month voyage to Venus. Orbital insertion at Venus is planned for 11 April 2006. A series of Earth/Moon images confirmed the excellent optical health of the imaging system.

For a chance to witness the first mission to Venus in 15 years, enter the "Postcards from Venus" art contest jointly sponsored by *The Planetary Society* and ESA, by 13 Jan 2006. Details at this website:

http://www.planetary.org/postcards_from_venus/

New Horizons (Pluto Flyby): The January 2006 liftoff nears for this first mission to Pluto and the Kuiper Belt, as new moons are discovered and speculation arises as to whether Pluto has a ring

system.

Cassini/Huygens (NASA/ESA): Two Amazing New Discoveries as we go to press. *Active Volcanic Plumes Found at Enceladus:* A fine spray of icy particles emanating from multiple fountains in the warmer south polar region, is seen in the image below. These water ices are believed to be the source material for the F ring.

The Cassini team has also just published the discovery that the *F ring is actually a single spiral arm*. The ring winds at least 3 times around Saturn instead of being a series of individual ringlets as previously thought. The unique spiral structure may be the result of some orbital interaction with a newly discovered moon. Details in **Science**: 25 Nov 2005, Vol. 310, p. 1300.

A colorful close-up view of the F-ring shepherd moon Pandora shows a layer of fine dust-sized icy material.

<http://photojournal.jpl.nasa.gov/catalog/PIA07632>

A close flyby within 310 miles of the surface of the icy moon Rhea occurred on Nov 26. A stunning view of Rhea just below the rings is here.

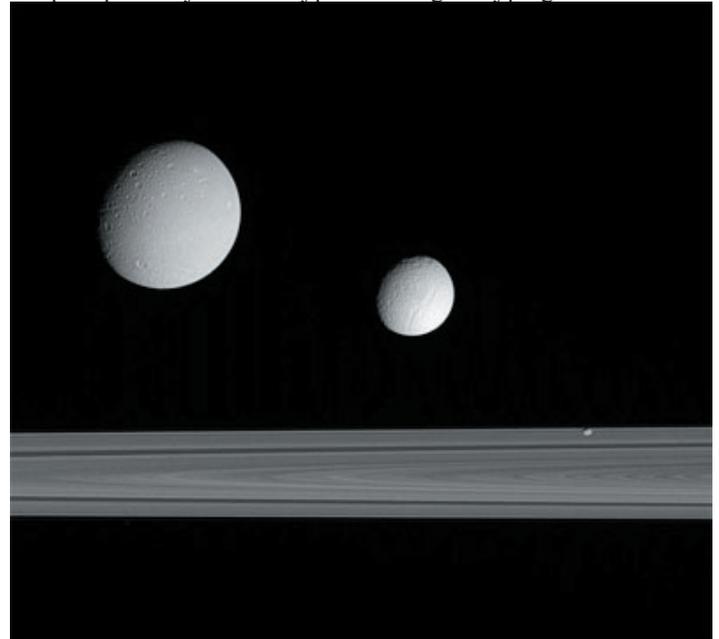
<http://photojournal.jpl.nasa.gov/jpeg/PIA07635.jpg>

The next Titan Flyby (T9) occurs on 26 Dec at a distance of 6500 miles. More than half of Titan's Saturn-facing hemisphere is seen at moderate resolution in the "New Lands of Titan". The 20 image mosaic highlights the Fensal-Aztlan region (formerly known as "the sideways H") with place names:

<http://photojournal.jpl.nasa.gov/catalog/PIA07753>

Satellite trio: This excellent grouping of three moons -- Dione, Tethys and Pandora -- near the rings provides a sampling of the diversity of worlds that exists in Saturn's realm.

<http://photojournal.jpl.nasa.gov/jpeg/PIA07628>

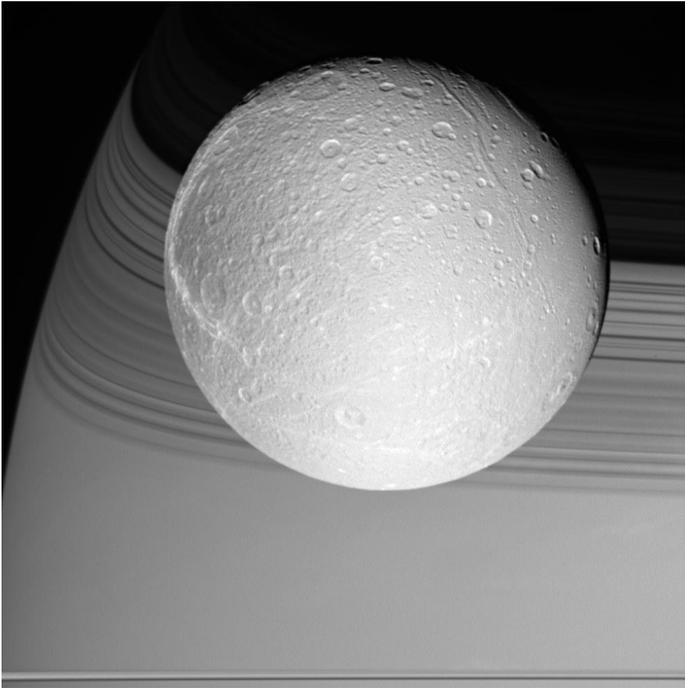


View a close-up of the brilliant, cratered ice-ball Dione in front of shadow-draped Saturn here:

<http://photojournal.jpl.nasa.gov/catalog/PIA07637>

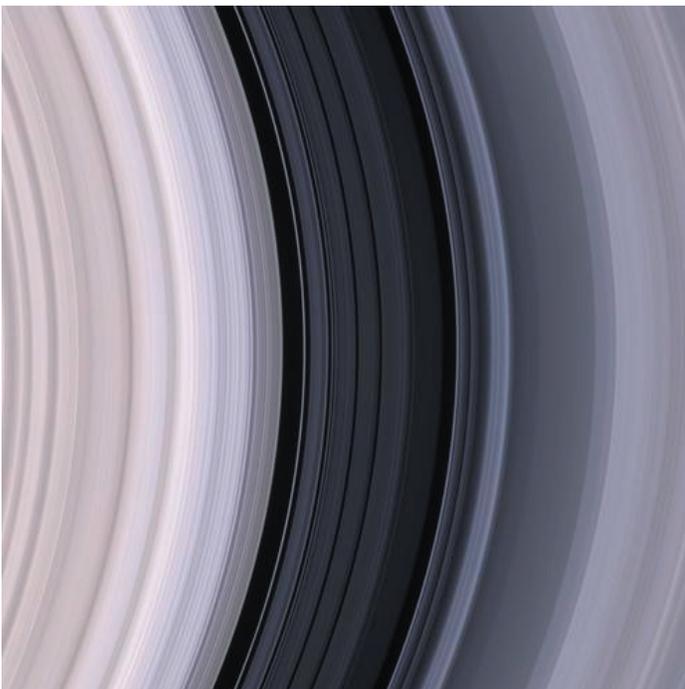
(Update, continued on page 6)

(Update, continued from page 5)



Much structure within the dark Cassini Division is seen at "The Graceful Lanes of Ice".

<http://photojournal.jpl.nasa.gov/jpeg/PIA07631.jpg>



Deep Impact: The University of Maryland team which led the successful mission won a major space award from The Space Frontier Foundation. They were selected for the "Vision to Reality" award because Deep Impact "represents the best accomplishment of the year in turning the vision of true space exploration and the gathering of scientific knowledge, into reality".

STEREO: NASA's twin STEREO spacecraft have arrived at the Goddard Spaceflight Center for exhaustive testing before their planned spring 2006 dual launch aboard a Delta 2 rocket. They will hunt for coronal mass ejections (CMEs), enormous solar eruptions of high-energy particles. They will be stationed at Sun-

watching positions ahead and behind Earth to record the first real-time "3D" images of our nearest star.

View a solar "3D" amateur image here:

http://antwrp.gsfc.nasa.gov/apod/image/0511/solar3d_piepol_f.jpg

Hayabusa (Japan/JAXA): A daring 2nd landing on the asteroid succeeded on Nov 26. Within a few seconds, projectiles were fired into the surface and several grams of dust grains were collected inside the earth return sample canister. The spacecraft then quickly ascended and will remain in the vicinity until early December. Thereafter, this unprecedented mission is to return the first ever asteroid samples to Earth by parachuting into the Australian outback in June 2007. Asteroids preserve the pristine materials that went into formation of the solar system: <http://www.isas.jaxa.jp/e/index.shtml>

More News

Two new moons for Pluto: The tiny moons are between 40 and 125 miles in diameter and are believed to orbit about 27,000 miles from Pluto. They were discovered in recent images taken by the Hubble Space Telescope and have been designated S/2005 P1 and P2. Further observations are planned for Feb 2006 to confirm their status and orbital plane (same as Charon). See photo here:

<http://hubblesite.org/newscenter/newsdesk/archive/releases/2005/19/>

ISS: The crew of NASA astronaut Bill McArthur and Russian cosmonaut Valery Tokarev enjoyed the first ever "live" musical wakeup call. On Nov 13, rock icon Paul McCartney performed "Good Morning Sunshine" for the jubilant crew and concert crowd via a live hook-up from Anaheim, Calif while on tour.

James Webb Space Telescope: JWST is the designated successor to the Hubble Space Telescope. NASA has announced a 2 year delay in launch to 2013 due to budget cost growth. The delay will allow NASA to maintain the science objectives of the infrared observatory rather than scaling down the size of the 6.5 meter mirror and de-scoping the mission. NASA is negotiating with ESA to launch the Webb telescope on board an Ariane 5 rocket.

Einstein's Rings: Newly released images from the Hubble Space Telescope show the rings as one of the most dramatic confirmations of Einstein's Theory of General Relativity in the Cosmos. They are a manifestation of gravitational lensing.

<http://www.cfa.harvard.edu/press/p0532ay.jpg>

Websites for daily updates/perspectives:

<http://marsrovers.jpl.nasa.gov/home/index.html>

http://www.esa.int/export/SPECIALS/Mars_Express/index.html

<http://saturn.jpl.nasa.gov/home/index.cfm>

<http://www.esa.int/SPECIALS/Cassini-Huygens/>

<http://deepimpact.jpl.nasa.gov/>

<http://pluto.jhuapl.edu/index.php>

http://www.esa.int/SPECIALS/Venus_Express/index.html

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

Email: ken@princetonastronomy.org

Ken Kremer

From the Program Chair

Upcoming AAAP lecture season and events:

December 13: The keynote speaker will be award-winning NASA Astronomer and author **Dr. Kimberly Weaver**, from NASA's Goddard Space Flight Center in Greenbelt, MD. She also serves as the program scientist for the Spitzer Space Telescope at NASA Headquarters. Her talk, titled *"New Eyes on the Universe: Observing Beyond Hubble with the Chandra and Spitzer Space Telescopes"*, will unveil the violent processes and dust-enshrouded objects that are revealed only by searching for their signatures in x-ray and infrared light. Star birth, star death, black holes, cosmic collisions, and the origins of other solar systems are revealed in stark clarity with NASA's newest space-based Great Observatories. Dr. Weaver is also an adjunct associate professor at Johns Hopkins University and won a NASA Presidential Early Career Award to pursue research in extragalactic astronomy. She has published more than 70 scientific papers on black holes and accretion disks in active galactic nuclei (AGN), starburst galaxies and extreme star formation in galaxies. In addition to conducting scientific research, Weaver served for five years as the deputy project scientist for Constellation-X, a future NASA mission which is part of NASA's Beyond Einstein program.

Dr. Weaver will be signing copies of her highly praised and richly illustrated new book, *"The Violent Universe: Joyrides through the X-ray Cosmos"*. The book will be autographed and on sale at the lecture theatre in Peyton Hall, courtesy of the Princeton University Bookstore.

Read a glowing book review in the December 2005 issue (p. 102) of *"Sky and Telescope"* under the banner of *"More Cosmic Inspiration"*.

January 10: Professor Peter Rona of Rutgers University will speak on *"Volcanoes of the Deep Sea: The Science Behind the*

IMAX Films". He is an expert on Black Smokers and will illustrate how the spectacular volcanic processes on the deep ocean floor relate to the search for life beyond Earth, such as Europa. He was Associate Science Director for the award winning IMAX film "Volcanoes of the Deep Sea" made by Executive Producer James Cameron. The film is available on DVD. Website:

http://www.volcanoesofthedeepsea.com/index_flash.html

For the most recent article relevant to the talk, please read this by Peter A. Rona: "Secret Survivor", *Natural History Magazine*, 113(7), September, 2004, pages 50-55. Available online in the archive section at: <http://www.naturalhistorymag.com/>

Field Trip to Honeybee Robotics in Manhattan: Projected for Jan/Feb. Limited to 17 participants, 13 so far. Those interested should please email Bryan Hubbard or me: brypen@optonline.net

February 14: Professor Mary Lou West of Montclair State University will speak on *"How Things Move in Space"*. She is a leader of the New Jersey Astronomical Group (NJAG).

On November 8, **Dr. Mario Livio** gave a very well received talk on *"Hubble's Top 10 Scientific Discoveries"*. At the top of the list were: The Accelerating Universe and Dark Energy, The Distance Scale and Age of the Universe, The Evolution of Galaxies and Cosmic Star Formation Rate and Extrasolar Planets. The attentive audience responded with many excellent questions. Dr. Livio also autographed copies of his acclaimed new book, *"The Equation that Couldn't Be Solved"* following the lecture. The stack of 25 books was completely sold out.

Please send me your suggestions for speakers, with contact/topic information.

Email: ken@princetonastronomy.org

Ken Kremer

(Martian, Continued from page 1)

Magazine. The highly detailed 6 page cover package by Craig Covault, titled *"Rocky Martian High"*, describes the dramatic flight operations of the JPL/Cornell team as Spirit completed work on a Martian mountaintop: see www.aviationweek.com. The cover photo of Spirit and 2 additional pictures inside (full widescreen view and hazcam of Hillary rock outcrop), were derived by the team of Mars enthusiasts indicating how outside analysts can use the raw imagery data from the rovers available to everyone. Picture credit: Marco Di Lorenzo, Douglas Ellison, Bernhard Braun and Kenneth Kremer (AAAP Program Chair).

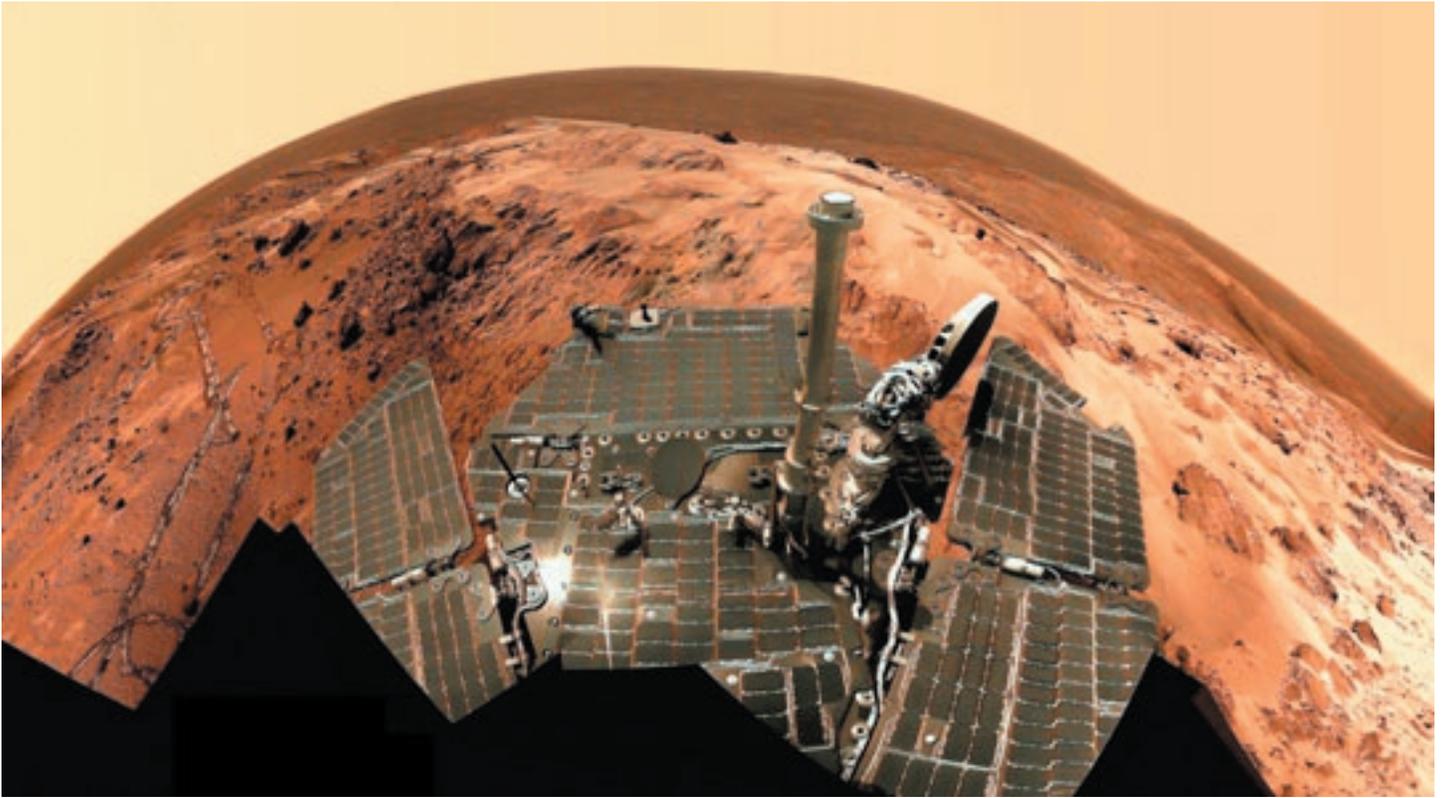
The "Spirit" panorama was also featured on "Astronomy Picture of the Day" on 28 Nov 2005. A larger version of the panorama image which was used for the cover design is included on page 8.

Ken Kremer

(Right) With rover angled up 27 deg. on slope, robotic arm reaches out to place instruments on Hillary outcrop where wheel slippage became a major concern. Credit: NASA/JPL HAZCAM IMAGE COLOR CODED by Marco Di Lorenzo, Douglas Ellison, Bernhard Braun and Kenneth Kremer using JPL/Cornell Pancam



Mars pictures and article excerpts reprinted by permission of Aviation Week and Space Technology Magazine.



The Mars Rover Spirit, high on a Martian mountaintop 50 million mi. from Earth, takes a Navcam self-portrait along with mosaic of the summit terrain and the sides of Husband Hill sloping to the distant Gusev crater floor. Spirit drove for 3 mi. and two years across the distant plains at rear, to reach and climb the mountain. NASA/JPL monochromatic Navcam imagery merged and color-coded by Marco Di Lorenzo, Douglas Ellison, Bernhard Braun and Kenneth Kremer using JPL/Cornell Pancam data.

See us on the Web: www.princetonastronomy.org

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December 2005