

# SIDEREAL TIMES

The Official Publication of the  
Amateur Astronomers Association of Princeton

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**AAAP Meeting Feb 14 (8:00 Peyton Hall).** Continuing our intellectual excursion through the different domains of astronomy, astrophysics, and planetary sciences, the next AAAP meeting will make a stop in the **realm of celestial mechanics**. From its rich tradition going back to Kepler and Newton, and Copernicus and Ptolemy before them, this field has recently been influenced by modern high technology to give a revitalized and more detailed picture. At our Feb 14 meeting this will be presented with a new flair by **Dr Mary Lou West**, from the Dept of Mathematical Sciences at Montclair State Univ in NJ. More background on her lecture, *"How Things Move in Space"*, can be found in Program Chair **Ken Kremer's** article in this issue.

**ADVANCE NOTICE: Change in March AAAP meeting date-- mark your calendar!**

We will have two meetings in March: our lecture is being co-sponsored by AAAP along with Princeton University's Dept of Mechanical and Aerospace Engineering (MAE). **Dr. Marc Rayman of JPL** (Pasadena, CA) will present *"NASA's DAWN and Deep Space-1 Missions"*, on **Thursday March 9 at 8:00** at the Friend Center Room 101 on William St on the Princeton campus. Please see **Ken Kremer's section in this issue** and the **AAAP website** for more information. We will also hold our regular club meeting on **Tuesday night March 14** focused on upcoming astronomy events and activities.

**From Ice Skater Physics to Star Birth in HII Regions.** At the 38<sup>th</sup> annual Rutgers University Geology Museum Open House January 28, Dr. Jeff Hester of Arizona State University Astronomy Dept talked about new understanding of the process of stellar formation in HII regions where star systems similar to our own are thought to form in our galaxy. He gave a colorful analogy for the development of newborn star systems as they transition from molecular cloud to protoplanetary disc (proplyd): the early stages of condensation, collapse, and rotation are dominated by "ice skater physics" (think of this during the upcoming Olympics!) and through conservation of angular momentum eventually become



*The HII Region M42 in Orion's sword, (Tak FS128 / ST-10XME astrophoto by RAP)*

controlled by "pizza dough physics" as the condensed newborn system spreads out to become a protoplanetary disc.

Pondering all this on a recent clear night while viewing one of the most beautiful HII regions which can be seen in amateur scopes, the Great Nebula in Orion (M42), I was again inspired to photograph this incredible object. Because of its large angular field size (over 1 degree) and wide variations in brightness, M42 is a challenging object for astrophotography, as several AAAP members who have tried their cameras on it know. I set up for a new color (LRGB) exposure series using my 5 inch Takahashi fluorite refractor at f/8 with SBIG ST-10XME CCD camera. The result (above) shows the vast and intricate molecular cloud of interstellar gases and dust which form the HII region where new stars are now being born. The intense radiation, very strong in the UV band, from the central group of young hot stars including the famous 4-star formation known as the Trapezium in the middle of the image causes ionization and fluorescence of the hydrogen gas clouds, seen in the reddish tint. Makes one wonder about the protoplanetary discs forming out there, and whether the composition of the

Simpson Observatory (609) 737-2575

*(Director, continued on page 2)*

*(Director; continued from page 1)*

interstellar medium is enriched enough in heavy metals for rocky, earth-like planets to form in this region. How much of this can you see visually in your own telescope or in the club's C14 at the Washington Crossing Observatory? You'll have another month or so to check it out before the winter constellations descend over the horizon as the spring galaxies move into prime viewing position!

**Astrophotography in the AAAP.** Here's a word of thanks to member and Observatory Co-Chair Brian Van Liew for organizing an astrophotography interest group for club members. Get in touch with Brian if you'd like to learn how to get going in this challenging but rewarding area of science and technology. We also consider astrophotography to be an art form, as evidenced by the remarkable and beautiful work of the AAAP's own Dr Robert Vanderbei of Princeton Univ. Bob's astrophotography will be the subject of an upcoming exhibition by the School of Engineering and Applied Science, which will be available for viewing Feb 13-Mar 10 in the school's E-Quad "Art in the Café" series (see the announcement elsewhere in this issue).

Dark skies! -- Rex

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## Minutes of the General Meeting of the AAAP January 10, 2006

The meeting started at 8 PM with Rex Parker (Director) giving a welcome. New member Rob Teeter gave a 10-minute talk on the telescope making business he started in 2002. He has made 33 Teeter Scopes in the last 3 years. Rob had one of his scopes on hand for all to admire.

10 members attended the pre-meeting dinner at the Annex restaurant with the guest speaker Peter Rona.

Ken Kremer (Program Chair) then introduced the guest speaker, Dr. Peter Rona. His talk was on "Volcanoes of the Deep Sea" which described volcanic 'black smokers', which he discovered many years ago in the deep sea of the Atlantic. The lecture hall had approximately 60 in attendance.

At 9:40 PM, the member meeting was called to order by Rex Parker (Director). He received word from Gordon Bonn that he has started an online newsletter, eTPO, by electronic subscription. It's published quarterly and is geared to observing. Rex encouraged the membership to check it out and possible subscribe to the newsletter.

NEAF (Northeast Astronomy Forum) will be May 6<sup>th</sup> to 7<sup>th</sup>.

StarQuest will be June 23<sup>rd</sup> to 25<sup>th</sup>. Don Monticello will chair the planning and be the contact for our summer event. The caterer has been contacted already.

Rex proposed that we purchase several copies of "Deep Sky" astronomy software on a special deal from the publisher that when resold, would make the club \$20-\$25 per copy. This could possibly be a raffle item at StarQuest, but can also available to the club membership.

Rex also presented an outline of the club structure, and called for more effort in developing the publicity committee and other committees that need members to support and promote the club.

Ludy D'Angelo (Secretary) announced that the minutes of the

board of directors and the regular club minutes were published in the January Sidereal Times. He pointed out that the outline for expenditures were also included. He then took corrections on the minutes. John Church indicated that the notice published concerning membership dues, as being a charitable donation, was incorrect. Some discussion ensued; Ludy will make a correction to the announcement in the February issue.

Membership stands at 103 members. New members joining January-March will pay dues of \$30, which is the prorated amount.

Ken Kremer (Program Chair) reported he was please with the attendance to the programs. There has been good effort in publicity, and he mentioned seeing articles in the local papers advertising the talks. He reports that Mary Lou West will be the February 14<sup>th</sup> speaker. Also, the field trip to Honeybee Robotics is still being scheduled for the near future. There are 17 people signed up to go (the maximum allowed). Bryan Hubbard is coordinating the list. It's the first field trip in many years. In addition, Ken reports that the new Imax film "Roving Mars" will premier January 27<sup>th</sup> at the Franklin Institute in Philadelphia.

Ken will present at the Lawrenceville Elementary School who will have their Science night on 1/27/06. AAAP participation is anticipated with telescopes again this year. Linda Papetti will have an AAAP table of materials there also.

Ken is also taking suggestions for the Starquest speaker. Which will also be discussed at the next meeting.

Ron Mittelstaedt (Treasurer) reports that the treasury is at \$XXXX.

Brian VanLiew (Observatory Co-Chair) reported that about 50% of the scheduled 6 training sessions for keyholders actually happened. He has also organized a special interest group (SIG) to learn astrophotography. The first meeting will be Saturday 1/14/06, 7 PM at Brian's house. Anyone interested should contact him. There are about 12 signed up for the first meeting. Keyholder training will continue into the future.

Gene Ramsey (Observatory Co-Chair) is still looking into clearing some trees around the observatory at Washington Crossing with permission of the Park Superintendent. Hopefully, the back roof of the observatory will be worked on soon.

John Miller (Assistant Director/Webmaster) reported that there are several additions to the website: A member roster (password accessible), and a "Members and Their Scopes" gallery page. He also changed the front page.

Vic Belanger (Editor) reports that the deadline for submissions for the Sidereal Times will be February 3, 2006. He also encourages our support to preserve the Yerkes Observatory in Chicago from being closed down (see article in January edition of Sidereal Times), by writing letters supporting the purchase by Aurora University, who will preserve and use the observatory.

Meeting adjourned at 10:40 PM

Submitted by Ludovico D'Angelo, Secretary

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## From the Treasurer

The current treasury balance is: \$XXXX.

Ron Mittlestaedt

The School of Engineering and Applied Science's

# Art in the Café

Presents

## THE ASTROPHOTOGRAPHY OF PROF. ROBERT VANDERBEI



Opening Reception

**Monday, February 13th, 2006**

**4:00pm @ E-quad Cafe**

Exhibition

**February 13th-March 10th**

### Notice

“Last month it was indicated that member’s dues would be tax deductible as a charitable donation. This may not be the case. Please refer to IRS publication 526 for clarification. Any monetary contributions to the club in excess of the members dues are considered a tax deductible charitable donation.”

L. D’Angelo

### Key-holder Training Schedule

Here are the dates for 2006 Spring Key-Holder Training Nights:

February 18<sup>th</sup> & 25<sup>th</sup>; March 11<sup>th</sup> & 18<sup>th</sup>; April 15<sup>th</sup> & 22<sup>nd</sup>

If you haven’t had previous training and are interested and please let me know so I can add you to the list. I have a group with some training but new trainees are welcome. The only prerequisite is being an **active** AAAP member. Once trained and checked out by a key-holder you will be assigned to a Team for the public nights and be given a key for the observatory.

I also need experienced trainers for these Saturday evenings. Please let me know on what dates you can help out!

Training is only cancelled if the weather does not permit the opening of the observatory roof. The group will meet at the Rte579

park gate by the soccer fields at 7pm sharp.

Brian Van Liew

Observatory Co Chair

[brian@princetonastronomy.org](mailto:brian@princetonastronomy.org)

### What did you do for the opposition of Saturn?

A group of us (Gene, Larry, Ludy, John, Ron, Linda and her brother Rich, Ken and myself) spent the evening at the Lawrenceville Elementary Schools Science and Discovery Fair. This was our 3<sup>rd</sup> year there and the warmest. We were setup at the entrance of the school with our scopes with Ken inside running his Mars/Saturn presentation. We always seem to luck out with clear skies and a large turnout of visitors at this event. Things got going at 6pm and the crowds just kept coming until 9pm. The star feature every one wanted to see was Saturn and who could blame them. It was just rising over the school as the night began and by midway through the evening it was in all it’s glory. That night was the opposition and it was a mere 775 million miles away. You could almost reach out and touch it. The guests were treated to many objects this evening. I myself had started out with Almaak a beautiful gold and blue binary star, then when there was a break in the crowd I proceeded to move from here to M31, M42, M37, Mars with a peek at Saturn once and awhile. As the fair ended I took out my web cam to get my first Saturn image of 2006. After packing up a group of us headed out to get something to eat and to talk about our successful evening. So what did you do for the opposition of Saturn?

Brian VanLiew

*Not to be outdone by Rex, Brian VanLiew offers  
his favorite image of M-42*



# Astronomy Events for 2006

Edited by Barlow Bob

<b>Feb 20 - 25</b>	<b>Winter Star Party</b> , Florida Keys, FL <a href="http://www.scas.org/">http://www.scas.org/</a>	<a href="http://www.ochesterastronomy.com">ochesterastronomy.com</a>	
	<b>Zombie Party</b> , Atlanta, GA <a href="http://www.atlantaastronomy.org/">http://www.atlantaastronomy.org/</a>		
<b>Apr 28 - May 2</b>	<b>Delmarva Star Gaze Star Party</b> , Tuckahoe State Park, MD <a href="http://www.delmarvastargaze.rs.org/archive/sg2006/sg2006.html">http://www.delmarvastargaze.rs.org/archive/sg2006/sg2006.html</a>	<b>Jul 21 - 30</b>	<b>Rockland Summer Star Party</b> , Savoy, MA <a href="http://www.rocklandastronomy.com/">http://www.rocklandastronomy.com/</a>
	<b>South Jersey Spring Star Party</b> , Belleplaine State Forest, NJ <a href="http://members.aol.com/sjastroc/sjacsp1b.html">http://members.aol.com/sjastroc/sjacsp1b.html</a>	<b>Jul 28 - 29</b>	<b>Stellafane</b> , Springfield, VT <a href="http://www.stellafane.com">http://www.stellafane.com</a>
<b>May 6 - 7</b>	<b>NEAF</b> , NEAF Solar Star Party, Suffern, NY <a href="http://www.rocklandastronomy.com/neaf.htm">http://www.rocklandastronomy.com/neaf.htm</a>	<b>Aug 18 - 20</b>	<b>The Conjunction</b> , Northfield, MA <a href="http://www.philharrington.net/astroconjunction/">http://www.philharrington.net/astroconjunction/</a>
<b>Jun 22 - 26</b>	<b>Cherry Springs Star Party</b> , Cherry Springs Park, PA <a href="http://www.astrohbg.org/s4/index.php">http://www.astrohbg.org/s4/index.php</a>	<b>Aug 25 - 27</b>	<b>Arunah Hill Days</b> , Cummington, MA <a href="http://www.arunah.org/calendar.htm">http://www.arunah.org/calendar.htm</a>
<b>Jun 23 - 25</b>	<b>Jersey Starquest</b> , Hope, NJ <a href="http://www.prinetonastronomy.org">http://www.prinetonastronomy.org</a>	<b>Aug 25 - 27</b>	<b>Black Forest Star Party</b> , Cherry Springs State Park, PA <a href="http://www.bfsp.org/starparty/index.cfm">http://www.bfsp.org/starparty/index.cfm</a>
	<b>Starconn</b> , Wesleyan University, Middletown, CT <a href="http://www.asgh.org/">http://www.asgh.org/</a>	<b>Sep 22 - 24</b>	<b>Connecticut Star Party</b> , Marlborough, CT <a href="http://www.asnh.org/">http://www.asnh.org/</a>
<b>Oct 18 - 22</b>	<b>Mason Dixon Star Party</b> , Shreveport Airport / Footlight Ranch York County, PA <a href="http://www.masondixonstarparty.org/">http://www.masondixonstarparty.org/</a>	<b>Sep 28 - Oct 2</b>	<b>Delmarva No-Frills Star Party</b> , Tuckahoe State Park, MD <a href="http://www.delmarvastargaze.rs.org/archive/nofrills2005/index.html">http://www.delmarvastargaze.rs.org/archive/nofrills2005/index.html</a>
<b>Jun 21 - 24</b>	<b>Green Bank Star Quest</b> , Green Bank, WV <a href="http://www.greenbankstarquest.org/">http://www.greenbankstarquest.org/</a>	<b>Sep 30</b>	<b>Novac Star Gaze</b> , Manassas, VA <a href="http://www.novac.com/gaze/">http://www.novac.com/gaze/</a>
<b>Jul 21 - 23</b>	<b>Rochestar Fest</b> , Rochester, NY <a href="http://www.r">http://www.r</a>	<b>Sep 29 - 30</b>	<b>Astro Assembly</b> , Skyscrapers, Inc Amateur Astronomical Society Of Rhode Island <a href="http://www.theskyscrapers.org/">http://www.theskyscrapers.org/</a>
		<b>Oct 16 - 26</b>	<b>Mid Atlantic Star Party</b> , Robbins, NC <a href="http://www.masp.org/">http://www.masp.org/</a>

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## Amateur Solar Astronomers

The first observations of the Sun's spots were made with the unprotected eye, during the morning or evening, when the Sun was obscured by smoke or haze, so its brilliance was somewhat diminished. Although sunspots were recorded in this simple manner for over 2,000 years, it was not until 1610 and the advent of the astronomical telescope that the real character of these solar features became apparent.

Rick Fienberg, Editor In Chief of Sky and Telescope magazine, said "We can all play Galileo during the International Year of Astronomy in 2009". 2009 is the 400<sup>th</sup> anniversary of Galileo's first look through a telescope.

In 1610 Galileo Galilei used the newly invented telescope to make routine observations of the Sun. 2010 is the 400<sup>th</sup> anniversary of Galileo's first observation of sunspots.

If 2009 is the International Year of Astronomy, then 2010 is the International year of Solar Astronomy. Amateur solar astronomers can use this event to promote safe solar observation.

Barlow Bob

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## AAAP Apparel

In need of a new jacket for stargazing, or just something to make you stand out in the crowd? Then maybe you would be interested in some AAAP apparel. I can get a number of items including jackets, shirts and caps all with the AAAP logo embroidered onto them. If interested see me at the next monthly meeting and I will have a catalog you can look through to pick out your size and favorite color. There maybe even some of the members there with some of these items on display. If desired I can give you the name of the business I use and you can personally place your order.

Brian Van Liew

## Astronomy Member's Demographics

I did some research to see if there is anything that I could contribute to the AAAP as Membership Chairman. I started my research by contacting the Astronomy and Sky & Telescope magazine to have them send me a media kit. Media kits are sent to individuals interested in advertising in the companies' magazines. The kits include data such as the cost of advertising, history of the magazine, and subscribers' demographics. Obviously, the readers' demographics were of importance to me (the free magazine did not hurt, either).

Here are some statistics from a random survey conducted by an independent organization of over two hundred thousand Astronomy Magazine readers:

- 68.7% are married
- 86% Male
- 14% Female
- Mean household income: \$95,800
- Involved in astronomy hobby: 21.3 years (mean)
- Replacement cost of astronomy equipment: \$2,614 a year

Readers' specific areas of interest:

Planetary observing:	66%
Science of galaxies, The Milky Way:	62%
Sun, moon, comets, and meteors:	62%

Monthly, the average reader spends 8.9 hours on his hobby, with the most time spent under the stars:

- 3.6 hours Observing
- 3.5 hours Reading about astronomy
- 1.5 hours Visiting astronomy websites or internet activities
- 1.8 hours Participating in other astronomy-related activities, including imaging and attending club meetings

(I know that the hours do not add up to 8.9. I am assuming people that average more than 8.9 hours a month on astronomy, 1.5 hours is spent on visiting astronomy websites or internet activities).

Astronomy websites visited in the last 6 months:

Astronomy magazine:	57%
Hubble Space Telescope:	48%
Sky & Telescope:	28%
Space.com:	24%
NASA Space Science:	23%
Astronomy picture of the day:	23%

The statistics seem slightly skewed in favor of Astronomy magazine, but I am sure that the statistics are not far from the truth. If nothing else this list might give our AAAP members different sites to surf the web, broadening their astronomy interests.

The final statistic from Astronomy Magazine that is worth mentioning is quite astonishing from a marketing standpoint. \$50,970,000 was spent on Astronomy products/activities in the past twelve months.

Now, here are some statistics from Sky & Telescope (both magazines have similar figures):

- 94% have at least some college education while 80% graduated from college or higher
- The average age is 52 and 1/3 fall between the ages of 40

and 59.

- 95% of the readers attend star parties and 97% attend astronomy club meetings.

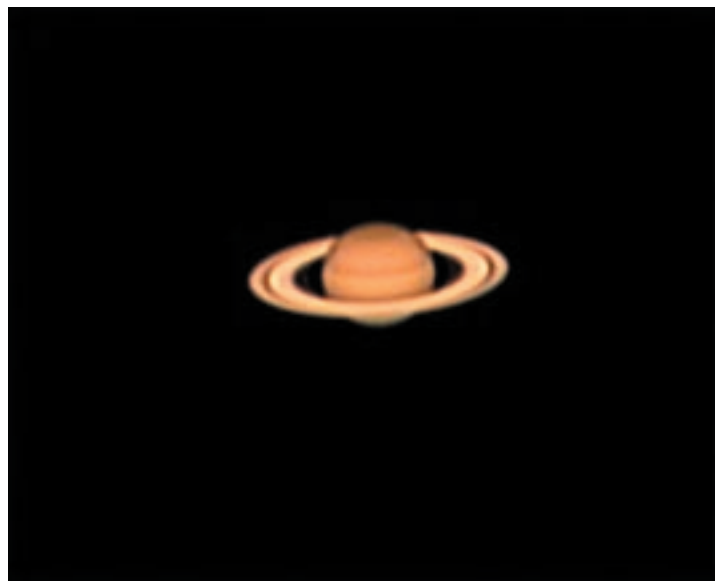
68 percent of the subscribers surveyed said that friends and colleagues are important when determining which astronomy product to buy (by far the highest response out of all the other responses). That statistic, along with that fact 97% of Sky & Telescope subscribers attend astronomy association meetings, implies to me that people need the AAAP as much as the AAAP needs them.

People who actively pursue astronomy as a hobby are generally mature, affluent, and stable individuals who like to spend lots of their money on astronomy related activities. In a perfect world, the statistics that I have reported in this article hint that the AAAP should have plenty of money and even more members than the current roster reflects. Fortunately, this is not a perfect world so the circumstances that are not perfect can be improved.

Members should be encouraged to bring friends or family members to one meeting a year because "birds of a feather flock together." Another suggestion is to have an advice column on the AAAP's website of astronomers and their equipment (which is exactly what John Miller has begun). The association members could write what they liked and disliked about their equipment (which would give the website more hits and hopefully more members).

In addition, the association should put donations jars at public viewing nights and at our meetings at Princeton University (this was not my idea but it is worth reiterating). Regardless of the number of members in the Amateur Astronomy Association of Princeton, I am honored to be a member of such a respectable, well-organized association that has such unique members, let alone the Welcome Co-Chairman.

Ryan Corrigan  
Membership Chairman



*Saturn Photo by Brian VanLiew*

Deadline for the March Issue  
of the  
Sidereal Times, March 3, 2006

# Science Outreach and Exploration Update

## Science Outreach

**Rittenhouse Astronomical Society (RAS):** Philadelphia, PA, Fels Planetarium in the Franklin Institute on Jan 11, 2006 at 7:30 PM. The delightful RAS astronomy club welcomed me for my first presentation of the new year on *"Exploring Mars and the Search for Life"*, updated to include the latest results from Spirit's incredible descent from the summit of Husband Hill. All were thrilled to see the images projected in a realistic manner on a planetarium dome and RAS sent me quite a nice note of thanks and invited me back next year. Prior to my lecture, RAS led me on complimentary tour through the eye-popping *"Body Works"* exhibit at the museum. RAS officers have attended recent AAAP lectures and we have established an outstanding level of cooperation.

Dr. Kim Weaver (NASA) will be the RAS speaker on Feb 8, 2006 at 7:30 PM discussing "New Eyes on the Universe". Website:

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



*Ken and RAS Club friends: 11 Jan 2006*

**"Science and Discovery Night" at Lawrence Elementary School:** Lawrenceville, NJ, Fri, Jan 27, 2006, 6:30 PM. This annual science fair extravaganza was attended by well over 400 kids and adults and featured more than a dozen science activities. AAAP members "WOWED" the enthusiastic crowd on the exact day of Saturn at Opposition with an armada of 7 scopes outside the school entrance and my astronomy talks inside at the Media Center.

The overflow crowd enjoyed my video presentations on *"A Tour of Our New Solar System"* and *"Mars and Saturn in 3D"* with 3D glasses provided by the PTO. They were delighted to see and handle the Honeybee "RAT rock drill" and overwhelmingly voted that Pluto should remain as a planet. Many experienced their first sight of Pluto's new moons, the 10<sup>th</sup> planet and the cometary dust particles newly returned by Stardust.

Outside, the continuous line of eager telescope viewers were thrilled to view Spectacular Saturn on a perfectly clear night and with temperatures thankfully warmer than Pluto. The majestic rings were tilted at 19 glorious degrees, enabling a great view of the Cassini Division and several moons were also visible. Other

targets included the Orion Nebula M42, the Andromeda Galaxy M31 and the Owl Cluster in Cassiopeia NGC 457.

AAAP participants included Brian van Liew, Ron Mittelstaedt, Larry Kane, Gene Ramsey, John Miller, Ludy D'Angelo, Linda Papetti and her brother Richard Fabbri and myself. Ralph Marantino's grandsons, Ludy's family and other AAAP members had a blast. Afterwards, a group of us enjoyed a pizza wrap-up party.

**Riverside Elementary School:** Princeton, NJ, Fri, Feb 10, 7 PM. This upcoming star party for eager 3<sup>rd</sup> graders will feature AAAP telescope viewing and my Mars educational presentations. The appreciative teachers sent me a gracious note of thanks for my contributions to the success of last year's event.

**Rockland Astronomy Club (RAC):** Blauvelt, NY, Sat, Feb 11, 2006 at 6 PM. The Rockland club has kindly invited me to be the guest speaker at their annual dinner meeting. My presentation on *"Mars, Saturn, Comets and Beyond!"* will highlight Spirit and

Opportunity celebrating 2 years on the Red Planet, the Cassini Mission to Saturn and its many intriguing moons, and journeys to Comets, Pluto and Beyond!

RAC beautifully reprinted the *"Spirit"* panoramic image from my Mars team as a full page cover for the Jan 2006 issue of the *"Distant Light"* club journal.

<http://www.rocklandastronomy.com/news/RAC200601.pdf>

**New Jersey Astronomical Association (NJAA):** Paul Robinson Observatory, High Bridge, NJ, Sat, Mar 25, 2006 at 8:30 PM. The NJAA has invited me to give a talk on *"Exploring Mars and the Search for Life"* and *"Mars and Saturn in 3D"*. 3D glasses will be provided. Open to the public.

Website: <http://www.njaa.org/>

**Washington Crossing State Park:** Interpretive Center, Titusville, NJ, Sun, April 2 at 1:30 PM. "A Tour of Our New Solar System" will highlight the amazing new discoveries in our Solar System at Mars, Saturn, Pluto, Comets, the new 10<sup>th</sup> "Planet" and more. Open to kids of all ages 4 to 84.

Website: <http://www.state.nj.us/dep/parksandforests/parks/washeros.html>

**NEAF Northeast Astronomy Forum:** Suffern, NY, May 6-7. RAC has lined up a prestigious group of speakers. Barlow Bob is organizing the Solar Star Party and RAC has invited me back for solar system presentations. <http://www.rocklandastronomy.com/neaf.htm>

For science outreach presentations please contact me at Email: [ken@princetonastronomy.org](mailto:ken@princetonastronomy.org)

*Outreach for AAAP, JPL and The Planetary Society*

Ken Kremer

## Robotic Mission Exploration Update

Stardust Capsule Lands Safely; Brings back pristine comet samples from the formation of the solar system: This 7 year and 3  
*(Update, continued on page7)*

*(Update, continued from page 6)*

Billion mile long journey ended with a blazing flash of light during the fastest ever spacecraft reentry into the Earth's atmosphere in the early morning of January 15 at 29000 MPH and up to 5000 degrees F. The comet sample return capsule streaked through the sky producing a luminous comet-like trail, clearly visible for over half a minute. The main chute deployed at 10,000 feet and the capsule landed safely at 5:10 AM EST at about 10 MPH in the Utah desert. The capsule bounced about 5 times, was completely intact and landed well within the target landing ellipse. At a post landing press conference, Principal Science Investigator Prof. Don Brownlee said that "we grabbed a piece of a comet" and that much of the science starts now since comets are like libraries that have stored vast quantities of information. The cometary dust particles collected onboard inside aerogel canisters from the Comet Wild 2 flyby in January 2004, are the least changed solar system material and originate from before its formation. "We fully expect some of the comet particles to be older than the Sun."



*Stardust Capsule: Earth Reentry 15 Jan 2006*

According to Prof Brownlee, "We're sampling the material Pluto is made of" because Comet Wild 2 is originally from the Kuiper Belt, a region of primordial material at the edge of our Solar System. Probably over a million dust particles were collected, far exceeding expectations. They range in size from 10-30 microns and up to 1 mm. Some are clearly visible to the naked eye (see picture below).

The dust collection tray was quickly shipped to the Johnson Space Center in Houston where the particles are currently being extracted. They will be sliced and subdivided for many different types of analysis using the most powerful science instruments known to man. Having the particles in hand allows all types of study compared to the limited instrumentation available onboard any spacecraft. Initial studies have begun.

Stardust continues to fly through space and will be retargeted in an extended mission to perhaps multiple encounters with other comets and asteroids using the 17 kg of remaining propellant.

#### **INSERT PICTURE: Stardust aerogel closeup**

Stardust Aerogel closeup: Comet dust particles

**New Horizons (Pluto Flyby):** NASA's first mission to Pluto, its moons and the Kuiper Belt was launched successfully on 19

January 2006 at 2 PM EST. With an escape velocity of 36,000 MPH, it is the fastest spacecraft to ever depart Earth, passing the moon in just 9 hours, compared to 3 days for the Apollo astronauts. She will fly past Jupiter in February 2007 for a gravity assist to probe mysterious Pluto in July 2015 with a suite of 7 science instruments. Principal Investigator Prof. Alan Stern said that with the flawless Atlas 5 launch, there is significantly more fuel available than planned for the exploration of the Kuiper Belt objects designed to unlock the secrets of the formation of our solar system.



*Launch to Pluto on 19 Jan 2006*

#### **Spirit and Opportunity on Mars: Two Earth Years on Mars!**

The 2<sup>nd</sup> Earth-year anniversaries for the rovers were Jan 3 for Spirit and Jan 24 for Opportunity. They have traveled a combined distance of over 8 miles and taken over 145,000 images. The 6 month fall season started on 22 January.

As we go to press, Spirit has just arrived at the long desired and mysterious circular and layered outcrop nicknamed "Home Plate" after an exhilarating drive past the exotic nearby mountain ridges. Along the way in mid-January, she accidentally discovered a bright white spot, while slipping in the sandy soil, with the highest salt content on Mars to date and another clue to past water.

On the other side of Mars, Prof Jim Bell communicated to me that at Erebus Crater, Opportunity had found festoon "rocks that actually provide \*better\* evidence for the past presence of surface water than the ones we saw at Eagle or Endurance craters. After studying some of the section at the Mogollon Rim/Payson region of Erebus, which is actually not very far away, THEN I would expect us to hit the Victoria Road." Victoria is a half mile wide crater and the next big science target. Jim said that Opportunity is finally on

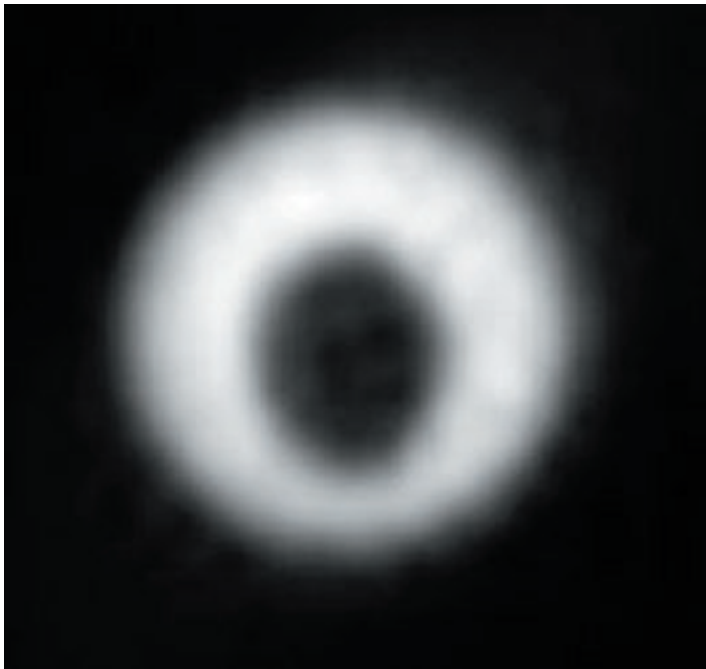
*(Update, continued on page 8)*

*(Update, continued from page 7)*

the move again after mostly overcoming recent troubles with the robotic arm. The team had to determine a safe way to stow the arm while driving after a broken wire hindered its movements.

Jim is the rover panoramic camera leader at Cornell and commanded Opportunity to take a new set of eclipse photos in January. He told me that the rover team “had updated the orbital predictions based on our earlier transit observations.” With this knowledge he was able to execute a complex plan for images at 3 second intervals and photograph an “awesome shot of Phobos almost perfectly centered in the Sun on Sol 709” in mid January (see photo).

A few days later on Sol 718, Jim targeted a family portrait of Venus, Jupiter and Earth. Jim will tell us the exciting story of the rovers at a AAAP lecture scheduled for Fall 2006.



*Phobos Eclipse on Sol 709 from Opportunity*

**Mars Reconnaissance Orbiter (MRO):** NASA's next Mars orbiter is now on final approach with arrival in a month on March 10.

**Cassini/Huygens (NASA/ESA):** A “Titanic” new year of exciting science began with the first of 13 planned flybys of Titan on 15 January at a distance of 1269 miles. Images from the Huygens Probe and 8 Cassini flybys have revealed that every geologic process on Earth is also active on Titan. Scientists see evidence pointing to rivers and channels, a possible lake, a shoreline, what may be a volcano, and an abundance of sand dunes.

High altitude haze layers in the atmosphere encircle the oblate figure of Saturn (photo at top of nest column). The icy moon Dione (700 miles across) is barely visible at upper right.

**Smallest Planet Detected:** Using a technique called microlensing, astronomers have discovered an extrasolar planet only 5 times the mass of Earth and orbiting a star in the Sagittarius constellation. The planet, designated OGLE-2005-BLG-390Lb, has a surface temperature around -220 degrees Celsius and orbits a red dwarf about one fifth the mass of our Sun.



*Cassini Views Saturn from 1.8 Million Miles*

*Websites for daily updates/perspectives:*

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

[http://www.esa.int/export/SPECIALS/Mars\\_Express/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.esa.int/SPECIALS/Venus_Express/index.html)

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

Email: [ken@princetonastronomy.org](mailto:ken@princetonastronomy.org)

Ken Kremer

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## From the Program Chair:

### Upcoming 2006 AAAP lecture season:

**February 14:** The keynote speaker will be **Prof. Mary Lou West**. Dr. West is a Professor in the Department of Mathematical Sciences at Montclair State University (MSU) and completed her Ph.D at Columbia. Her talk, titled *"How Things Move in Outer Space"*, translates a frequently daunting subject (Celestial Mechanics), into a delightful, automated, thoroughly digestible feast for the eyes and ears. The discussion will include the orbits of planets, perturbed orbits, gravity assists, Einstein's theory of general relativity and warped spacetime, binary stars, extrasolar planets, and precession of the Earth's axis.

She teaches university students astronomy, physics, and computer simulations. Some recent student projects include constructing a small radio telescope, observing sunspots, imaging variable stars and nebulae, taking stellar spectra, the stability of bicycles, modeling a hinged pendulum, measuring the magnetic properties of meteorites, and modeling cosmic chemical evolution.

Dr. West sponsors an amateur club, the North Jersey Astronomical Group ([www.njastro.org](http://www.njastro.org)), at MSU which hosts weekly Public Telescope Nights from September to May as well as monthly

*(Program, continued on page 9)*



(Program, continued from page 8)

scientific meetings.

**March 9 (THURSDAY): Special Science Lecture by Dr. Marc Rayman** from the Jet Propulsion Lab in Pasadena, Ca. jointly sponsored by AAAP and the Mechanical and Aerospace Engineering Department (MAE) of Princeton U at 8 PM. Dr. Rayman will speak on “*NASA’s DAWN and Deep Space 1 Missions*” for which he is the Chief Engineer. Deep Space 1 tested 12 high-risk, advanced technologies for future space science missions. Among the exotic systems tested were ion propulsion and artificial intelligence. The mission was so successful that NASA converted it to a comet explorer for an extremely ambitious and risky but flawless encounter with Comet Borrelly, returning the best pictures that had ever been taken of the nucleus of a comet.

Dawn is a beneficiary of Deep Space 1 and will use ion propulsion to undertake a mission far beyond the capability of conventional propulsion systems and will study the two most massive asteroids, Ceres and Vesta. They are among the last unexplored worlds in the inner solar system and should reveal much about the dawn of the solar system. Marc will review these missions and relate the excitement of flying spacecraft through the solar system.

**NOTE: DATE and LOCATION CHANGE:**

This special lecture will be on a **Thursday** at the **Friend Center Room 101 on William Street**, a very short walk from the parking lot behind Thomas Sw eet. March 9 lecture is listed on MAE website:

[http://mae.princeton.edu/events/2006/01/e180/mae\\_seminar.html](http://mae.princeton.edu/events/2006/01/e180/mae_seminar.html)

**April 11: Prof. Robert Nemiroff** of Michigan Technological University is the co-author of the “*Astronomy Picture of the Day*” website.

**May 9: Distinguished Prof. Michael A’Hearn** from U. Maryland is the Scientific Principal Investigator for the Deep Impact mission to Comet Temple 1.

On January 10, Award-Winning Rutgers University **Professor Peter A. Rona** gave an insightful and very popular lecture on “*Volcanoes of the Deep Sea: The Science Behind the IMAX Films*”. He described his expeditions aboard state of the art submarines to discover the black smoker volcanic vents over 2 miles beneath the surface of the ocean. These vents are the energy and mineral source for exotic life forms which thrive despite the absence of photosynthesis and provide insight into the origin of life on earth and beyond. The IMAX film is available on DVD. Website:

[http://www.volcanoesofthedeepsea.com/index\\_flash.html](http://www.volcanoesofthedeepsea.com/index_flash.html)

Following his AAAP lecture, Peter was invited to speak at the Rittenhouse Astronomical Society on April 19, 2006, 7:30 PM, which meets in the Fels Planetarium at the Franklin Institute in Philadelphia. Website info:

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

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

Email: [ken@princetonastronomy.org](mailto:ken@princetonastronomy.org)

Ken Kremer

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## Special Science Lecture

### Announcement

Dr. Marc Rayman

of the

Jet Propulsion Lab

March 9, THURSDAY, 8 PM

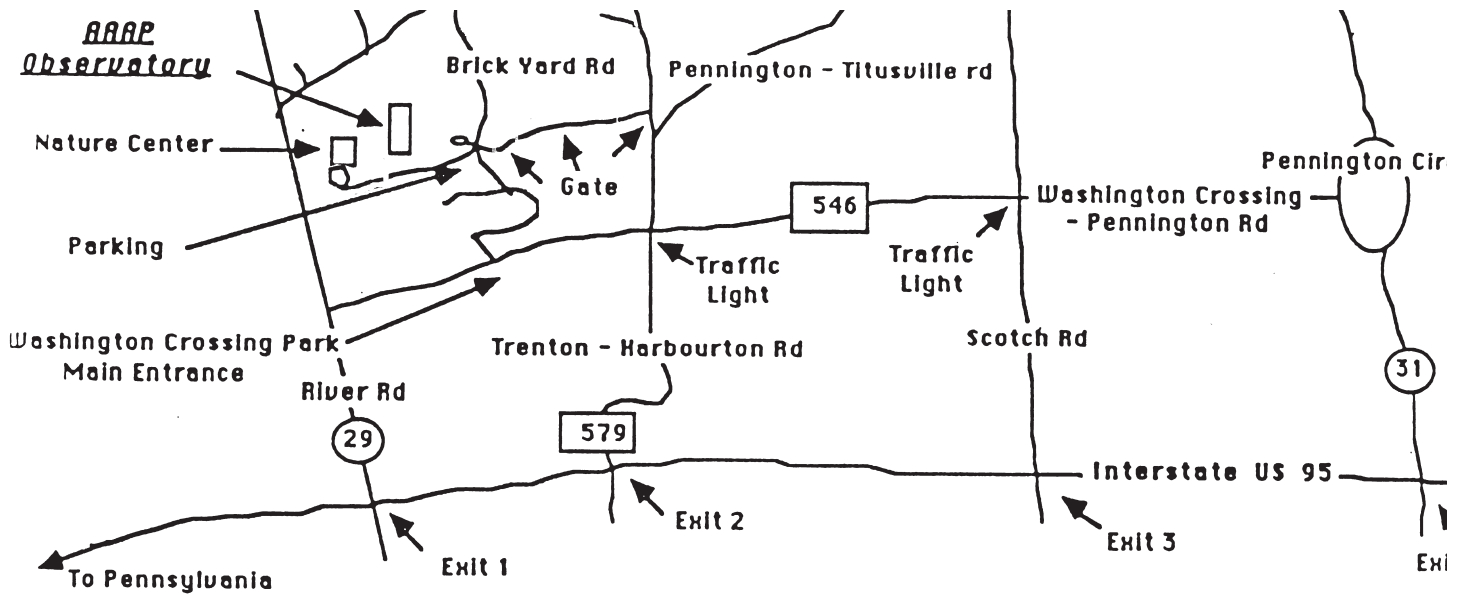


AAAP/Princeton U (MAE) Joint Sponsorship

Location:

Friend Center Room 101 on William Street

“NASA’s DAWN and Deep Space 1 Missions”



The best way to get to the observatory is to take Interstate 95 South towards Pennsylvania. Then take Scotch road at Exit 3 and proceed north (this amounts to right). Then, at the third traffic light take a left onto the Washington Crossing-Pennington road (County Route 546). Take this road to the first traffic light and take a right onto Trenton-Harbourton road (County Route 579). Take this road to the first driveway on the left, this is the Phillips Farm/Soccer Field entrance to the park. There is a series of three gates with club combination locks. If the gates are not open, you will need the lock combination to open the gate or be accompanied by a Keyholder member.

See us on the Web: [www.princetonastronomy.org](http://www.princetonastronomy.org)

Amateur Astronomers'  
 Association of Princeton  
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