SIDEREAL TIMES

The Official Publication of the
Amateur Astronomers Association of Princeton

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From the Director

AAAP Meeting March 13 (8:00 Peyton Hall). Our astronomical excursion heads next to an exciting new area with a novel presentation on **Plasma Propulsion and the Exploration of Space**, by **Dr. Edgar Choueiri**, Director of Princeton's Electric Propulsion and Plasma Dynamics Lab (EPPDyL). Dr Choueiri is Associate Professor in the Mechanical and Aerospace Engineering (MAE) Dept at Princeton, and also Assoc. Faculty in Astrophysics. With his deep background in plasma and space physics and applied mathematics, Dr Choueiri is a leading expert and proponent of advances in propulsion science and technology. In his talk he will describe from firsthand knowledge what this means to the future of space exploration. Several AAAP members (Ken Kremer, Ron Mittelstaedt, Larry Kane, John Miller, Nick Hillman, and I) were privileged to learn a bit more about this field last year when we provided telescopes and observing skills as "entertainment" during the opening night (Halloween) reception of the International Electric Propulsion Conference 2005 hosted by Princeton/MAE Dept, for which Dr Choueiri was the Chairman. He is now returning the favor by addressing the AAAP. We hope to see a great turnout of members (spread the word to friends and co-workers) for the March 13 talk. For more information see **Program Chair Ken Kremer's** article in this issue-- and go to the AAAP website.

AAAP Special Science Presentation, Friday March 30, 8:00 Peyton Hall. Using the new Coronado H-alpha setup I recently acquired for my small refractor, I'm in awe of what the sun really looks like. Now comes a remarkable opportunity for all AAAP members to learn more about our closest star-- straight from a leading figure in solar physics and expert on solar eclipses. **Dr. Fred Espenak from the NASA Goddard Spaceflight Center** will present **Predicting and Chasing Solar Eclipses** at a special lecture on March 30. Dr Espenak has studied solar eclipses first-hand at sites all over the globe for the past 35 years. In his presentation on March 30, he will share some of this experience through photos and video, including his most recent expedition to Libya in 2006. Information about future solar eclipses visible from Princeton will be distributed at this event, at which the public is also welcome (bring your kids too!). For more information, please go to the AAAP website or contact Ken Kremer.

Observing events coming up. The Observatory Committee and other members have been doing a great job organizing and getting the telescope/mount upgrade completed for the next observing season. At the recent Board meeting Feb 1, we decided to improve public outreach (and member access) at the Observatory by scheduling every Friday night in April-October as public observing nights. Keyholders should consult the website for team duty schedules (please contact Larry Kane if there are questions). This new schedule will also improve member access because all AAAP members can count on coming out to the observatory any clear/mostly clear Friday night during the season and learn about telescopes and observing techniques from experienced members. I'd like to give a special thanks to Observatory Co-Chairs Larry Kane (Keyholder Training and Scheduling), Gene Ramsey (Building and Grounds Maintenance), and Ron Mittelstaedt (Observing Equipment Maintenance), as well as John Miller and Ludy D'Angelo for helping the club get ready for the new season. A combo **Keyholder Refresher Training** for the new software/mount upgrade along with a "**Messier Mini-Marathon**" has been scheduled at the Observatory on **Friday night March 16 starting at 7:00 PM**.

Nominations Committee Chair sought. It's that time of year again! As set out in the by-laws, we are seeking a Chairperson to form the Nominations Committee to identify candidates for the next Board. At the March meeting, I will nominate a Chair who then forms a temporary committee to identify candidates for Director, Asst. Director, Treasurer, Secretary, and Program Chair. The slate would be announced at the April meeting, with membership voting in May. Please send me a note or call (see masthead) if you'd be willing to help the club with the role of Nominations Chair.

Dark skies! — Rex

Simpson Observatory (609) 737-2575

Science Outreach and Exploration Update

Lawrence Elementary School: Lawrenceville, NJ, Jan 26, 2007, *Science and Discovery Night"*. This annual event is Mercer County's premiere science fair. Over 400 kids and family members rotated through more then a dozen activity stations including my presentations on discoveries from the Sun, Mars, Saturn and beyond and AAAP telescope viewing (courtesy of Ron Mittelstaedt, Jeff Bernardis, Larry Kane, Ludy D'Angelo and John Miller). As a special treat for outreach, the Mars team at JPL has sent giant 3-D display posters of Opportunity at Victoria Crater.

Kids of all ages enjoy the Opportunity rover and the Solar System in 3-D at Lawrence Elementary.

AAAP members set up an indoor telescope display at the Lawrence science fair on this sub 20's night, thrilling hundred's with the wonders of the cosmos! Shown here are Ron and Larry, with scopes firmly locked on celestial picture targets. Ludy braved the Martian arctic outdoors.

Knollwood Middle School: Fair Haven, NJ, Jan 29. The science coordinator for the Fair Haven school district near the Jersey Shore contacted me to present an afternoon of astronomy and science enrichment to over 140 middle schooler's in 2 sessions.

Over 120 8th Graders experience "Mars in 3-D" from AAAP Program Chair Ken Kremer at Knollwood. And they literally leaped with glee to sign the Pluto is a Planet Petition. Sharp kids indeed!

A smaller group of 6th graders happily milling about with Knollwood Science Coordinator Marion Carolan and myself, conversing on the wonders of Saturn and Titan and the search for life beyond Earth.

My upcoming astronomy talks include the following schools and community groups:

Orchard Hill Elementary School: Skillman, NJ, Feb 28 & Mar 5, 6 PM. Family Astro Night.

Crossroads North Middle School: Dayton, NJ, Tue, Mar 6, 7 PM. Astronomy for Boy Scouts.

Prospect Library at Municipal Center: Barneveld, NY**,** Fri, Mar 9, 7 PM. *"Exploring Mars and the Search for Life (in 3-D)"*.

The Children's Museum of Science and Technology: Utica, NY, Sat Mar 10, 10 AM – 4 PM. All day astronomy event: "*Blast Off for Space with NASA: To Mars, Pluto and Beyond (in 3-D)"*. Website: http://www.museum4kids.net/AstronomyNASA.htm

Mohawk Valley Astronomical Society (MVAS): Clinton, NY, Sat Mar 10, 6 PM. Annual dinner banquet invited speaker: *"Exploring Mars and the Search for Life (in 3-D)"*. Website: http://mvas-ny.org/Meetings1.html

Raritan Valley Community College Planetarium: Somerville, NJ, Tue Mar 27, 7:30 PM. *"Our New Solar System (in 3-D)"*. Website: http://www.raritanval.edu/planetarium/

Rittenhouse Astronomical Society (RAS) in the Franklin Institute: Philadelphia, PA, Wed April 11, 8 PM. "*Mars, Saturn, Comets and Beyond in 3-D"*. Website: http://www.rittenhouseastronomicalsociety.org/

The Explorers Club: New York, NY, Mon Apr 23, 7 PM. *"Exploring Mars and the Search for Life (in 3-D)"*. Website: http://www.explorers.org/index.php

Please contact, by email, for science outreach presentations.

Ken Kremer
AAAP Program/Lecture Chairman

From the Program Chair

Upcoming 2006-2007 AAAP Lecture Season

Important Reminder: 2 AAAP Guest Speaker events in March 2007. Please attend both exciting lectures on March 13 (Tue) and March 30 (Fri)

March 13: Professor Edgar Choueiri, Director of the Electric Propulsion and Plasma Dynamics Laboratory (EPPDyL) at Princeton University, is the keynote speaker. Dr. Choueiri's talk is titled "*Plasma Propulsion and the Exploration of Space"* and will highlight the next generation rocket technology crucial to enabling advanced missions to explore deep space. A brief history of rocketry will explain why the chemical rockets currently used to send humans to the Moon are not feasible for ambitious deep space exploration. He will describe the basic physics of more advanced spacecraft propulsion concepts, such as nuclear and plasma propulsion, and show how the plasma rockets that have been successfully used on several recent small spacecraft are being evolved for the more ambitious missions that will define the next age of space exploration, such as a Jupiter moon tour, a Pluto or a Neptune orbiter, and sample return missions to Mercury, Titan, Europa, comets, asteroids and Kuiper Belt objects.

Choueiri holds a PhD from Princeton where he is an Associate Professor of Applied Physics at Princeton's Mechanical and Aerospace Engineering Department and the Department of Astrophysical Sciences. He has authored more than 130 scientific publications on spacecraft propulsion, plasma physics and astronautics. His research experiments have been launched on the space shuttle and Russian scientific spacecraft, and served as Principal Investigator on more than 25 research grants from NASA, USAF Office of Scientific Research, and other governmental agencies. He is the recipient of numerous honors and awards and is presently leading a large team of researchers at his Princeton lab and various NASA centers to develop plasma rockets.

Prof Choueiri and myself served as co-hosts for the jointly sponsored AAAP/MAE Special Science Lecture by Dr. Marc Rayman in March 2006. Marc is from the NASA Jet Propulsion Lab in Pasadena, CA and his soon to launch DAWN asteroid orbiter utilizes advanced propulsion concepts which are the focus of Prof Choueiri's talk.

March 30 (Friday at Peyton, 8 PM): Fred Espenak, world renowned Eclipse expert from NASA Goddard Spaceflight Center will present a **Special Science Lecture.** His talk is titled *"Predicting and Chasing Solar Eclipses"*. A total eclipse of the Sun is arguably the most spectacular astronomical phenomenon visible to the naked eye. Among early civilizations, the gradual disappearance of the Sun during an eclipse brought with it abject terror and panic. Today, we know that eclipses are simply the result of the geometric alignment of the Sun, Moon and Earth. The eerie darkness brought on by this incredible event is welcomed by scientists as a rare opportunity to study the beautiful corona which surrounds the Sun.

How often do eclipses occur and where can they be seen from? When will the USA see its next total eclipse? What can eclipses tell us about the Sun and its mysterious corona? Espenak has spent the past 35 years chasing eclipses around the world. He will share some of his experiences with us through photos and video, including his most recent expedition to Libya in 2006. The next total eclipse occurs on August 01, 2008 when the path of the Moon's umbral shadow crosses northern Canada, Greenland and central Asia. A preview of this exciting upcoming event will be illustrated with maps and climatological data (http://sunearth.gsfc.nasa.gov/eclipse/SEmono/TSE2008/TSE2008.html). Finally, a special handout listing future solar eclipses visible from Princeton, NJ will be distributed to the audience.

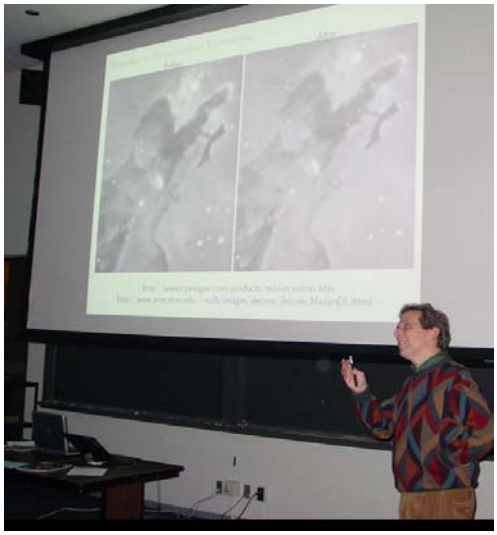
Fred Espenak's research involves monitoring of ozone in Mars' atmosphere, the detection of winds on Venus, Mars and Titan, and the measurement of hydrocarbons in the stratospheres of Jupiter and Saturn.

Espenak is perhaps best known for his predictions of eclipses. His two books, "Fifty Year Canon of Solar Eclipses: 1986 - 2035" and "Fifty Year Canon of Lunar Eclipses: 1986 - 2035" have become standard references on the subject. Espenak also publishes special NASA bulletins for each major solar eclipse which provide detailed predictions and maps. He is co-author of the popular book "Totality: Eclipses of the Sun". Espenak's interest in eclipses was first sparked after witnessing the total solar eclipse of March 1970. Since then, he has participated in over twenty eclipse expeditions around the world and has made predictions on thousands of eclipses. His eclipse photographs have appeared in both national and international publications, and he has lectured extensively to the general public on the Sun, eclipses and photography. He is the web master of NASA's official eclipse web site (http://sunearth.gsfc.nasa.gov/eclipse/) as well as a personal web site on eclipse photography (www.MrEclipse.com). In 2003, the International Astronomical Union honored Espenak by naming asteroid 14120 after him.

April 10: Professor David Spergel from Princeton University on "*Taking the Universe's Baby Picture"*.

May 8: Dr. Tony Del Genio from NASA Goddard Institute for Space Studies will present "*The Cassini Mission to Saturn"*. He is a member of the Cassini imaging team.

On Feb 13**, Professor Robert Vanderbei** of Princeton University, presented "Backyard Astrophotography: A How-To Story" to an enthusiastic crowd who braved the approaching ice storm. Bob discussed in stellar detail, the equipment and set up required to acquire good image data and transform it into artful images. He showed us many breathtaking creations and plans a new Art Exhibit for the summer of 2007 in the Engineering School Café.

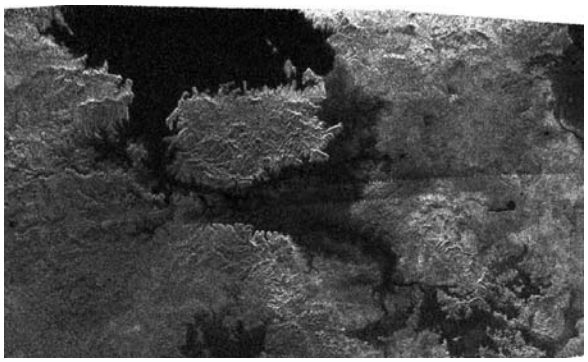


Bob Vanderbei is an active AAAP Member and described his extensive astrophotography techniques to manipulate images and optimize science and art at the Feb 13 meeting

On Feb 27, **Professor Jonathan Lunine** from the Lunar and Planetary Lab of the University of Arizona, presented a Special Science Lecture titled "Methane Lakes and Methane Rain on Titan: What it All Means". The scientific evidence for the remarkable discovery of **liquid methane lakes on Saturn's exotic moon Titan** was just published on the

"cover" of the journal "Nature" on 4 Jan 2007. Dr. Lunine is an award winning team member on the NASA/ESA Cassini/ Huygens Mission to explore Saturn and is a distinguished expert on Titan. Over 60 people attended his presentation. We were treated with breathtaking science which included unpublished data sent back by the Cassini orbiter only 5 days prior to his AAAP talk. These new radar and visible light data from the close flyby over the northern latitudes of Titan on 22 Feb, revealed a lake over 100,000 km2 in size and larger than Lake Superior (see image below). These lakes are not just pure methane, but are also comprised of ethane and more complex organic molecules. Furthermore the vast dune fields in the equatorial regions of Titan, are largely organic in nature. He suggested that a future mission to Titan could most efficiently explore via a balloon passing over large swaths of the surface for an extended duration. As one attendee wrote to me, the sentiment at the conclusion of the talk and extensive Q&A was "it was a privilege to hear Lunine's talk on Titan last night".

Prof Lunine explains a potential future balloon mission to Titan



At the 27 Feb AAAP Special Science Meeting, Dr. Lunine presented this radar image taken just days earlier on 22 Feb 2007, of a large 90 km wide island inside a giant and newly discovered 300 km wide methane lake near the north pole of Titan.

Please send me any photos from any of the past or current exciting lecture evenings which you may have or send your suggestions for speakers, with contact/topic information to:

Ken Kremer
AAAP Program/Lecture Chairman

Minutes of the General Membership Meeting AAAP February 13, 2007

The meeting started at 8 PM. Rex Parker (Director) gave a welcome to the audience. Larry Kane announced that there were copies of the Sky and Telescope Article featuring our speakers and club members Robert Vanderbei and Ruslan Belikov, plus other articles of interest, on the hall table. Rex continued with an overview of a recent Rutgers symposium on global warming. One of the lectures included in the symposium was "What happened to Pluto" given by Guy J. Consolmagno who is connected with the Vatican Observatory and Arizona State University. Rex asked him if he would consider giving us a talk in the future on one of his future trips. He was also a member of the IAU. Rex also was excited in joining the ranks of solar observing with his new Coronado PST. Ron Mittelstaedt announced that the C-14 was operational again and thanked all those who helped out in the effort. There is some training ahead with the new software installed. Rex also gave kudos to the outreach effort at Lawrence Elementary School some weeks back as several members were involved in the occasion.

Ken Kremer (Program Chair) announced a special lecture on February 27th by Jonathan Lunine talking about the Cassini mission. Professor Choueiri will be on March 13th. On March 30th will be another special lecture by Fred Espenak. He then announced our 10-minute member speaker Ruslan Belikov who talked about measuring 1 AU from your backyard. He explained both the history and methodology for doing such measurements.

Afterward, our main speaker Robert Vanderbei gave a talk on astrophotography. They both work together on finding extrasolar planets at Princeton University.

After the break, Rex announced that there would be an AAAP Board meeting at 7:30 in the basement of Peyton Hall on March 1st. Some topics to be covered are the succession plan, keyholder observing schedule, observatory maintenance, and other topics of interest.

Rex brought up a concern about the website and that when John Miller is not available there is no back up to maintain the web page. Ken said that there was one member interested in that function that may be able to help. He will forward the info to John Miller.

Ludy D'Angelo (Secretary) announced that the minutes for the last meeting were published and asked for any comments. There were none. He also announced that there was a new member who joined: Courtney Dressing is a student at Princeton in the Astrophysics Department. She has been coming to the meetings. Total membership is at 101 members.

Brian VanLiew (Treasurer) announced that the treasury balance is at $12,846.01. He also indicated that we got a donation from Lawrenceville School for $100.

There are several outreach opportunities in March. Please contact Jeff Bernardis if interested.

Ron Mittelstaedt and Larry Kane will need to communicate to the keyholders and team leaders about the upgrade to the software.

Brian VanLiew reported that there were 5 members who came out to Washington Crossing Park to view Saturn in opposition.

Drexel University. 3:30 PM March 8th will be a lecture by Nobel Prize winner John Mather.

Sidereal Times deadline will be the March 2nd. Ira Polans will be helping out for this issue. Articles are to be sent to Bryan Hubbard and Ira Polans.

The meeting ended at 10:20 PM.

Ludovico D'Angelo,
Secretary

Barlow Bob's Corner

Lunar Jack and Jill

As the Moon waxes, or fills out, the first quarter phase gradually grows to a pear-shaped gibbous Moon. Thereafter, some fourteen days after new Moon, the familiar full Moon rises in the east as the Sun sets, putting the Moon 180 degrees across the sky compared to the Sun.

After full, the Moon's phase fades off, or wanes, first with the waning gibbous phase, then with the last quarter phase, that rises at midnight and sets the following day around noon. Finally, just after the waning crescent phase, the monthly lunar cycle concludes when the Moon returns to the new phase, 29 ½ days after the previous new phase.

Everyone knows the nursery rhyme *Jack and Jill*. However, did you know that this rhyme tells the story about the Moon's changing phases over the course of a month?

As you watch the Moon's phases, try carefully observing the grayish patterns on its surface, called maria. Maria is the Latin word for sea. Ancient astronomers thought that these dark areas on the Moon were seas. Using the unaided eye or binoculars, can you visualize the story of Jack and Jill using the maria?

The rhyme comes from ancient Scandinavia. Jakka, the Scandinavian word for increase, represents the waxing lunar phases (the phases after new but before full). Bila, their word for dissolve or decrease, represents Jill, or the waning phase after full and before new Moon. At first quarter an outline of a head, arms body and legs (Jack) may be perceived. At full phase you may envision Jill standing to the left of Jack, while at last quarter, *Jack falls down* and Jill is last to fade just before new Moon.

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Barlow Bob

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