

# SIDEREAL TIMES

The Official Publication of the  
Amateur Astronomers Association of Princeton

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## From the Director

December! Another month upon us, and another month of busy amateur astronomy activities if one has the wherewithal in New Jersey to get outside, stay warm, and do some observing. The major event of the month will be the total lunar eclipse on December 21<sup>st</sup>, the moon will be the highest in the sky and it is the day of the winter solstice. Unfortunately, it starts at 1:32 AM with mid-eclipse at 3:17 AM. So all you insomniacs out there will have no problem with this. But if you are a heavy sleeper, it may be worth it to you to set an alarm and maybe take a peek outside your window at the right time.

Some other things to look for is Venus in the pre dawn sky being at its brightest on December 4<sup>th</sup>. The Geminid Meteor shower will peak on December 13/14. All during the month, Jupiter and Uranus are relatively close to each other, but on January 2<sup>nd</sup>, they'll be close enough to see in the same field of view in a telescope. On this note, I hope that if the weather cooperates, lets get some members out to the observatory for this event.

Now if the outside is too cold for you, you can always stay inside and contemplate astronomy and the universe using a nice large book full of images and information. The book is "Sizing Up the Universe" by Richard Gott and Robert Vanderbei. They will be speaking to us in Peyton Hall on December 14<sup>th</sup>. Both Dr. Gott and Dr. Vanderbei are Princeton University professors. Richard Gott has spoken to our club on many occasions over the years. The first time was in 1972 as a graduate student at Princeton! Bob Vanderbei has been an AAAP club member for many years and is an excellent astro-photographer. Their book will be available for purchase and a book signing after their lecture. It will be a special night, so don't miss it!

See you all on the 14<sup>th</sup>!

*Ludovico D'Angelo, Director*

## Sidereal Times is Available as a Blog!

Sidereal Times is available as an online blog at <http://princetonastronomy.wordpress.com>. Articles will be posted to the blog monthly at the same time Sidereal Times is mailed to members.

Members are encouraged to subscribe to the online version via the RSS feed by clicking on the red icon on the upper right side of the home page under the words "Subscribe". All articles will be automatically sent to the RSS feed reader of your choice when they are posted. For additional information on RSS feed readers, see [RSS Explained](#)

The online version allows members to comment on the articles. To maintain cordial and family-friendly discourse, members are asked to abide by the comment rules posted on the site. Violators will be banned from the blog.

We hope members enjoy this alternative way to get club news and meeting announcements.

## Membership Meeting Minutes November 9, 2010

Director Ludy D'Angelo called the meeting to order.

**Lunar Eclipse Event** Bill Murray announced that on the early morning of December 21, there will be a significant total lunar eclipse. A discussion was held whether the AAAP should get together at our Washington Crossing observatory and invite the public. Bill said that he would publicize the event at his showings at the New Jersey State Planetarium. It was agreed that, weather permitting, the club will hold an eclipse event at the observatory.

**The deadline for the January issue is:**

**Wednesday, December 29, 2010**

**Send your submissions to:**

**[editors@princetonastronomy.org](mailto:editors@princetonastronomy.org)**

**Secretary Report** There was no report given.

**Treasurer's Report** The Treasurer's Report appears in another section of the Sidereal Times.

**Outreach** Outreach Coordinator Dave Letcher stated that the AAAP will conduct a Star Party at the Allentown Middle School this coming Friday. Member Dee Bosh has requested a Star Party at the Pemberton High School on two nights, November 18 and 19. Dave will contact Vic Ballenger to try to get some of the materials he used in his astronomy class.

**Observatory** Co-Chair Gene Ramsey announced that the donation can, placed at the observatory, had over \$100 in it. Gene and Jeff Bernardis are looking at upgrades to the observatory security system. John Giles announced that he contacted Scott Losmandy and was told that the refractor controller could be fixed for about \$40. Gene and John Church will winterize the observatory, this weekend.

**Sidereal Times** The next deadline for articles is December 1. Michael Wright is developing a mock-up of the Sidereal Times using the program Word Press.

*Larry Kane, Secretary*

## Community Outreach

There are no current requests for community outreach. As requests are received I will email notices.

*David Letcher, Outreach Coordinator*

### Interested in keyholder training?

**Contact:**  
**kane@princetonastronomy.org or**  
**by cell phone (609-273-1456)**

## Treasurer's Report

Dues for the current fiscal year are continuing to come in. To date we have 59 paid members for FY 2011, totaling \$2,340 in dues compared to \$3,560 for all of last year and \$4,147 for the year before. Thank you to those who have sent in their dues! It would be great to receive renewing member's dues before year end.

Some trailing expenses for StarQuest have reduced the surplus on 2010's event to \$466, which is still excellent.

In December we will pay our annual insurance premium of roughly \$1,000.

Our surplus for the fiscal year-to-date is approximately \$2,700, and on a cumulative basis it is roughly \$21,000.

*Michael Mitrano, Treasurer*

## From the Program Chair

In November we were treated to a fine presentation given by astro-photographer Jerry Lodriguss, featuring photos that he has produced over the years using advanced CCD and editing techniques. The art

of astrophotography has certainly progressed rapidly in the last decade or so. Several of our own members are continuing to do excellent work in this area as well.

Our December 14 meeting will feature Prof. (and AAAP member) Bob Vanderbei and Prof. J. Richard Gott of Princeton University discussing their new National Geographic book, "Sizing Up the Universe." The book will feature many of Bob's photos taken from his driveway. The authors will be signing copies of their book, which will be on sale during the intermission.



*Bob Vanderbei*



*Richard Gott, III*

On January 11, we will have our own Dr. Ken Kremer to speak on "The Space Shuttle, The Space Station, and What's Beyond for NASA." The talk will include many of Ken's photos and descriptions from personal behind-the-scenes visits to the Kennedy Space Center at Cape Canaveral, where Ken has a press pass.

On February 8, Dr. Fronefield (Froney) Crawford from Franklin & Marshall College in Lancaster, PA, will be speaking on the topic of "New Searches for Old Pulsars."

March and May are open as of this writing. On April 12 we will have Michael Molnar speaking on "The Star of Bethlehem," a topic he has extensively researched. Michael will be signing copies of his book on this subject during the intermission. On June 14, we will be treated to another presentation by Bill Murray in the New Jersey State Museum Planetarium in Trenton.

There will be a "Meet the Speakers" dinner at the Triumph Brewing Company on Nassau Street, beginning at 6:00 pm before the meeting. For reservations, please contact John Church ([j.church@mindspring.com](mailto:j.church@mindspring.com)) by no later than noon on Tuesday, Dec. 14<sup>th</sup> so that a table can be reserved.

*John Church, Program Chair*

## Robots Arrive at Kennedy Space Center

Two of the world's most advanced robots have invaded the Kennedy Space Center (KSC) as NASA prepares to launch Space Shuttle Discovery on the STS-133 mission to the International Space Station (ISS). These robots are friendly to earthlings—at least for now.

The twin brother of Robonaut 2 – known as R2A – was standing guard at the KSC press site adjacent to the Vehicle Assembly Building (VAB) where I had the unique pleasure to meet him for an outdoors encounter. R2A was gazing intently at Launch Pad 39 A and shuttle Discovery where his sibling—Robonaut 2 – is set to meet his destiny and become the first humanoid robot in space. R2A is virtually identical to Robonaut 2.

The launch of Discovery on her final flight has been reset to no earlier than Feb 3 after a hydrogen fuel leak delayed the blastoff. Robonaut 2, also known as R2 or R2B, is stowed inside the “Leonardo” Permanent Multipurpose Module (PMM) which is the primary cargo loaded inside the shuttle’s payload bay.

R2 will be stationed inside the US built Destiny science research laboratory as a robotic assistant. It will work together shoulder to shoulder with the ISS crew in space.

R2 will make history by becoming an official member of the ISS crew and the first non-human member to boot. The goal is to demonstrate how dexterous robots can operate in the zero g environment of space and how they can work to contribute to the maintenance and scientific output of the ISS.

R2 is the most dexterously advanced robot on Earth. When R2 boards the station, the ISS will become the most advanced robotics lab in human history and serve as an ideal test bed for humans and robots working together to build a future of exploration and discovery.

“The chance to fly our robot to the ISS was a dream come true,” Ron Diffler told me in an interview at KSC. Diffler is NASA’s R2 project manager at the Johnson Space Center in Houston, TX. “The human form is intentional and we hope it should help to motivate kids to study science.”

“We hope that one day, after further upgrades and the addition of a lower body and legs that R2 will even be able to venture outside and conduct EVAs to assist spacewalking astronauts,” Diffler added.

R2 weighs some 300 pounds and was manufactured from nickel-plated carbon fiber and aluminum. It is equipped with human like arms and hands as well as four visible light cameras that provide stereo vision.

The robot was developed in collaboration with GM. “NASA and GM pooled their resources and R2 was unveiled in February 2010,” according to Susan Smyth, GM Director of Research and Development. “With R2 we will demonstrate ground breaking technology that will also have real world applications as GM works to build better and safer cars.”

The key point is that R2 can accomplish real work with incredibly dexterous hands and an opposable thumb as I witnessed in a live action demonstration at KSC.

R2A will be watching his twin brother’s blast off to space live from KSC. Look here for more details about Robonaut: <http://www.spaceref.com/news/viewnews.html?id=1473>

## Astronomy Outreach by Ken Kremer

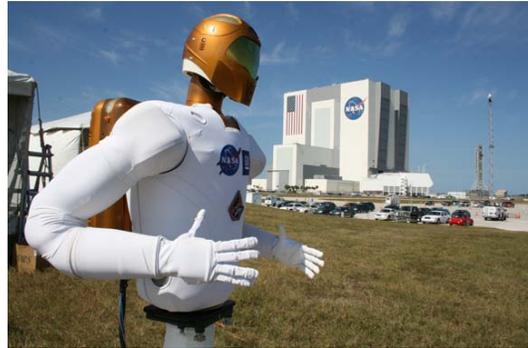
At the AAAP January 2011 monthly meeting, I’ll speak about my up close experiences at KSC and at Cape Canaveral with R2, the Shuttle, Orion and SpaceX. Upcoming talks:

**Gloucester County College Astronomy Club:** Sewell, NJ, Dec 7, 7:30 PM. “*The Last Journey of Shuttle Discovery.*” Website: [http://www.gccnj.edu/news\\_and\\_alerts/rotating\\_ads/ken\\_kremer.cfm](http://www.gccnj.edu/news_and_alerts/rotating_ads/ken_kremer.cfm)

**Amateur Astronomers Association of Princeton:** Princeton, NJ, Jan 11, Tue, 8 PM “*Whats Beyond for NASA: Shuttle, Station, Orion, SpaceX.*” Website: <http://www.princetonastronomy.org/>

Ken Kremer: Spaceflight magazine & The Planetary Society

Please contact me for more info or science outreach presentations at [kremerken@yahoo.com](mailto:kremerken@yahoo.com) or my website: [www.kenkremer.com](http://www.kenkremer.com)



Robonaut 2A with the VAB in the background at KSC. Credit: Ken Kremer



Robonaut 2A guards Launch Pad 39 A where his twin brother – dubbed R2 – will blast off to space inside shuttle Discovery at KSC. Note US flag and world famous countdown clock at right. Credit: Ken Kremer



Robonaut 2A and Ken Kremer shake hands at KSC. R2 has over 350 sensors. What a cool experience to meet and greet the most advanced humanoid robot in the world. Credit: Ken Kremer



Discovery unveiled in darkness at pad 39 A at KSC. Credit: Ken Kremer



Robonaut 2A and Ron Difiler, NASA's R2 project manager at the Johnson Space Center greet the media at a KSC press briefing for the STS-133 mission. The cameras provide eyesight for R2A and are projected live on the TV monitor at rear. Credit: Ken Kremer

Ken Kremer

## Minimum of Algol by CCD Photometry

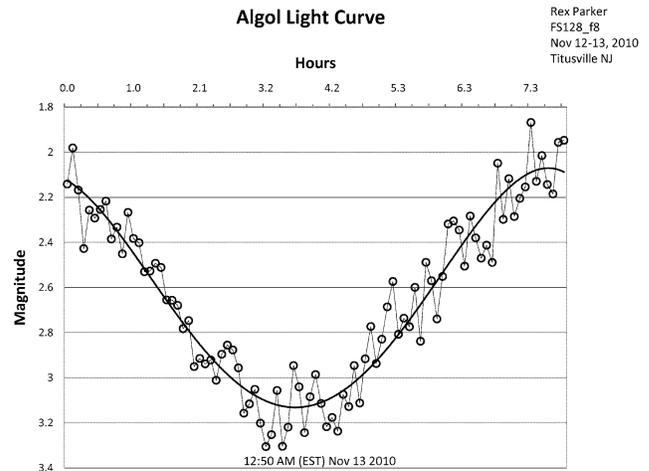
Variable stars are not getting the attention they deserve in the AAAP these days! Deep sky objects, planets & exo-planets, and intergalactic large scale structure are the hot topics. Even double stars get more telescope time at the observatory. Visually observing the changes in star brightness is slow and perhaps difficult. Yet the science behind variable stars is fascinating, and the photomultiplier tube (PMT) detector has been displaced by the CCD as instrument of choice for their measurement. A CCD camera on a telescope with a good tracking mount can accurately measure stellar magnitudes. It occurred to me that for variables, the real obstacle is to actually set up and do the experiment.

Algol (Beta-Persei) is a variable star 92 light years away in the constellation Perseus which undergoes periodic variations in brightness every ~2.87 days. It is the most famous example of an eclipsing binary star system; when the dimmer star moves in front of the brighter (in our line of sight) the overall intensity decreases markedly. November is the only time when the full light curve of Algol can be observed at our latitude. This is because Algol stays at its minimum for ~2 hours and takes about 10 hours to complete the eclipse.

What is needed is a clear November night without a full or gibbous moon, and a minimum occurring around midnight. Sky & Telescope publishes the "Minima of Algol" monthly in the magazine and website. I had been keeping an eye on these tables and noticed a minimum predicted for Friday night (11/13) at 12:52 AM.

Non-anti-blooming CCD chips are linear photometric devices. The wells (pixels) of the chip fill with electrons in linear proportion to the photon flux, as long as the full well capacity is not exceeded (controlled by exposure time). For the data below, images at 0.2 sec each were taken with SBIG ST10-XME and Tak FS-128 at f/8 on a Losmandy G11 mount, with images taken every 5 minutes all night long and downloaded in real time to my laptop. The data was processed the next day using a program (in Maxim DL) that compares the brightness of the target star to an invariant control in the same image field whose magnitude is precisely known (in this case, from NASA's Hipparcos). The reference star in this case was mag 8.6, so that probably gives rise to some of the noise in the plot (exposures had to be short to keep Algol's pixels within full well capacity of CCD). The resulting data are normalized brightness, given as magnitude, which allows construction of a light curve plot of magnitude vs time (Figure below). Recall that magnitude is a holdover

from historical units in which each magnitude is 2.5 times brighter than the next, and the span of all stars visible to the naked eye are 1 to 6 (1 is brightest).



At last, a minima of Algol near midnight on a clear Friday night in November when I was home!

Rez Parker

## Super Earth Has an Atmosphere, but is it Steam or Gassy?

*ScienceDaily* (Dec. 1, 2010) — In December 2009, astronomers announced the discovery of a super-Earth known as GJ 1214b. At the time, they reported signs that the newfound world likely had a thick, gaseous atmosphere. Now, a team led by Jacob Bean (Harvard-Smithsonian Center for Astrophysics) has made the first measurements of GJ 1214b's atmosphere. However, the measurements raise as many questions about the planet's atmospheric composition as they answer.

"This is the first super-Earth known to have an atmosphere," said Bean. "But even with these new measurements we can't say yet what that atmosphere is made of. This world is being very shy and veiling its true nature from us."

A super-Earth is a planet up to three times the size of Earth and weighing one to ten times as much. (GJ 1214b is 2.7 times the size of Earth and 6.5 times as massive.) They are likely to be mostly solid (some combination of rock or ices), unlike the hundreds of Jupiter-sized gas giants found to date around distant stars.

Researchers suggested three atmospheric possibilities for GJ 1214b. The most intriguing was a thick blanket of steam vaporized by the nearby star. (This option led to the nickname "waterworld," although it's too hot for an ocean.) The second option was a mini-Neptune with a rocky core surrounded by ices and a hydrogen/helium atmosphere. The third model has no equivalent in our solar system -- a big, rocky world with a soupy mix of gases (mainly hydrogen) recently emitted by volcanoes. To study the planet's atmosphere, the team observed it when it crossed in front of its star. During such transits, the star's light filters through the atmosphere. Gases absorb the starlight at particular wavelengths, or colors, leaving behind a chemical fingerprint detectable from Earth. Similar observations have found gases like hydrogen and sodium vapor in the atmospheres of distant "hot Jupiters."

The full article may be read at, is excerpted from, and is credited to Science Daily – <http://www.sciencedaily.com/releases/2010/12/101201134250.htm>

## 20 Years Ago In Sidereal Times...

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Amateur Astronomers Association of Princeton

Director: Larry Smith Editor: JWHS

DECEMBER 1990

### NOTES FROM THE NOVEMBER MEETING

Vic Belanger introduced the speaker for the evening, Dr. Freeman Dyson of The Institute for Advanced Study, who spoke on "Hunting Comets and Planets".

Director Larry Smith in the chair. Fifty-three members and guests were present. The meeting was called to order at 9:30 P.M. The minutes were approved as read. A Treasury balance of \$1,561.71 was reported.

A motion to eliminate the student classification in our dues structure, one result of the increase in Sky & Tel subscription rates, carried.

Program Committee: Vic Belanger announced that our December meeting would be a "member's night", and be essentially a "telescope buying clinic". Our February speaker will be John Gramme on the "Fate of the Earth".

Publicity: Louisa Lockette indicated trouble with getting proper insertions about AAAP in the Trenton Times. They are very particular about sending in two notices, etc. Vic Belanger has had a good deal of success in posting notices on bulletin boards in large companies.

Membership: Greg Mauro exhibited member packs to be given to new and prospective members. A sign-up sheet for guests was circulated tonight. Notices about meetings will be sent to Astronomy Magazine and other sources.

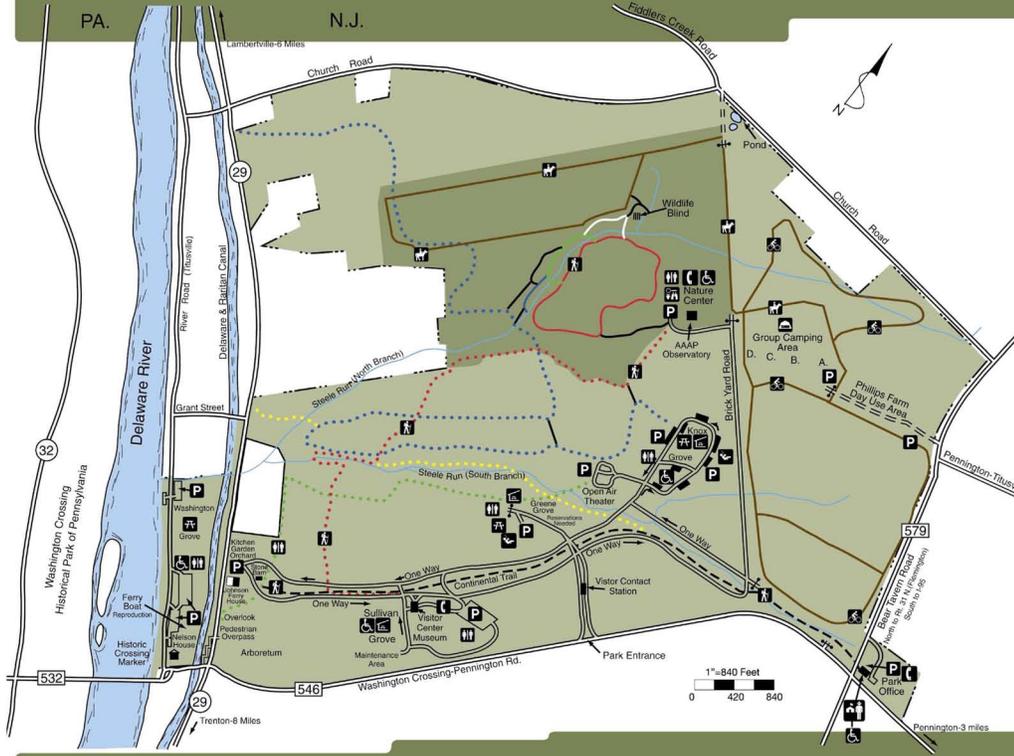
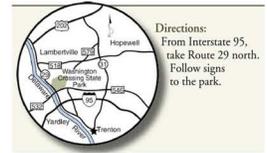
Observatory Chairman Bill Murray indicated that the Star Party scheduled for November 9 was too cloudy and had to be scrubbed; November 10 was also poor and only two people showed up. Setting circles and dewcaps have been ordered. A star-hop has been set for Friday December 7, with a rain-date of December 8. Arrangements will be made to change the locks on the Observatory door and new keys will be distributed to current qualified keyholders.

Publications: John Simpson indicated that he needs all articles and submissions for inclusion in the Times in his hands by the end of the month preceding each Times issue.

Field Trips: Jay Albert described current programs at the Hayden Planetarium, and indicated that he'd had only 1 response to the questionnaire in the last Sidereal Times.

# Amateur Astronomers Association of Princeton - Simpson Observatory

## AAAP



The Observatory is open to the public every clear Friday 8 to 11 PM from April to October.

Enter the park via the Philips Farm Day Use Area on Route 579, not the main park entrance. Drive past the soccer fields on the right to the soccer parking lot and look for a dirt road on left. Drive down the dirt road. Turn right on to the blacktop road and follow it to the observatory, which is on the right after the first bend.

Parking is permitted along one side of the paved road in front of the observatory. Keep vehicle wheels off the grass.

Members and guests must be accompanied by a Keyholder except on public nights.

Observatory phone: 609-737-2575

Park police: 609-737-0623

GPS:  
Lat: 40° 18' 51" or 40.314°  
Long: -74° 51' 42" or -74.862°

[www.princetonastronomy.org](http://www.princetonastronomy.org)

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