



The Prairie Astronomer

April, 2012

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The Official Newsletter of the Prairie Astronomy Club

April Program

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Space Law

By Stephen Rooke
UNL Law College

See Dave Churilla's column on page 6 for more information on this month's program

Space shuttle Discovery, mounted atop a NASA 747 Shuttle Carrier Aircraft, is seen as it flies near the U.S. Capitol, Tuesday, April 17, 2012, in Washington. Discovery, the first orbiter retired from NASA's shuttle fleet, completed 39 missions, spent 365 days in space, orbited the Earth 5,830 times, and traveled 148,221,675 miles. NASA will transfer Discovery to the National Air and Space Museum to begin its new mission to commemorate past achievements in space and to educate and inspire future generations of explorers.

Image Credit: NASA/Smithsonian Institution/Harold Dorwin

Featured Photo



Astronomy Day

Mueller Planetarium, Lincoln's Prairie Astronomy Club and a host of other local organizations join forces with Astronomy Magazine and Celestron Telescopes to celebrate Astronomy Day 2012 on April 28th. This year's event features an appearance by Nebraska's own astronaut, Clayton C. Anderson!



Participating organizations include Mueller Planetarium, Prairie Astronomy Club, Hyde Memorial Observatory, Nebraska Center for Materials and Nanoscience, UNL Department of Physics and Astronomy, UNL Microgravity University team, UNL Chapter of the American Institute of Aeronautics and Astronautics, UNL College of Engineering, Air Force Association.

Attendees will have a chance to win Celestron 15x70 Skymaster binoculars valued at \$76, donated by the Prairie Astronomy Club, or a Celestron AstroMaster LT 60AZ telescope valued at \$110, donated by Celestron and Astronomy Magazine.

Visit <http://www.spacelaser.com/ADay2012.html> for more information

Club Events

ON THE NET

Newsletter submission deadline, May 15, 2012

PAC Meeting

Tuesday April 24, 2012 7:30pm @Hyde Observatory

Program: Space Law by Steve Rooke

Astronomy Day

Saturday April 28, 2012 @Morill Hall

PAC Meeting

Tuesday May 29, 2012 7:30pm @Hyde Observatory

Program: Near Star Party

PAC Meeting

Tuesday June 26, 2012 7:30pm @Hyde Observatory

Program: BBQ/Social

PAC:

www.prairieastronomyclub.org

PAC E-Mail:

info@prairieastronomyclub.org

NSP:

www.nebraskastarparty.org

NSP E-Mail:

info@nebraskastarparty.org

OAS

www.OmahaAstro.com

Hyde Observatory

www.hydeobservatory.info

Panhandle Astronomy Club

Panhandleastronomyclub.com

PAC-LIST: You may subscribe to the PAC listserv by sending an e-mail message to: mailsrv@prairieastronomyclub.org. In the body of the message, write "Subscribe PAC-List your-email-address@your-domain.com"

For example:

Subscribe pac-list me@myISP.com

To post messages to the list, send to the address

pac-list@prairieastronomyclub.org

PAC can also be found on Twitter and Facebook.

Buy club apparel through the club website. Shirts, hats, mugs, mouse pads and more.



2012 PAC Star Party Dates - Dates in bold are closest to the new moon

January		Jan 20th
February	Feb 17th	Feb 24th
March	Mar 16th	Mar 23rd
April	Apr 13th	Apr 20th
May	May 11th	May 18th
June	Jun 15th	Jun 22nd
July	Jul 13th	Jul 20th
NSP	July 15-20	
August	Aug 10th	Aug 17th
September	Sep 7th	Sep 14th
October	Oct 5th	Oct 12th
November	Nov 9th	Nov 16th
December	Dec 7th	Dec 14th

Lunar Party Dates:

Apr 27th
May 25th

Jul 27th

Aug 24th
Sep 21st

Internet Links of Interest

<http://www.universetoday.com/>

<http://www.thespacereview.com>

<http://www.thespacereview.com/article/1945/1>

<http://space.flatoday.net/>

<http://www.spaceportamerica.com/>

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

<http://www.nasaspaceflight.com/>

<http://www.spacex.com>

April/May Observing: What to View--Jim Kvasnicka

Planets

Venus: Starts the month at its maximum brightness of -4.7. Venus starts the month fairly high, 36° at sunset. By the end of May that drops to just 6°. At the end of May the crescent shaped planet should be visible in binoculars.

Mars: Mars starts the month at magnitude 0.0 but fades to 0.5 by month's end.

Saturn: Saturn is 25° high in the southeast to start the month. It will dim from 0.3 to 0.5 in May.

Mercury: May be visible in the dawn sky through binoculars to start May.

Jupiter: Rises about 45 minutes before the Sun at the end of May.

Uranus and Neptune: Both are observable at dawn.

Messier List

M49/M61: Galaxies in Virgo.

M51: The Whirlpool Galaxy in Canes Venatici.

M63: The Sunflower Galaxy in Canes Venatici.

M64: The Black Eye Galaxy in Coma Berenices.

M85: Galaxy in Coma Berenices.

M94: Galaxy in Canes Venatici.

M101: The Pinwheel Galaxy in Ursa Major.

M102: Galaxy in Draco, look for NGC 5866.

M104: The Sombrero Galaxy in Virgo.

Last Month: M40, M65, M66, M95, M96, M105, M106, M108, M109

Next Month: M58, M59, M60, M84, M86, M87, M88, M89, M90, M91, M98, M99, M100 (The Virgo Galaxy Cluster)

NGC and Other Deep Sky Objects

NGC 4244: The Silver Needle Galaxy in Canes Venatici.

NGC 4490: The Cocoon Galaxy in Canes Venatici.

NGC 4631: The Whale Galaxy in Canes Venatici.

Mel 11: The Coma Cluster, use binoculars.

Double Star Club List

Kappa Bootis: Yellow primary with a blue secondary.

Iota Bootis: Yellow and dim blue pair.

Pi Bootis: Pair of white stars.

Epsilon Bootis: Yellow and greenish-yellow stars.

Xi Bootis: Pair of yellow stars.

Delta Bootis: Yellow primary with a blue-white secondary.

Mu Bootis: Yellow pair.

Zeta Corona Borealis: Light blue and greenish – yellow stars.

Focus on Observing Clubs

Sunspotters Program

The purpose of the Sunspotters Program is to encourage solar observing. By doing this program the observer will learn the various features of solar activity, how these features change, and learn how to develop a regular solar observing program.

Before starting any solar observing program, make certain you have safe solar filters to use.

In the Sunspotters Program you will make two sets of drawings. The first set is five detailed sketches of sunspot groups. The second set is 20 or more sketches of the whole solar disk during two solar rotations (one rotation is about 30 days).

The five sunspot sketches must be done on five different days. These sketches must include time, observing conditions, equipment used, and sunspot class. Several features of the sunspots must be identified. These features are identified on the Astronomical League website.

For the second set of drawings you will need to sketch the whole disk of the Sun throughout the passage of large sunspot groups during two different solar rotations. Your sketches must identify the sunspot penumbrae and umbrae. You must also classify the sunspot groups on the disk and perform a sunspot count. You should have a minimum of 20 whole disk drawings for two rotations.

When you complete the Sunspotters Program you will need to submit a copy of your observing logs to me for review. If the logs are accurate and complete I will submit your name to the Sunspotters Program chair for approval. The chair will forward to me your certificate and pin that I will present to you at our monthly PAC meeting.

If you have any questions regarding the Sunspotters Program or need help getting started please ask me and I will be glad to assist you.

Sunspotters Program Awardees from PAC

No PAC member has completed the Sunspotters Program.

ANNUAL MEMBERSHIP

REGULAR MEMBER - \$30.00 per year. Includes club newsletter, and 1 vote at club meetings, plus all other standard club privileges.

FAMILY MEMBER - \$35.00 per year. Same as regular member except gets 2 votes at club meetings.

If you renew your membership prior to your annual renewal date, you will receive a 10% discount.

Club members are also eligible for special subscription discounts on Sky & Telescope Magazine.

Club Telescopes

To check out one of the club telescope contact **Jason Noelle**. If you keep a scope for more than a week, please check in with Jason once a week, to verify the location of the telescope and how long you plan to use it. The checkout time limit will be two weeks, but can be extended if no one else has requested use of a club scope.

100mm Orion refractor:
Available

10 inch Meade Dobsonian:
Checked Out

13 inch Truss Dobsonian:
Available

Program Chair Minute - Dave Churilla

We had a very interesting program for our March meeting. Professor Nathaniel Cunningham of Nebraska Wesleyan University spoke on Vulcanoids, potential asteroids within the orbit of Mercury. For my part I found the methodology of the research to be very interesting.

This month's PAC Meeting will be on Tuesday, April 24th. As usual we'll have a short business meeting at 7:30 PM which will include Observing Chair Jim Kvasnicka's Observing Report followed by the evening's program, "Space Law", by Stephen Rooke of the University of Nebraska Law College..

Stephen Rooke is a lifelong space enthusiast. Born and raised in Denver, Colorado, Stephen got his first telescope at the age of 10. For many years, he hoped to be an astronaut. Stephen graduated with degrees in Political Science and Policy Studies from Rice University in 2008 and received his J.D. (Juris Doctor) from the University of Michigan Law School in 2011. He is currently a candidate for an LL.M.(Masters of Law) in Space, Cyber & Telecommunications Law from the University of Nebraska College of Law. His research focuses on how to use satellites to bring telemedicine applications to rural clinics in developing countries.

In science fiction and in law, space is the final frontier. For millennia, man has looked out at the stars and wondered what is out there. Fifty-five years ago, man got its first taste of outer space.

Spaceflight became a reality against the backdrop of conflict (e.g. the Cold War). The same technologies that were used to launch satellites and men into space could also be used to transport weapons of mass destruction to any target around the globe. To mitigate unknown risks, the space-faring nations created an international legal system regulating space activities and enshrining the principle that outer space is the province of all mankind.

We've learned a lot from discoveries made by the Hubble Telescope and its kin. Likewise, we've learned as much about ourselves and our own planet by turning telescopes back at us. Without the contributions of space law, these benefits may not have occurred. That said, certain antiquated legal rules are ill-equipped to deal with emerging issues like orbital debris, which threaten the ISS and Hubble and could have catastrophic consequences for the James Webb Telescope.

Join Stephen for an introduction to space law and a discussion about how it affects the future of astronomy.

This is a unique program and I think an interesting one. Hope to see you all there.

And in May yours truly will be hosting a Near Star Party. I invite everyone who has a solar filter to bring it and their telescopes and set them up between 6 PM and 7 PM for everyone to enjoy viewing the sun. I'll have my H-Alpha T-Scanner set up, which this year should be much more fun as the sun's activity has really been heating up. I'll have more info as we get closer.

Upcoming programs:

May 2012: Near Star Party: I will set up my telescope at 6:30 PM until 8 PM for anyone who would like to view the sun in H-Alpha. Anyone who would like to join me with their telescope is welcome to do so. With the sun being quite active this should be a great opportunity (I know, I've jinxed it now) for everyone to experience the H-Alpha Filter. This will be only a star party so come casual, bring a lawn chair, and enjoy the evening. We'll go until about 8 PM when everyone can adjourn to the observatory for the PAC business meeting. If the weather is cloudy we'll have our normal meeting and I'll give a short presentation.

June 2012: BBQ Social (tentative) We will have our June Social again this year. At this point Chef Cajon Bob has graciously agreed to smoke more pork for the BBQ pulled pork sandwiches. There will be a nominal fee (likely \$5 like last year). We'll let you know more as we get closer.

Jul 2012: NSP 2012 Update Get Jason your photos from NSP and we'll enjoy an evening of looking at the fun everyone had at there this year.

Aug 2012: Space Update Jason Noelle will give a program – subject yet to be determined.

Sep 2012: Fun With Astronomy The PAC Executive Board will put together a short collection of fun, humorous clips about space and astronomy. You don't want to miss the fun.

Oct 2012: Computer Astronomy This one is still tentative. Brian Sivill is considering giving a program on computer astronomy. Just what that entails – well, you'll have to wait for the trailers ☺.

I'll try to keep you apprised of upcoming programs so you can plan to attend.

Challenge Observing Objects for April/May

Each month I will have two objects, one for the more seasoned observer and one for the beginning observer. Each object I hope will challenge you just a little bit. I will provide you with a little bit of information about the object. It is your job to find it and if you would write a little report or draw what you see. The first person to report back on each object will have their report published in the next issue of the newsletter. Happy Hunting!

Advanced Object

NGC 5846 Group

Part of the Virgo galaxy cluster. A chain of galaxies WNE-ESE in Virgo, NGC 5839, NGC 5845, NGC 5846-46A, NGC 5850. NGC 5846 is the brightest in the group. This group is also called a Virgo III group. The Virgo III Groups form a very obvious line of 8 galaxy groups on the left side of the Virgo cluster. The gravitational pull of the Virgo cluster has stretched this collection of groups into a long chain of galaxies which extends across 40 million light years of space.



Adam Block/Mount Lemmon SkyCenter/University of Arizona

Beginner Object

Struve 1659

Also known as the “Stargate.” It is a 5' triangle of 3 stars with a smaller triangle of 3 stars inside. It's located in Corvis and the magnitudes of the 6 stars range from 6.6 - 11. It resembles a portal device featured in the Buck Rogers science fiction TV series.



Frog Rock Observatory in Mudgee, New South Wales, Australia

‘Seeing’ Cosmic Rays in Space

by Nancy Atkinson of Universe Today

Astronauts have long reported the experience of seeing flashes while they are in space, even when their eyes are closed. Neil Armstrong and Buzz Aldrin both reported these flashes during the Apollo 11 mission, and similar reports during the Apollo 12 and 13 missions led to subsequent Apollo missions including experiments specifically looking at this strange phenomenon. These experiments involved blindfolding crewmembers and recording their comments during designated observation sessions, and later missions had a special device, the Apollo Light Flash Moving Emulsion Detector (ALFMED), which was worn by the astronauts during dark periods to record of incidents of cosmic ray hits. It was determined the astronauts were ‘seeing’ cosmic rays zipping through their eyeballs. Cosmic rays are high-energy charged subatomic particles whose origins are not yet known. Fortunately, cosmic rays passing through Earth are usually absorbed by our atmosphere. But astronauts outside the atmosphere can find themselves “seeing things that aren’t there,” wrote current International Space Station astronaut Don Pettit, who told about his experience of seeing these flashes on his blog: **“In space I see things that are not there. Flashes in my eyes, like luminous dancing fairies, give a subtle display of light that is easy to overlook when I’m consumed by normal tasks. But in the dark confines of my sleep station, with the droopy eyelids of pending sleep, I see the flashing fairies. As I drift off, I wonder how many can dance on the head of an orbital pin.”**

In a report on the Apollo experiment, astronauts described the types of flashes they saw in three ways: the ‘spot’, the ‘streak’, and the ‘cloud’; and all but one described the flashes as ‘white’ or ‘colorless.’ One crewmember, Apollo 15 Commander David Scott, described one flash as “blue with a white cast, like a blue diamond.” Pettit described the physics/biology of what takes place: **“When a cosmic ray happens to pass through the retina it causes the rods and cones to fire, and you perceive a flash of light that is really not there. The triggered cells are localized around the spot where the cosmic ray passes, so the flash has some structure. A perpendicular ray appears as a fuzzy dot. A ray at an angle appears as a segmented line. Sometimes the tracks have side branches, giving the impression of an electric spark. The retina functions as a miniature Wilson cloud chamber where the recording of a cosmic ray is displayed by a trail left in its wake.”**

Pettit said that the rate or frequency at which these flashes are seen varies with orbital position. **“There is a radiation hot spot in orbit, a place where the flux of cosmic rays is 10 to 100 times greater than the rest of the orbital path. Situated southeast of Argentina, this region (called the South Atlantic Anomaly) extends about halfway across the Atlantic Ocean. As we pass through this region, eye flashes will increase from one or two every 10 minutes to several per minute.**

During the Apollo missions, astronauts saw these flashes after their eyes had become dark-adapted. When it was dark, they reported a flash every 2.9 minutes on average. Only one Apollo crewmember involved in the experiments did not report seeing the phenomenon, Apollo 16’s Command Module Pilot Ken Mattingly, who stated that he had poor night vision. These cosmic rays don’t just hit people, but things in space, too, and sometimes cause problems. Pettit wrote: **“Free from the protection offered by the atmosphere, cosmic rays bombard us within Space Station, penetrating the hull almost as if it was not there. They zap everything inside, causing such mischief as locking up our laptop computers and knocking pixels out of whack in our cameras. The computers recover with a reboot; the cameras suffer permanent damage. After about a year, the images they produce look like they are covered with electronic snow. Cosmic rays contribute most of the radiation dose received by Space Station crews. We have defined lifetime limits, after which you fly a desk for the rest of your career. No one has reached that dose level yet.”**

There are experiments on board the ISS to monitor how much radiation the crew is receiving. One experiment is the Phantom Torso, a mummy-looking mock-up of the human body which determines the distribution of radiation doses inside the human body at various tissues and organs. There’s also the Alpha Magnetic Spectrometer experiment, a particle physics experiment module that is mounted on the ISS. It is designed to search for various types of unusual matter by measuring cosmic rays, and hopefully will also tell us more about the origins of both those crazy flashes seen in space, and also the origins of the Universe. A tall order!

Hubble Reveals Curious Auroras on Uranus

By Jason Major of Universe Today

Astronomers have finally succeeded in capturing the first Earth-based images of the curious and fleeting auroras of Uranus using the Hubble Space Telescope, careful planning... and no small amount of luck. Unlike Earthly auroras, whose long-lived curtains of glowing green, red and purple have been the subject of countless stunning photos over the past months, Uranus' auroras are relatively dim and short-lived, lasting only several minutes at most. They were first witnessed on Uranus by Voyager 2 in 1986, but never by any Earth-based telescopes until November of 2011. Using Hubble, an international team of astronomers led by Laurent Lamy from the Observatoire de Paris in Meudon, France spotted two instances of auroras on the distant planet... once on November 16 and again on the 29th.

Auroras are known to be created by a planet's magnetosphere, which on Earth is aligned closely with the rotational axis — which is why auroras are seen nearest the polar latitudes. But Uranus' magnetic field is quite offset from its rotational axis, which in turn is tipped nearly 98 degrees relative to its orbital path. In other words, Uranus travels around the Sun rolling on its side! And with a 60-degree difference between its magnetic and rotational axis, nothing on Uranus seems to point quite where it should. This — along with its 2.5-billion-mile (4 billion km) distance — makes for a “very poorly known” magnetic field.

“This planet was only investigated in detail once, during the Voyager flyby, dating from 1986. Since then, we've had no opportunities to get new observations of this very unusual magnetosphere,” said Laurent Lamy, lead author of the team's paper Earth-based detection of Uranus' aurorae.

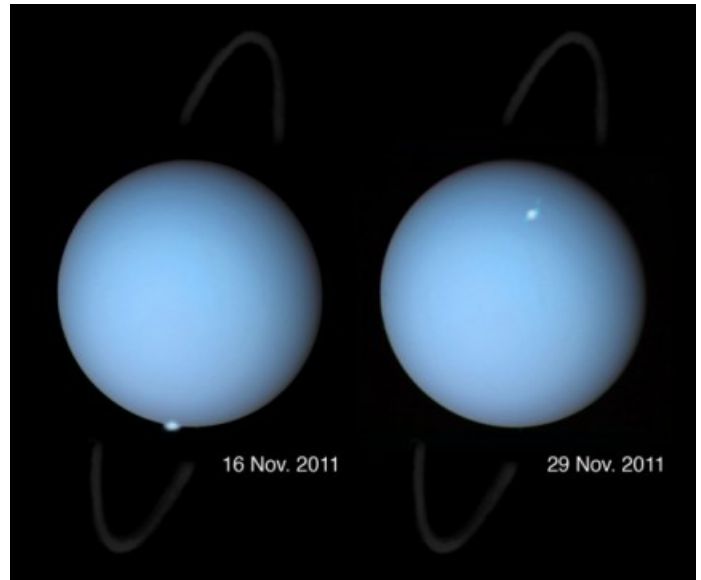
Rather than rings of bright emissions, as witnessed on Earth as well as Saturn and Jupiter, the Uranian auroras appeared as bright spots of activity on the planet's daytime side — most likely a result of Uranus' peculiar orientation, as well as its seasonal alignment.

It's not yet known what may be happening on Uranus' night side, which is out of view of Hubble.

When Voyager 2 passed by Uranus in 1986 the planet was tipped such that its rotational axis was aimed toward the Sun. This meant that its magnetic axis — offset by 60 degrees — was angled enough to encounter the solar wind in much the same way that Earth's does. This created nightside auroras similar to Earth's that Voyager saw.

By 2011, however, Uranus — which has an 84-year-long orbit — was near equinox and as a result its magnetic axis was nearly perpendicular with its orbital plane, aiming each end directly into the solar wind once a day. This makes for very different kinds of auroras than what was seen by Voyager; in fact, there's really nothing else like it that astronomers know of. “This configuration is unique in the solar system,” said Lamy. Further investigations of Uranus' auroras and magnetic field can offer insight into the dynamics of Earth's own magnetosphere and how it interacts with the solar wind, which in turn affects our increasingly technological society.

The team's paper will be published in *Geophysical Research Letters*, a journal of the American Geophysical Union.



Two instances of Uranian aurora imaged in Nov. 2011. (L. Lamy)



THE *Prairie* Astronomy Club

Amateur Astronomy --
A Hobby as Big as the Universe

The Prairie Astronomer is published monthly by the Prairie Astronomy Club, Inc. Membership expiration date is listed on the mailing label. Membership dues are: **Regular \$30/yr, Family \$35/yr.** Address all new memberships and renewals to: **The Prairie Astronomy Club, Inc., PO Box 5585, Lincoln, NE 68505-0585.** For other club information, please contact one of the club officers listed to the right. Newsletter comments and articles should be submitted to: **Jason Noelle at jason.noelle@gmail.com**, no less than ten days prior to the club meeting. The Prairie Astronomy Club meets the last Tuesday of each month at Hyde Memorial Observatory in Lincoln, NE.

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FIRST CLASS MAIL

Next PAC Meeting
Tuesday
May 29, 2012
7:30 PM
Hyde Observatory