The Prairie Astronomer

June, 2012 Volume 53, Issue #6

The Official Newsletter of the Prairie Astronomy Club

June Program

PAC Smoked BBQ Social

By: PAC Officers

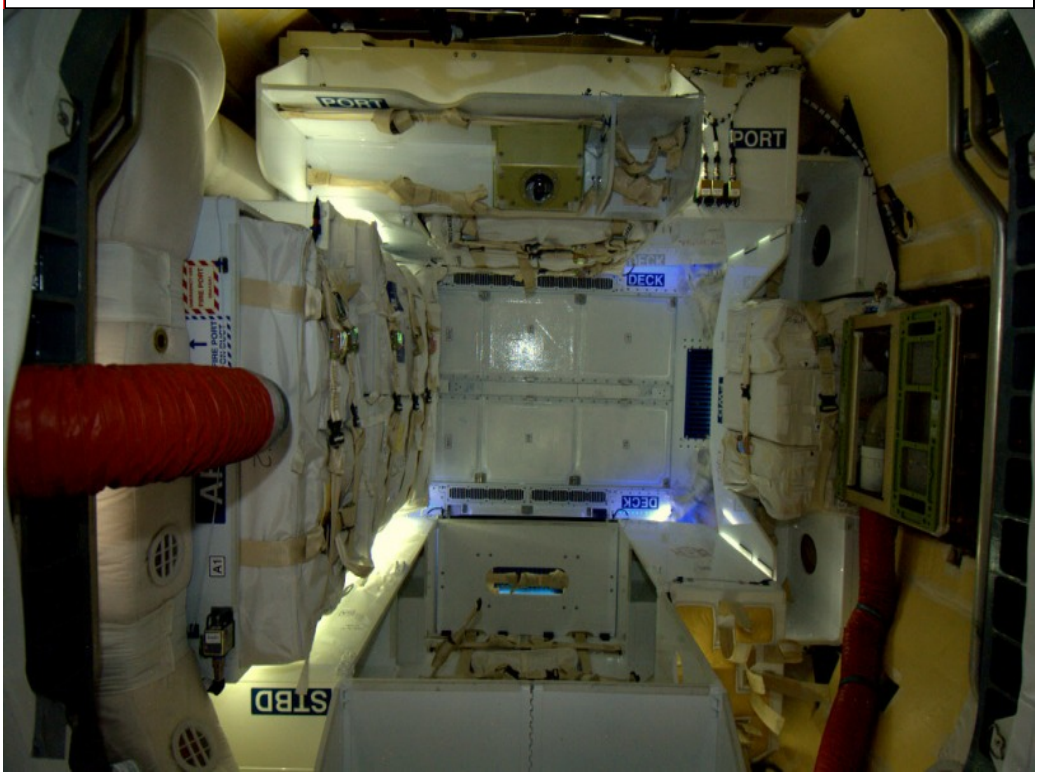
We'll change things up a bit this month although the meeting will start at the normal time of 7:30 PM. We'll be having our PAC Smoked BBQ Social that night with a very short meeting sometime during the meal. We're still deciding on the menu but featured will be Cajun Bob Kacvinsky's Smoked Pulled Pork sandwiches along with probably Cole slaw and potato salad plus a drink for $5 a head. Hopefully we'll begin serving at 7:30 PM.

In This Issue:

Featured Photo

This image of the inside of the Dragon module was taken by European Space Agency astronaut Andre Kuipers. The SpaceX Falcon 9 and its Dragon spacecraft launched on Tuesday, May 22, at 3:44 a.m. EDT. This mission is a demonstration flight by Space Exploration Technologies, or SpaceX, as part of its contract with NASA to have private companies launch cargo safely to the International Space Station.

Image Credit: ESA/NASA



The Bad Astronomer Fact of the Month

To scale, if the Earth/Sun distance were one inch, a light year would be exactly one mile.

Humans have a miserable sense of scale. Space is huge – that's why we call it "space" – but how huge? Here's a fun trick my friend Dan Durda pointed out to me many years ago when we were in college together (forgive my not using metric units, but what the heck, this only works in imperial):

The average distance of the Earth to the Sun (what we call an astronomical unit) is about 92.8 million miles. If you made a scale model of the solar system where that distance were equal to one inch, then one mile in the model would be almost exactly a light year in the real world!

The math is easy. One light year is the distance light travels in a year. The speed of light is 186,282 miles/second, and distance equals speed multiplied by time. So:

186,282 mi/sec x 86,400 sec/day x 365.25 days/year = 5.88 trillion miles

[Note: I'm rounding the answer to two decimal places for ease of comparison.]

OK, now what about our scale? There are 12 inches to a foot, and 5280 feet to a mile. That means there are:

12 in/ft x 5280 ft/mile = 63,360 inches/mile

If we let 1 inch = 92.8 million miles, then 63,360 inches = 5.88 trillion miles.

See? To two decimal places the scale is exact! In real life the Earth orbits the Sun in an ellipse, so there's a roughly 3% change in distance over time. But if we just take the average distance, this works perfectly.

So the next time you're out driving, keep that in mind… The nearest known star to the Sun is Proxima Centauri, roughly 4.2 light years away. That means it's 4.2 miles away to scale, and at 60 mph would take over four minutes to reach. At that same speed, you're crossing the entire Earth/Sun distance in less than one-thousandth of second!

If you really tried to drive from the Earth to the Sun (and there were a heavenly highway connecting them) at that speed it would take over 175 years.

From a scale model millisecond to more than a century. Did I mention space is big?

Visit the Bad Astronomer at http://blogs.discovermagazine.com/badastronomy/

Club Events

Newsletter submission deadline, July 15, 2012

PAC Meeting
Tuesday June 26, 2012 7:30pm @Hyde Observatory
Program: BBQ/Social

Nebraska Star Party
July 15 - 20 Snake Campground, Merritt Reservoir
Valentine, Nebraska

PAC Meeting
Tuesday July 31, 2012 @Hyde Observatory
NSP Wrap up

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

ON THE NET

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: imailsrv@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.

June/July Observing: What to View--Jim Kvasnicka

Planets

Venus and Jupiter: Both put on a good show before July's sunrise. They start July just 4.8º apart low in the ENE before daybreak. Venus is the brightest at -4.7 and Jupiter shines at -2.1 magnitude.

Saturn: Dims a little to 0.8 magnitude near Spica.

Mars: Closes in on Saturn and by the end of July it is only 8º from Saturn.

Mercury: Look for Mercury low in the WNW after sunset at 0.5 magnitude.

Uranus and Neptune: In Cetus and Aquarius.

Messier List

M3: Class VI globular cluster in Canes Venatici.

M4: Class IX globular cluster in Scorpius.

M5: Class V globular cluster in Serpens Caput.

M53: Class V globular cluster in Coma Berenices.

M68: Class X globular cluster in Hydra.

M80: Class II globular cluster in Scorpius.

M83: Galaxy in Hydra

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

Next Month: M6, M7, M8, M9, M10, M12, M19, M20, M21, M23, M62, M107

NGC and Other Deep Sky Objects

NGC 6229: Class IV globular cluster in Hercules.

NGC 6231: Open cluster in Scorpius.

NGC 6369: Little Ghost Nebula in Ophiuchus.

NGC 6543: Cat's Eye Nebula in Draco.

Double Star Club List

Nu Draconis: Equal pair of white stars.

Psi Draconis: Light yellow pair.

40/41 Draconis: Equal pair of light yellow stars.

Xi Scorpii: Yellow and light blue.

Struve 1999: Two yellow-orange stars.

Beta Scorpii: Blue-white primary with a light blue secondary.

Nu Scorpii: Yellow and light blue pair.

Delta Serpentis: Pair of pale yellow stars.

Theta Serpentis: Blue and white pair.

Focus on Observing Clubs

Herschel 400 Program

Amateur astronomers have enjoyed the challenge and excitement provided by the 110 objects in the Messier Program for many years. After completing the program, however, most were left in a void. They wanted to further their quest for deep-sky objects, but there was organized program that provided the next step. With this in mind the Herschel 400 Program started.

The New General Catalog (NGC) contained almost 8,000 objects of which 2,477 were observed by William Herschel. After considerable study 400 of the objects were selected to comprise the Herschel 400 Program. All the objects can be seen through a 6 inch telescope. Most of the objects can be seen from moderate light polluted areas. A list of the 400 objects can be downloaded from the Astronomical League website.

The Herschel 400 Program is meant to be an advanced program for observers who already have a fair degree of experience. Anyone starting out should do the Messier Program first before attempting the Herschel 400 Program.

When you complete the Herschel 400 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 Herschel 400 Program chair for approval. The chair will forward to me your certificate and pin that I will present them to you at our monthly PAC meeting.

If you have any questions regarding the Herschel 400 Program or need help getting started in any observing program please ask me and I will be glad to assist you.

Herschel 400 Program Awardees from PAC

David Knisely

Rick Johnson

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:
Available

13 inch Truss Dobsonian:
Available

Program Chair Minute - Dave Churilla

May's program, if you missed it, was our Near Star Party out on Hyde's lawn. The weather and the sun cooperated magnificently as the weather was very comfortable and the sun was active. An eruptive prominence was fun to watch as the magnetic fields began ripping it up and making the material "rain" back down on the sun's surface (this took about 2 hours). Lots of things to see on the sun, multiple sun spots and I think all had a good time. Hopefully more of you will consider some form of solar filters for your scope or the PST so that we can all get together in the future and enjoy solar observing. I've become very fond of it (almost more than the night observing) and again have to thank Dave Knisely and Rick Johnson for getting me involved with it.

This month's PAC Meeting will be on Tuesday, June 26th. Again this month we'll change things up a bit although the meeting will start at the normal time of 7:30 PM. We'll be having our PAC Smoked BBQ Social that night with a very short meeting sometime during the meal. We're still deciding on the menu but featured will be Cajun Bob Kacvinsky's Smoked Pulled Pork sandwiches along with probably Cole slaw and potato salad plus a drink for $5 a head. Hopefully we'll begin serving at 7:30 PM. Thanks to all the officers and appointed chairs who will be helping plan, set up, serve and tear down for the BBQ.

The plan is for Bob and me to smoke the meat in my smoker with Bob's special recipe. It takes a long time to smoke the meat – if you didn't know Bob slow cooks/smokes it at about 200° for 10-12 hours. It's very labor intensive as the smoker/fire has to be checked about every 20-30 minutes to ensure the temperature is holding true. I just hope the store doesn't run out of brew while we tend the pork butts this year!!!

NOTE RSVP: We do ask that you either call me at 402-467-1514 or email me at weber2@inebraska.com to let me know if you are coming and if you are bringing a guest or family (how many) so we can get a head count. If possible I'd like to know by June 15th. Thanks!

So come out and join us for the BBQ and the chance to just visit other club members and guests. We had a great time last year and I expect the same this year…if nothing else the food is great!

Upcoming programs:

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 and Ben Rush 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 June/July

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 5907

A spiral galaxy located approximately 50 million light years from Earth in the constellation Draco. Also called the Knife Edge or Splinter Galaxy. Supernova 1940A was in this galaxy. In 2006, this galaxy was found to have a long tidal stream which is thought to be what is left of a dwarf galaxy that collided with it several billion years ago. It's apparent magnitude is 11.1 and it's dimensions are about 12.7' x 1.4'.

NGC 5907, 24 inch telescope on Mt. Lemmon.
Courtesy of Joseph D. Schulman

Beginner Object

67 Ursa Majoris

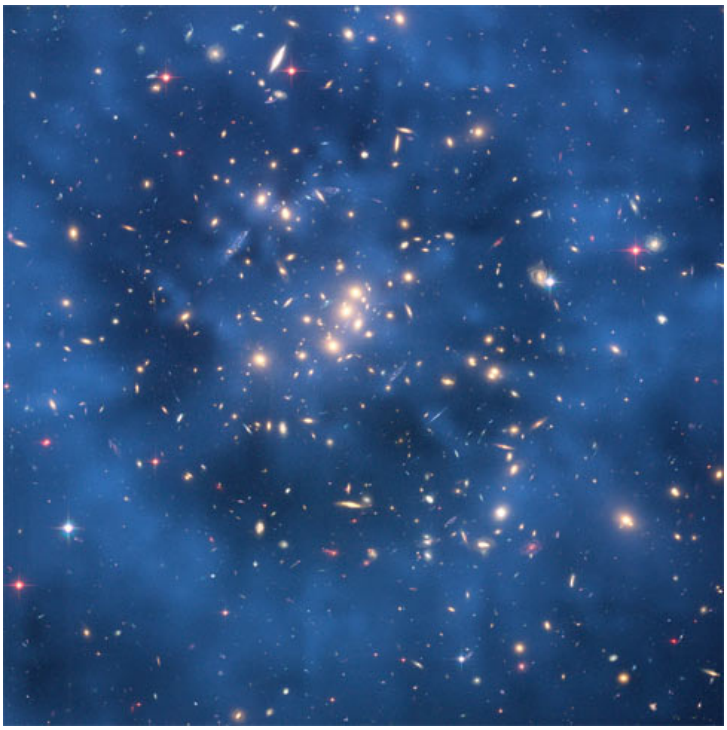
This quadruple star system has four stars of different colors is located in Ursa Major. The magnitudes for all four stars are 5.2, 6.6, 8.3, 8.9. All three companion stars are between four and seven arc minutes from the brighter primary star. See if you can spot all four!

Could 'Mirror Neutrons' Account for Unobservable Dark Matter?

by Nancy Atkinson of Universe Today

Could mirror universes or parallel worlds account for dark matter — the 'missing' matter in the Universe? In what seems to be mixing of science and science fiction, a new paper by a team of theoretical physicists hypothesizes the existence of mirror particles as a possible candidate for dark matter. An anomaly observed in the behavior of ordinary particles that appear to oscillate in and out of existence could be from a "hypothetical parallel world consisting of mirror particles," says a press release from Springer. "Each neutron would have the ability to transition into its invisible mirror twin, and back, oscillating from one world to the other."

Theoretical physicists Zurab Berezhiani and Fabrizio Nesti from the University of l'Aquila, Italy, reanalyzed the experimental data obtained by the research group of Anatoly Serebrov at the Institut Laue-Langevin, France, which showed that the loss rate of very slow free neutrons appeared to depend on the direction and strength of the magnetic field applied.



Artists concept of dark matter in the Universe.
Credit: NASA

This type of field could be created by mirror particles floating around in the galaxy as dark matter, according to the new paper. Hypothetically, the Earth could capture the mirror matter via very weak interactions between ordinary particles and those from parallel worlds.

Berezhiani and Nesti's abstract:

Present experiments do not exclude that the neutron transforms into some invisible degenerate twin, so called mirror neutron, with an appreciable probability. These transitions are actively studied by monitoring neutron losses in ultra-cold neutron traps, where they can be revealed by their magnetic field dependence. In this work we reanalyze the experimental data acquired by the group of A.P. Serebrov at Institute Laue-Langevin, and find a dependence at more than 5 sigma away from the null hypothesis…. If confirmed by future experiments, this will have a number of deepest consequences in particle physics and astrophysics.

The oscillations between the parallel worlds could occur within a timescale of a few seconds, the team says.

"Each neutron would have the ability to transition into its invisible mirror twin, and back, oscillating from one world to the other," the authors say.

This isn't the first time the existence of mirror matter has been suggested and has been predicted to be sensitive to the presence of magnetic field such as Earth's.

"The discovery of a parallel world via … oscillation and of a mirror magnetic back-ground at the Earth, striking in itself, would give crucial information on the accumulation the of dark matter in the solar system and in the Earth, due to its interaction with normal matter, with far reaching implications for physics of the sun and even for geophysics," the team writes in their paper.

Researchers calculate size of particles in Martian clouds of CO2 snow

By Jennifer Chu, MIT News Office

In the dead of a Martian winter, clouds of snow blanket the Red Planet's poles — but unlike our water-based snow, the particles on Mars are frozen crystals of carbon dioxide. Most of the Martian atmosphere is composed of carbon dioxide, and in the winter, the poles get so cold — cold enough to freeze alcohol — that the gas condenses, forming tiny particles of snow. Now researchers at MIT have calculated the size of snow particles in clouds at both Martian poles from data gathered by orbiting spacecraft. From their calculations, the group found snow particles in the south are slightly smaller than snow in the north — but particles at both poles are about the size of a red blood cell. "These are very fine particles, not big flakes," says Kerri Cahoy, the Boeing Career Development Assistant Professor of Aeronautics and Astronautics at MIT. If the carbon dioxide particles were eventually to fall and settle on the Martian surface, "you would probably see it as a fog, because they're so small."

Cahoy and graduate student Renyu Hu worked with Maria Zuber, the E.A. Griswold Professor of Geophysics at MIT, to analyze vast libraries of data gathered from instruments onboard the Mars Global Surveyor (MGS) and Mars Reconnaissance Orbiter (MRO). From the data, they determined the size of carbon dioxide snow particles in clouds, using measurements of the maximum buildup of surface snow at both poles. The buildup is about 50 percent larger at Mars' south pole than its north pole. Over the course of a Martian year (a protracted 687 days, versus Earth's 365), the researchers observed that as it gets colder and darker from fall to winter, snow clouds expand from the planet's poles toward its equator. The snow reaches halfway to the equator before shrinking back toward the poles as winter turns to spring, much like on Earth. "For the first time, using only spacecraft data, we really revealed this phenomenon on Mars," says Hu, lead author of a paper published in the Journal of Geophysical Research, which details the group's results.

To get an accurate picture of carbon dioxide condensation on Mars, Hu analyzed an immense amount of data, including temperature and pressure profiles taken by the MRO every 30 seconds over the course of five Martian years (more than nine years on Earth). The researchers looked through the data to see where and when conditions would allow carbon dioxide cloud particles to form. The team also sifted through measurements from the MGS' laser altimeter, which measured the topography of the planet by sending laser pulses to the surface, then timing how long it took for the beams to bounce back. Every once in a while, the instrument picked up a strange signal when the beam bounced back faster than anticipated, reflecting off an anomalously high point above the planet's surface. Scientists figured these laser beams had encountered clouds in the atmosphere. Hu analyzed these cloud returns, looking for additional evidence to confirm carbon dioxide condensation. He looked at every case where a cloud was detected, then tried to match the laser altimeter data with concurrent data on local temperature and pressure. In 11 instances, the laser altimeter detected clouds when temperature and pressure conditions were ripe for carbon dioxide to condense. Hu then analyzed the opacity of each cloud — the amount of light reflected — and through calculations, determined the density of carbon dioxide in each cloud.

To estimate the total mass of carbon dioxide snow deposited at both poles, Hu used earlier measurements of seasonal variations in the Martian gravitational field done by Zuber's group: As snow piles up at Mars' poles each winter, the planet's gravitational field changes by a tiny amount. By analyzing the gravitational difference through the seasons, the researchers determined the total mass of snow at the north and south poles. Using the total mass, Hu figured out the number of snow particles in a given volume of snow cover, and from that, determined the size of the particles. In the north, molecules of condensed carbon dioxide ranged from 8 to 22 microns, while particles in the south were a smaller 4 to 13 microns. "It's neat to think that we've had spacecraft on or around Mars for over 10 years, and we have all these great datasets," Cahoy says. "If you put different pieces of them together, you can learn something new just from the data." Since carbon dioxide makes up most of the Martian climate, understanding how it behaves on the planet will help scientists understand Mars' overall climate, says Paul Hayne, a postdoc in planetary sciences at the California Institute of Technology.

"The big-picture question this addresses is how the seasonal ice caps on Mars form," says Hayne, who was not involved in the research. "The ice could be freezing directly at the surface, or forming as snow particles in the atmosphere and snowing down on the surface … this work seems to show that at least in some cases it's snowfall rather than direct ice deposition. That's been suspected for a long time, but this may be the strongest evidence." Hu says knowing the size of carbon dioxide snow cloud particles on Mars may help researchers understand the properties and behavior of dust in the planet's atmosphere. For snow to form, carbon dioxide requires something around which to condense — for instance, a small silicate or dust particle. "What kinds of dust do you need to have this kind of condensation?" Hu asks. "Do you need tiny dust particles? Do you need a water coating around that dust to facilitate cloud formation?" Just as snow on Earth affects the way heat is distributed around the planet, Hu says snow particles on Mars may have a similar effect, reflecting sunlight in various ways, depending on the size of each particle. "They could be completely different in their contribution to the energy budget of the planet," Hu says. "These datasets could be used to study many problems." This research was funded by the Radio Science Gravity investigation of the NASA Mars Reconnaissance Orbiter mission.

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.

FIRST CLASS MAIL

Next PAC Meeting
Tuesday
July 31 , 2012
7:30 PM
Hyde Observatory