The Prairie Astronomer

November, 2012 Volume 53, Issue #11

The Official Newsletter of the Prairie Astronomy Club

November Program

How to Buy a Telescope

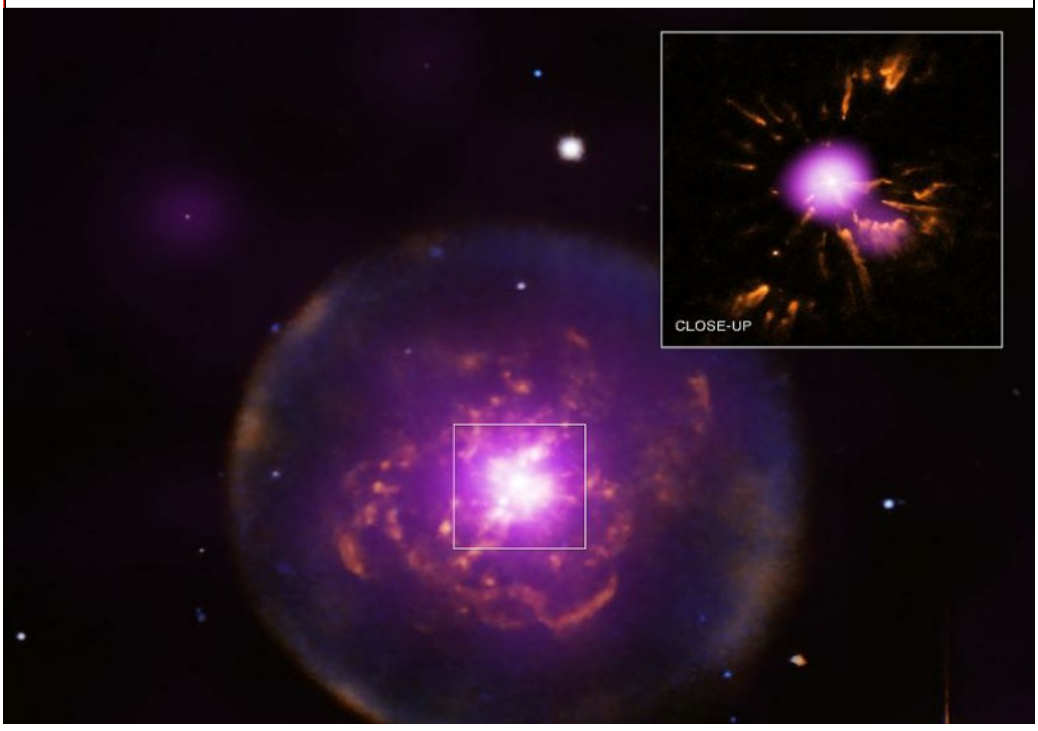
By Members of the Prairie Astronomy Club

This will be our annual How to Buy a Telescope Program for the public. Club members will have very short presentations concerning telescopes then all club members will answer guests' questions about equipment. Displays will be set up.

In This Issue:

Featured Photo

These images of the planetary nebula Abell 30 show one of the clearest views ever obtained of a special phase of evolution for these objects. The inset image on the right is a close-up view of A30 showing X-ray data from NASA's Chandra X-ray Observatory in purple and Hubble Space Telescope data showing optical emission from oxygen ions in orange. On the left is a larger view showing optical and X-ray data from the Kitt Peak National Observatory and ESA's XMM-Newton, respectively. In this image the optical data show emission from oxygen (orange) and hydrogen (green and blue), and X-ray emission is colored purple.
Image Credit: NASA/ESA



The Bad Astronomer Fact of the Month

Some people call Venus our sister planet, but if it is, it's the sister that went very, very bad.

The atmospheric pressure at the surface is a crushing 90 atmospheres. The surface temperature is 470 Celsius (about 900 F). The atmosphere is almost entirely carbon dioxide, and it rains sulphuric acid. To paraphrase Chekov, it's not exactly a garden spot.

Through a telescope (and by eye for that matter) Venus is beautiful and bright, but featureless. In visible light, the best you can see are very subtle patches on the disk of the planet. The atmosphere is far too thick to see the surface.

But there's still a lot to learn from the planet. The European Space Agency's Venus Express orbiter arrived at the hellish planet in April 2006 and set up shop. It's equipped with an ultraviolet camera, and when viewed in UV Venus is a whole 'nuther place. The chemicals in the atmosphere reflect or absorb UV from the Sun ,creating beautiful global weather patterns reminiscent of Earth's. Here's a recent UV shot:

Image Credit:ESA

As you can see, the story is different in UV than in visible. Things is, scientists aren't exactly sure what they're seeing. The bright stripes are due to sulphuric acid droplets in the air (yikes… I mean seriously, yikes). But they're not sure what's causing the darker regions; something is absorbing UV, but it's unknown exactly what it is.

And the weather on Venus is weird, too. The science team was recently amazed to see a bright haze form over the south pole of Venus, then, over the course of several days, grow to cover the southern half of the planet. Then, just as quickly, it receded. What could cause such a thing? No one knows. There are very small amounts of water vapor and sulphur dioxide in Venus's atmosphere, located deeper down (below 70 km in height). If this wells up, the ultraviolet from the Sun can break the molecules apart, which would reform into sulphuric acid, creating the haze. But why would those two molecules suddenly well up to the top of the atmosphere in the first place? Again, no one knows.

The only thing to do is keep looking. Venus Express has been orbiting the planet for nearly two years now, and that allows the long view, so to speak. By examining the data taken over long periods of time, scientists can investigate global properties of the planet and look for trends, connections, cause and effect. Venus has the same mass, size, and density of Earth, but at some point in its past it took a very different path than we did. Studying it carefully will reveal more about the Earth and why things turned out so well for us.

Sure, when you look into the abyss, sometimes it looks back into you. But that can be pretty helpful when you want to learn more about the abyss as well as yourself.

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

Club Events

Newsletter submission deadline December 15, 2012

PAC Meeting
Tuesday November 27, 2012 @Hyde Observatory
How To Buy a Telescope

PAC Meeting
December - Holiday Social

PAC Meeting
Tuesday January 29, 2013 @Hyde Observatory
How to use a Telescope

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.

November/December Observing: What to View--Jim Kvasnicka

Planets

Jupiter: Reaches opposition on December 2nd and it shines brightly at -2.8 with a disk 48" across.

Mars: Very low in the southwest and dim at magnitude +1.2.

Uranus and Neptune: In Pisces and Aquarius.

Saturn: Rises by 4 am to start December and by 2:30 am to end the month. Its rings are tilted 19º towards Earth.

Venus and Mercury: Both are to the lower left of Saturn. Venus will sink into the twilight by the end of December.

Meteor Showers

Geminids: Peaks the night of December 13-14 but is active a couple of days before and after. You can expect about 120 meteors per hour and there will be no moon.

Messier List

M2: Class II globular cluster in Aquarius.
M15: Class IV globular cluster in Pegasus.
M29: Open cluster in Cygnus.
M31: The Andromeda Galaxy.
M32: Companion galaxy to M31.
M39: Open cluster in Cygnus.
M110: Companion galaxy to M31.
Last Month: M27, M30, M56, M57, M71, M72, M73
Next Month: M33, M34, M52, M74, M76, M77, M103

NGC and Other Deep Sky Objects

Mel 20: Open cluster in Perseus, use binoculars.
NGC 246: Planetary nebula in Cetus.
NGC 247: Elongated galaxy in Cetus.
NGC 869/864: The Double Cluster in Perseus.

Double Star Club List

Eta Cassiopeiae: Yellow primary with a rose colored secondary.

Sigma Cassiopeiae: Yellow and light blue pair.

Theta Aurigae: Bright white primary with a pale blue secondary.

1 Camelopardalis: White and pale blue stars.

32 Camelopardalis: Equal white pair.

Gamma Ceti: Bright white and pale yellow stars.

Chi Tauri: White primary with a pale blue secondary.

118 Tauri: White primary with a yellow secondary.

Focus on Observing Clubs

Astronomical League Observing Programs

The Astronomical League offers a variety of different observing programs that PAC members can participate in. The current number of programs offered is now up to 39. Upon completion of an observing program PAC members will receive a certificate of accomplishment and a pin designed specifically for that observing program. The observing skills required range from the beginner to the advanced observer, and the equipment ranges from the naked eye to a 15 inch telescope.

Beginning Observing Programs

Analemme Program
Asterism Program
Binocular Double Star Program
Carbon Star Program
Binocular Messier Program
Comet Observers Program
Constellation Hunter Program
Dark Sky Advocate Program
Dark Nebula Program
Double Star Program
Deep Sky Binocular Program
Lunar Program
Galileo Program
Meteor Program
Messier Program
Southern Skies Binocular Program
Sky Puppy Program
Variable Star Program
Universe Sampler Program

Intermediate Observing Programs

Asteroid Observing Program
Caldwell Program
Earth Orbiting Satellite Program
Globular Cluster Program
Herschel 400 Program
Lunar II Program
NEO Program
Outreach Award
Planetary Observers Program
Southern Sky Telescopic Program
Sunspotters Program
Urban Observing Program

Advanced Observing Programs

Arp Peculiar Galaxy Program
Flat Galaxies Program
Master Observer Award
Herschel II Program
Open Cluster Program
Local Galaxy Groups &
Neighborhood Program
Galaxy Groups & Clusters Program
Planetary Nebula Program

Observing logs must be completed for each observing program and submitted for review. For more information on a specific observing program go to the Astronomical League website and look under Observing. You can find a link to the Astronomical League on the PAC website.

If you have any questions or need help getting started on any observing program please ask me and I will be glad to help.

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 **Ben Rush.** 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

Science News and Notes by Ben Rush

Another model for Type Ia Supernovae

Dr. J. Craig Wheeler of the University of Texas at Austin has proposed a new theory surrounding the mystery of Type Ia Supernovae.

Type Ia Supernovae are a special sub-class of supernovae that result from the explosion of a white dwarf star, however the model by which these spectacular events occur suffers from a couple of competing theories. The "single-degenerate model" holds Type Ia supernovae occur due to a single white dwarf pulling material off a young companion star. The material siphoned off the young star finally takes the white dwarf to a critical mass and density whereby a thermonuclear reaction occurs. Another theory - the "double-degenerate model" - states a Type Ia supernova detonates when two white dwarfs in a binary system spiral into one another.

The problem is telescope data backs neither theory. In particular, telescope observations do not show the spectral data expected for any of these theories. Professor Wheeler believes including a special type of star known as a M dwarf in the binary system does explain visible evidence, however.

M dwarf stars - according to Professor Wheeler - are ideal for a number of reasons. The first is their abundance. M dwarf stars are the single-most abundant star in the universe, the second being white dwarfs themselves. M dwarf stars are also small. A problem which has vexed astronomers studying Type Ia supernovae has been that the companion star is nowhere to be seen after the explosion. M dwarf stars are so small and dim that even the Hubble Space Telescope would miss them, meaning they are there, just too dim to see.

The final reason M dwarf stars are ideal is they - like white dwarfs - are magnetic. Theoretically their magnetic poles would become attracted and result in a tidally and magnetically locked pair. Material pulled from the M dwarf by the white dwarf would collect on a single spot, increasing the likelihood of the massive detonation we see.

Young Stars Spotted in Globular Clusters

A long-held theory regarding the age of stars constituting globular clusters has been challenged thanks to a new survey by the Hubble Space Telescope. Young, blue stars known as "blue stragglers" have been spotted in clusters such as NGC 6362 providing evidence our way of looking at globular clusters as retirement homes for stars may be flawed. "May" is the operative word, however.

A theory has been proposed which may keep the old framework intact: namely, that material being swept up by stars within the cluster could potentially heat the star up, making it appear younger and bluer than its surrounding neighbors.

Challenge Observing Objects for November/December

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 1333

NGC 1333 is a reflection nebula located in the constellation Perseus. It belongs to the Perseus molecular cloud. In 2011 researchers reported finding 30 to 40 brown dwarf objects in the cloud and in the Rho Ophiuchi cloud complex. Look for an 8' x 6' oval glow NE-SW. It's apparent magnitude is 5.6

Image Credit: Hunter Wilson

Beginner Object

NGC 206

NGC 206 is a giant star cloud within the Andromeda Galaxy. It forms a triangle with M32 and the galactic center. It is one of the largest star forming regions in the local group of galaxies. It is similar to M24 in our own galaxy but much larger. It has an apparent size of 4' x 2.5'.

Image Credit: B.J. Mochejska (Warsaw University), The DIRECT Project, FLWO, MDM

NASA Great Observatories Find Candidate for Most Distant Object in the Universe to Date
By Rob Gutro, Donna Weaver and Ray Villard of NASA and STSI

By combining the power of NASA's Hubble and Spitzer space telescopes and one of nature's own natural "zoom lenses" in space, astronomers have set a new record for finding the most distant galaxy seen in the universe. The newly discovered galaxy, named MACS0647-JD, is very young and only a tiny fraction of the size of our Milky Way. The object is observed 420 million years after the big bang. The inset at left shows a close-up of the young dwarf galaxy. This image is a composite taken with Hubble's WFC 3 and ACS on Oct. 5 and Nov. 29, 2011. Credit: NASA, ESA, and M. Postman and D. Coe (STScI) and CLASH Team.

The farthest galaxy appears as a diminutive blob that is only a tiny fraction of the size of our Milky Way galaxy. But it offers a peek back into a time when the universe was 3 percent of its present age of 13.7 billion years.The newly discovered galaxy, named MACS0647-JD, was observed 420 million years after the big bang, the theorized beginning of the universe. Its light has traveled 13.3 billion years to reach Earth. This find is the latest discovery from a program that uses natural zoom lenses to reveal distant galaxies in the early universe. The Cluster Lensing And Supernova Survey with Hubble (CLASH),an international group led by Marc Postman of the Space Telescope Science Institute in Baltimore, Md., is using massive galaxy clusters as cosmic telescopes to magnify distant galaxies behind them. This effect is called gravitational lensing.

The newly discovered galaxy, named MACS0647-JD, is very young and only a tiny fraction of the size of our Milky Way. The object is observed 420 million years after the big bang. Video Credit: NASA, ESA, and G. Bacon (STScI) Along the way, 8 billion years into its journey, light from MACS0647-JD took a detour along multiple paths around the massive galaxy cluster MACS J0647+7015. Without the cluster's magnification powers, astronomers would not have seen this remote galaxy.Because of gravitational lensing, the CLASH research team was able to observe three magnified images of MACS0647-JD with the Hubble telescope. The cluster's gravity boosted the light from the faraway galaxy, making the images appear about eight, seven, and two times brighter than they otherwise would that enabled astronomers to detect the galaxy more efficiently and with greater confidence. "This cluster does what no manmade telescope can do," said Postman. "Without the magnification, it would require a Herculean effort to observe this galaxy." MACS0647-JD is so small it may be in the first steps of forming a larger galaxy. An analysis shows the galaxy is less than 600 light-years wide. Based on observations of somewhat closer galaxies, astronomers estimate that a typical galaxy of a similar age should be about 2,000 light-years wide. For comparison, the Large Magellanic Cloud, a dwarf galaxy companion to the Milky Way, is 14,000 light-years wide. Our Milky Way is 150,000 light-years across. "This object may be one of many building blocks of a galaxy,"said the study's lead author, Dan Coe of the Space Telescope Science Institute. "Over the next 13 billion years, it may have dozens, hundreds, or even thousands of merging events with other galaxies and galaxy fragments."

The galaxy was observed with 17 filters,spanning near-ultraviolet to near-infrared wavelengths, using Hubble's Wide Field Camera 3 (WFC3) and Advanced Camera for Surveys (ACS). Coe, a CLASH team member, discovered the galaxy in February while poring over a catalogue of thousands of gravitationally lensed objects found in Hubble observations of 17 clusters in the CLASH survey. But the galaxy appeared only in the two reddest filters. "So either MACS0647-JD is a very red object, only shining at red wavelengths, or it is extremely distant and its light has been 'redshifted' to these wavelengths, or some combination of the two," Coe said. "We considered this full range of possibilities."

The CLASH team identified multiple images of eight galaxies lensed by the galaxy cluster. Their positions allowed the team to produce a map of the cluster's mass, which is primarily composed of dark matter. Dark matter is an invisible form of matter that makes up the bulk of the universe's mass. "It's like a big puzzle," said Coe. "We have to arrange the mass in the cluster so that it deflects the light of each galaxy to the positions observed." The team's analysis revealed that the cluster's mass distribution produced three lensed images of MACS0647-JD at the positions and relative brightness observed in the Hubble image. Coe and his collaborators spent months systematically ruling out these other alternative explanations for the object's identity, including red stars, brown dwarfs, and red (old or dusty) galaxies at intermediate distances from Earth. They concluded that a very distant galaxy was the correct explanation.

Redshift is a consequence of the expansion of space over cosmic time. Astronomers study the distant universe in near-infrared light because the expansion of space stretches ultraviolet and visible light from galaxies into infrared wavelengths. Coe estimates MACS0647-JD has a redshift of 11, the highest yet observed. Images of the galaxy at longer wavelengths obtained with the Spitzer Space Telescope played a key role in the analysis. If the object were intrinsically red, it would appear bright in the Spitzer images. Instead, the galaxy barely was detected, if at all, indicating its great distance. The research team plans to use Spitzer to obtain deeper observations of the galaxy, which should yield confident detections as well as estimates of the object's age and dust content.

MACS0647-JD galaxy, however, may be too far away for any current telescope to confirm the distance based on spectroscopy, which spreads out an object's light into thousands of colors. Nevertheless, Coe is confident the fledgling galaxy is the new distance champion based on its unique colors and the research team's extensive analysis. "All three of the lensed galaxy images match fairly well and are in positions you would expect for a galaxy at that remote distance when you look at the predictions from our best lens models for this cluster," Coe said. The new distance champion is the second remote galaxy uncovered in the CLASH survey, a multi-wavelength census of 25 hefty galaxy clusters with Hubble's ACS and WFC3. Earlier this year, the CLASH team announced the discovery of a galaxy that existed when the universe was 490 million years old, 70 million years later than the new record-breaking galaxy. So far, the survey has completed observations for 20 of the 25 clusters.

The team hopes to use Hubble to search for more dwarf galaxies at these early epochs. If these infant galaxies are numerous, then they could have provided the energy to burn off the fog of hydrogen that blanketed the universe, a process called re-ionization. Re-ionization ultimately made the universe transparent to light.

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
December 26/27, 2012
7:00 PM
Mueller Planetarium