The Prairie Astronomer

August, 2012 Volume 53, Issue #8

The Official Newsletter of the Prairie Astronomy Club

August Program

August 2012 PAC Program
Space Update/PAC Web Site Review
Jason Noelle & Ben Rush

Jason Noelle will give us a space probe update, new discoveries and other exciting stuff. He said he'll likely start with mercury and work his way out.

Ben Rush will give us report on the new look of the PAC web site plus a walk through on posting content there.

In This Issue:

Featured Photo

DDO 190 is classified as a dwarf irregular galaxy as it is relatively small and lacks clear structure. Older, reddish stars mostly populate DDO 190's outskirts, while some younger, bluish stars gleam in DDO 190's more crowded interior. Some pockets of ionized gas heated up by stars appear here and there, with the most noticeable one shining towards the bottom of DDO 190 in this picture. Meanwhile, a great number of distant galaxies with evident spiral, elliptical and less-defined shapes glow in the background. DDO 190 lies around 9 million light years away from our solar system. It is considered part of the loosely associated Messier 94 group of galaxies, not far from the Local Group of galaxies that includes the Milky Way. Although within the Messier 94 group, DDO 190 is on its own. The galaxy's nearest dwarf galaxy neighbor, DDO 187, is thought to be no closer than 3 million light years away. In contrast, many of the Milky Way's companion galaxies, such as the Large and Small Magellanic Clouds, reside within a fifth or so of that distance, and even the giant spiral of the Andromeda Galaxy is closer to the Milky Way than DDO 190 is to its nearest neighbor. *Image Credit: ESA/Hubble & NASA*

The Bad Astronomer Fact of the Month

Happy birthday, Universe! Kinda. It's not really the Universe's birthday, but now we do know to high accuracy just how old it is. How?

NASA's WMAP is the Wilkinson Microwave Anisotropy Probe (which is a mouthful, and why we just call it WMAP). It was designed to map the Universe with exquisite precision, detecting microwaves coming from the most distant source there is: the cooling fireball of the Big Bang itself. New results just released from WMAP have nailed down lots of cool stuff — literally — about the Universe. I am about to explain the early Universe to you. I'll be brief, but if you want to skip to the results, then go ahead.

Here's the quick version: the Big Bang was hot. The Universe itself expanded outward from a single point — actually, it's space itself that expands, not the objects in it — and like any expanding gas it cooled. After about a microsecond, it had cooled enough for protons and neutrons to form. Three minutes later (yes, just three minutes) it had cooled enough for protons and neutrons to stick together. Hydrogen, helium, and just a dash of lithium were created, and these would be the only elements for some time (hundreds of millions of years, in fact). The Universe was a thick soup of matter and energy. It kept expanding and cooling. At this point, it was opaque to light. A photon couldn't travel an inch without smacking into an electron and then getting sent off in some other random direction. However, after a few hundred thousand years, an amazing thing happened: neutral hydrogen could form. Before this point, the Universe was still too hot; as soon as an electron bonded with a proton, some ultraviolet photon would come along and whack it off. But at that golden moment the cosmos had cooled off enough that a lasting atomic relationship was in the offing. Neutral hydrogen was born. At that moment — astronomers call it recombination, which is a misnomer, since it was the first time electrons and protons could combine — the Universe became transparent; without all those pesky electrons floating around, photons found themselves free to travel long distances. It's those photons WMAP sees. After 13.7 billion years, the expansion of the Universe has cooled the light, stretched its wavelength from ultraviolet to microwave. Another way to think about it is that the temperature associated with each photon went from thousands of Kelvins down to just a few, less than 3, in fact. That's -270 Celsius, and -454 Fahrenheit. Brrrr. That light emitted just after recombination tells us a vast amount about the Universe at that time. By carefully mapping the exact wavelength of the light and the direction from where it came, we can tell the density and temperature of the matter at that time. Incredibly we can also tell how much dark energy there was, and even the geometry of the Universe: whether it is flat, open, or closed. All this, from the dying glow of the Big Bang itself.

WMAP Results

A lot of this information was determined a while back, just a couple of years after WMAP launched. But now they have released the Five Year Data, a comprehensive analysis of what all that data means. Here's a quick rundown:

1) The age of the Universe is 13.73 billion years, plus or minus 120 million years. Some people might say it doesn't look a day over 6000 years. They're wrong. 2) The image shows the temperature difference between different parts of the sky. Red is hotter, blue is cooler. However, the difference is incredibly small: the entire temperature range from cold to hot is only 0.0002 degrees Celsius. The average temperature is 2.725 Kelvin, so you're seeing temperatures from 2.7248 to 2.7252 Kelvins.

3) The age of the Universe when recombination occurred was 375,938 years, +/- about 3100 years. Wow.

4) The Universe is flat.

5) The energy budget of the Universe is the total amount of energy and matter in the whole cosmos added up. Together with some other observations, WMAP has been able to determine just how much of that budget is occupied by dark energy, dark matter, and normal matter. What they got was: the Universe is 72.1% dark energy, 23.3% dark matter, and 4.62% normal matter. You read that right: everything you can see, taste, hear, touch, just sense in any way… is less than 5% of the whole Universe. We occupy a razor thin slice of reality.

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

Club Events

Newsletter submission deadline September 15, 2012

PAC Meeting
Tuesday August 28, 2012 @Hyde Observatory
Space and NASA Update

PAC Meeting
Tuesday September 25, 2012 @Hyde Observatory
Fun with Astronomy

PAC Meeting
Tuesday October 30, 2012 @Hyde Observatory
Computer Astronomy

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.

August/September Observing: What to View--Jim Kvasnicka

Planets

Mars and Saturn: Both start September a little over 10º high in the WSW.

Jupiter: Rises just before midnight to start September and around 10 pm at the end. Jupiter will increase in brightness from -2.3 to -2.5.

Venus: Rises about 3½ hours before the Sun at magnitude -4.2.

Mercury: Too close to the Sun to observe all month.

Uranus and Neptune: In Cetus and Aquarius. Uranus is at opposition the night of September 28-29 and will shine at magnitude 5.7 all month.

Messier List

M13: The Great Hercules Cluster, class V globular cluster.

M14: Class VIII globular cluster in Ophiuchus.

M22: Class VII globular cluster in Sagittarius.

M28: Class IV globular cluster in Sagittarius.

M54/M69/M70: Class III, V, and V globular clusters along the bottom of Sagittarius.

M92: Class IV globular cluster in Hercules.

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

Next Month: M11, M16, M17, M18, M24, M25, M26, M55, M75

NGC and Other Deep Sky Objects

NGC 6826: The Blinking Planetary in Cygnus.

NGC 6934: Globular cluster in Delphinus.

NGC 6960/6992/6995: The Veil Nebula in Cygnus. Use low power with an OIII filter.

Cr 399: The Coat Hanger.

NGC 7026: Bluish-green planetary nebula in Cygnus.

Double Star Club List

Otto Struve 525: Yellow and blue pair in Lyra.

Gamma Delphinus: Yellow primary with a yellow-green secondary.

Zeta Aquarii: Yellow and white pair.

94 Aquarii: Yellow primary with a pale blue secondary.

Alpha Capricornus: Wide pair of yellow stars.

Beta Capricornus: Yellow and blue stars.

36 Ophiuchi: Equal pair of yellow-orange stars.

Omicron Ophiuchi: Yellow primary with a pale yellow secondary.

70 Ophiuchi: Yellow and orange pair.

Focus on Observing Clubs

Earth Orbiting Satellite Observing Program

The purpose of the Earth Orbiting Satellite Observing Program is to introduce observers to satellite observing, with the terminology and techniques of tracking satellites. The list of objects required for the award include targets that can be easily tracked using the unaided eye or binoculars.

Observing Tasks for the EOSOP Award

- ***Active Payloads –*** Observe four (4) different active payloads that may include weather satellites, communication satellites, and scientific payloads.
- ***Manned Spaceflight –*** Observe two (2) manned spacecraft, this may include the ISS, Soyuz, or Chinese spacecraft.
- ***Multinational Satellites –*** Observe satellites from four (4) different countries other than the USA.
- ***Rocket Bodies –*** Observe four (4) rocket bodies.
- ***Iridium Flares –*** Observe four (4) iridium flares. One must be in daylight.
- ***Multi-pass –*** Observe two (2) satellites on two separate passes, each pair must be observed on the same night.
- ***Formation –*** Observe two (2) sets of formation flights. This will usually be a Soyuz spacecraft flying in formation with the ISS.
- ***Aged Element Sets –*** Observe two (2) satellites with element sets of different ages. For each satellite one observation must be with an element set less than one week old, and the second observation with an element set at least three weeks old. The purpose is to see the effects of using old element sets and their effect on the arrival time of the satellite.

Observation reports can be downloaded from the Astronomical League website and printed for your use. There is also an observation checklist for you to download if you choose to. There are several links to websites that can provide element sets and predictions for satellites. The observation reporting forms must be completed and submitted in order to get credit. This includes a full sky sketch of the satellite pass. The sketch should include a solid line showing the path of the satellite against the background stars.

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

Earth Orbiting Satellite Observing Program Awardees from PAC

No PAC members have completed the Earth Orbiting Satellite

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

Well, this month's article will be short and sweet. I was gone for the last meeting so can't really give you a good review. Hopefully everyone had a great time at the Nebraska Star Party and then shared their images with everyone at the July meeting.

This month's PAC Meeting will be on Tuesday, August 28th. This month's program, which of course will include Jim Kvasnicka's observing report, will feature 2 club members. Jason Noelle will give us a space probe update, new discoveries and other exciting stuff. He said he'll likely start with mercury and work his way out.

Ben Rush will give us report on the new look of the PAC web site plus a walk through on posting content there.

Hope to see everyone at the meeting.

Upcoming programs:

Sep 2012: *Fun With Astronomy (PAC Board)* - 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 (Brian Sivill)* - 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 ☺.

Nov 2012: *How to Buy a Telescope (Club Members)* - This will be our Learn to Buy a Telescope Program for the public. More later.

Dec 2012: *PAC Holiday Social* - No public meeting (Club Holiday Get-Together). More later.

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

Challenge Observing Objects for August/September

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 6907

This is a small faint galaxy located in Capricornus. It has an apparent magnitude of 11.2 and is 3.4' x 2.6'. Will need a fairly large telescope to see the central bar of the galaxy.

Image Credit: Jim Riffle

Beginner Object

NGC 6520/Barnard 86

Located just above the "spout" of Sagittarius, this open cluster and dark nebula pair is one of the prettiest non-Messier sights in the sky. A relatively young open cluster sitting right next to a dark molecular cloud.

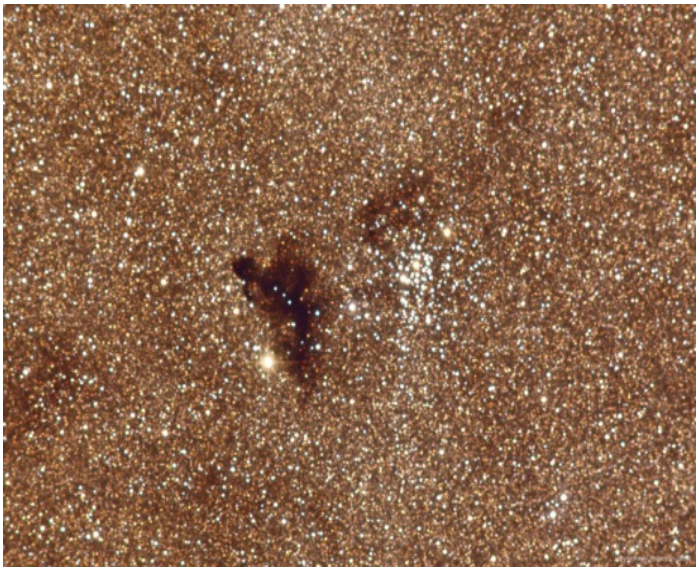


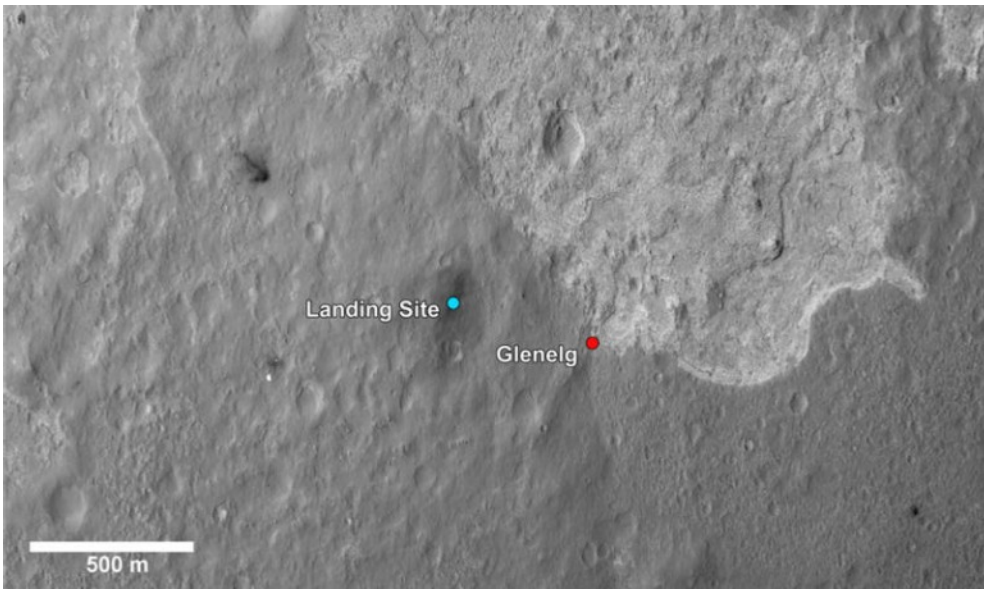
Image Credit: James R. Foster of http://www.astroimage.info/

NASA Curiosity Team Pinpoints Site for First Drive On Mars -

Sciencedaily.com

The scientists and engineers of NASA's Curiosity rover mission have selected the first driving destination for their one-ton, six-wheeled mobile Mars laboratory. The target area, named Glenelg, is a natural intersection of three kinds of terrain. The choice was described by Curiosity Principal Investigator John Grotzinger of the California Institute of Technology during a media teleconference on Aug. 17.

"With such a great landing spot in Gale Crater, we literally had every degree of the compass to choose from for our first drive," Grotzinger said. "We had a bunch of strong contenders. It is the kind of dilemma planetary scientists dream of, but you can only go one place for the first drilling for a rock sample on Mars. That first drilling will be a huge moment in the history of Mars exploration."



(Credit: NASA/JPL-Caltech/Univ. of Arizona)

The trek to Glenelg will send the rover 1,300 feet (400 meters) east-southeast of its landing site. One of the three types of terrain intersecting at Glenelg is layered bedrock, which is attractive as the first drilling target.

"We're about ready to load our new destination into our GPS and head out onto the open road," Grotzinger said. "Our challenge is there is no GPS on Mars, so we have a roomful of rover-driver engineers providing our turn-by-turn navigation for us."

Prior to the rover's trip to Glenelg, the team in charge of Curiosity's Chemistry and Camera instrument, or ChemCam, is planning to give

their mast-mounted, rock-zapping laser and telescope combination a thorough checkout. On Saturday night, Aug. 18, ChemCam is expected to "zap" its first rock in the name of planetary science. It will be the first time such a powerful laser has been used on the surface of another world.

"Rock N165 looks like your typical Mars rock, about three inches wide. It's about 10 feet away," said Roger Wiens, principal investigator of the ChemCam instrument from the Los Alamos National Laboratory in New Mexico. "We are going to hit it with 14 millijoules of energy 30 times in 10 seconds. It is not only going to be an excellent test of our system, it should be pretty cool too."

Mission engineers are devoting more time to planning the first roll of Curiosity. In the coming days, the rover will exercise each of its four steerable (front and back) wheels, turning each of them side-to-side before ending up with each wheel pointing straight ahead. On a later day, the rover will drive forward about one rover-length (10 feet, or 3 meters), turn 90 degrees, and then kick into reverse for about 7 feet (2 meters).

"There will be a lot of important firsts that will be taking place for Curiosity over the next few weeks, but the first motion of its wheels, the first time our roving laboratory on Mars does some actual roving, that will be something special," said Michael Watkins, mission manager for Curiosity from the Jet Propulsion Laboratory in Pasadena, Calif.

Phoenix Cluster Sets Record Pace at Forming Stars -

Spacedaily.com

Astronomers have found an extraordinary galaxy cluster, one of the largest objects in the universe, that is breaking several important cosmic records. Observations of the Phoenix cluster with NASA's Chandra X-ray Observatory, the National Science Foundation's South Pole Telescope, and eight other world-class observatories may force astronomers to rethink how these colossal structures and the galaxies that inhabit them evolve. Stars are forming in the Phoenix cluster at the highest rate ever observed for the middle of a galaxy cluster. The object also is the most powerful producer of X-rays of any known cluster and among the most massive. The data also suggest the rate of hot gas cooling in the central regions of the cluster is the largest ever observed.

The Phoenix cluster is located about 5.7 billion light years from Earth. It is named not only for the constellation in which it is located, but also for its remarkable properties. "While galaxies at the center of most clusters may have been dormant for billions of years, the central galaxy in this cluster seems to have come back to life with a new burst of star formation," said Michael McDonald, a Hubble Fellow at the Massachusetts Institute of Technology and the lead author of a paper appearing in the Aug. 16 issue of the journal Nature. "The mythology of the Phoenix, a bird rising from the dead, is a great way to describe this revived object."

Like other galaxy clusters, Phoenix contains a vast reservoir of hot gas, which itself holds more normal matter - not dark matter - than all of the galaxies in the cluster combined. This reservoir can be detected only with X-ray telescopes such as Chandra. The prevailing wisdom once had been that this hot gas should cool over time and sink to the galaxy at the center of the cluster, forming huge numbers of stars. However, most galaxy clusters have formed very few stars during the last few billion years. Astronomers think the supermassive black hole in the central galaxy of a cluster pumps energy into the system, preventing cooling of gas from causing a burst of star formation.

The famous Perseus cluster is an example of a black hole bellowing out energy and preventing the gas from cooling to form stars at a high rate. Repeated outbursts in the form of powerful jets from the black hole in the center of Perseus created giant cavities and produced sound waves with an incredibly deep B-flat note 57 octaves below middle C, which, in turn, keeps the gas hot. "We thought that these very deep sounds might be found in galaxy clusters everywhere," said co-author Ryan Foley, a Clay Fellow at the Harvard-Smithsonian Center for Astrophysics in Cambridge, Mass. "The Phoenix cluster is showing us this is not the case - or at least there are times the music essentially stops. Jets from the giant black hole at the center of a cluster are apparently not powerful enough to prevent the cluster gas from cooling." With its black hole not producing powerful enough jets, the center of the Phoenix cluster is buzzing with stars that are forming about 20 times faster than in the Perseus cluster. This rate is the highest seen in the center of a galaxy cluster but not the highest seen anywhere in the universe. However, other areas with the highest star formation rates, located outside clusters, have rates only about twice as high. The frenetic pace of star birth and cooling of gas in the Phoenix cluster are causing the galaxy and the black hole to add mass very quickly - an important phase the researchers predict will be relatively short-lived.

"The galaxy and its black hole are undergoing unsustainable growth," said co-author Bradford Benson, of the University of Chicago. "This growth spurt can't last longer than about a hundred million years. Otherwise, the galaxy and black hole would become much bigger than their counterparts in the nearby universe." Remarkably, the Phoenix cluster and its central galaxy and supermassive black hole are already among the most massive known objects of their type. Because of their tremendous size, galaxy clusters are crucial objects for studying cosmology and galaxy evolution, so finding one with such extreme properties like the Phoenix cluster is important. "This spectacular star burst is a very significant discovery because it suggests we have to rethink how the massive galaxies in the centers of clusters grow," said Martin Rees of Cambridge University, a world-renowned expert on cosmology who was not involved with the study. "The cooling of hot gas might be a much more important source of stars than previously thought."

The Phoenix cluster originally was detected by the National Science Foundation's South Pole Telescope, and later was observed in optical light by the Gemini Observatory, the Blanco 4-meter telescope and Magellan telescope, all in Chile. The hot gas and its rate of cooling were estimated from Chandra data. To measure the star formation rate in the Phoenix cluster, several space-based telescopes were used, including NASA's Wide-field Infrared Survey Explorer and Galaxy Evolution Explorer and ESA's Herschel.

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
September 25, 2012
7:30 PM
Hyde Observatory