December, 2013 Volume 54, Issue #12

The Prairie Astronomer

The Official Newsletter of the Prairie Astronomy Club

IN THIS ISSUE:

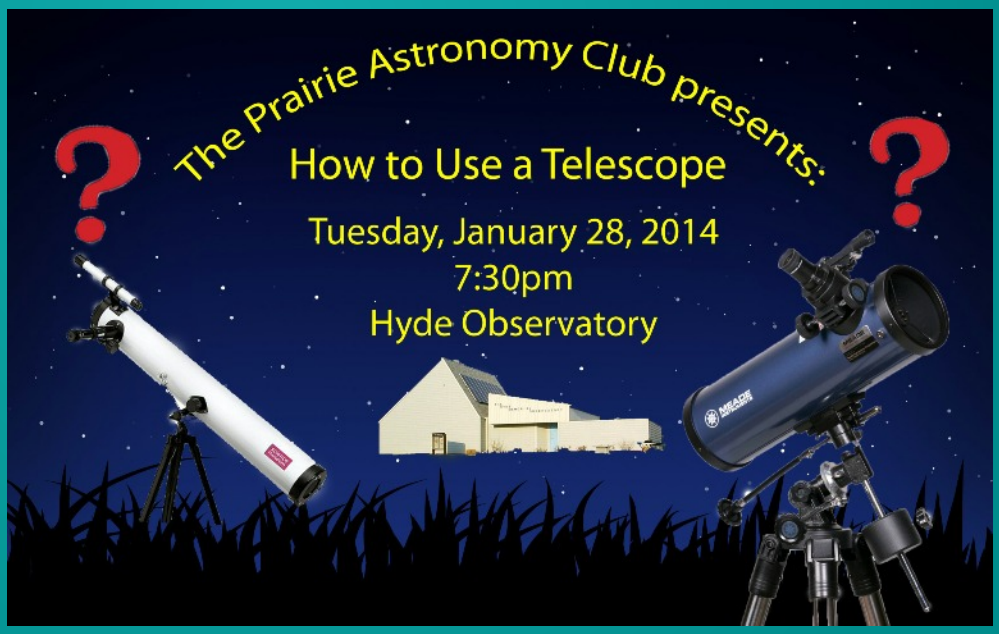
December Program

PAC will have its annual private holiday gathering. Please check your email for details or contact Jack Dunn or any club officer. We will have some very special guests, an interesting program and snacks.

Please mark your calendar for SATURDAY, December 28th at 6:30pm. Please RSVP Jack Dunn by December 26. See page 6 for more information.

2014 Programs–Zach Thompson

We're going to get 2014 started off with some great programs for PAC so be sure to attend the meetings and don't miss out! If you have an idea or suggestion for a future presentation for PAC, please contact me (zachthompson86@gmail.com). Thanks! Merry Christmas and Happy New Year!



Night Sky Network

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: **Mark Dahmke, P. O. Box 5585, Lincoln, NE 68505 or** mark@dahmke.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.

Meeting Minutes

PAC Meeting Minutes November 26, 2013

Brett Boller (VP) called meeting to order at 7:34.

Welcomed visitors. One visitor introduced themselves.

Program to follow the meeting was "How to Buy a Telescope."

December meeting still not determined, possibly December 30 for a Planetarium family get-together. [Note: see details on page 6] Jack Dunn had advised Brett that the date would be known following Thanksgiving.

Treasurer's report was provided by Bob Kackvinsky. Bob showed upcoming memberships needing renewals. Bill Gould, Richard Barry, Jeremy Michael, Doug Michel (Dec 1), and Linda Hugh Clark & Denise Wally (Jan 1). PAC Financial Status was provided including assets of 39,377.58. Assets have remained relatively flat since 2011, consistent with a non-profit association.

Observing report was provided by Jim Kvasnicka. Star parties upcoming w;ill be November 29 and December 6 at beginning of month. December 27 and January 3 for end of month.

Brett Boller provided a report on building a remote observatory. An ad hoc committee has been formed to investigate locations and costs of the project. Potential benefits were suggested as increased astrophotography possibilities, permanently set up scopes, remote video feeds for Hyde, possible revenue by renting, possible outreach. Considerations include location, type, power, internet, telescope, mount, camera, and cost. Brett asked for volunteers to committee which he will chair. General discussion followed about possibilities and considerations. Brian Sivil noted that a committee was fine for investigation and forming a proposing to membership, but expressed that no action could or should be taken by board. Brett Boller and other board members present confirmed there were no plans other than to investigate at this point and PAC membership would ultimately vote on any proposals.

Outreach report was provided by Jason Noelle. Report on boy scout outing was provided. Clouds hit early in the night but was reported as a positive outing in general.

Zach reported on the PAC library. Brett and Zach had organized the library. Several very old or multi-copy volumes were set aside to let PAC membership decide what to do with these. They were considered to be "taking up space." Possibility of donating to Strategic Air and Space Museum Library was suggested. No motions were made or decision made on what to do with these extra volumes.

No other business.

Business meeting adjourned at 8:05.

Respectfully submitted by,

Dale Bazan, Secretary.

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.

STUDENT MEMBER - $10.00 per year with volunteer requirement.

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 telescopes, contact Cassie Etmund. If you keep a scope for more than a week, please check in 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

PAC Star Party Dates

Dates in bold are closest to the new moon

Oct 25, **Nov 1,** Nov 29, **Dec 6** & 27

2014 Star Party Dates
January 24, **31**
February 21, **28**
March 21, **28,** April 25
May 2, 23, **30,** June 20, **27**
July 18, **25**
NSP: July 27-Aug 1
August **22**, 29, Sept 19, **26**
Oct 17, **24,** Nov 14, **21**
Dec 12, **19**

Lunar Party Dates
May 9, June 6, Sept 5, Oct 3
* Lunar party dates are tentative, sites to be determined.

PAC E-Mail:
info@prairieastronomyclub.org

PAC-LIST:
To subscribe send a request to PAC. To post messages to the list, send to the address:

pac-list@prairieastronomyclub.org

Events

PAC Holiday Gathering
Saturday December 28th, 2013 @Hyde Observatory

PAC Meeting
Tuesday Jan 28th, 2014 @Hyde Observatory

PAC Meeting
Tuesday Feb 25th, 2013 @Hyde Observatory

PAC Meeting
Tuesday March 25th, 2013 @Hyde Observatory

Newsletter submission deadline
January 18, 2013

Links

PAC: www.prairieastronomyclub.org
Night Sky Network: https://nightsky.jpl.nasa.gov/
CafePress (club apparel) www.cafepress.com

www.hydeobservatory.info
www.nebraskastarparty.org
www.OmahaAstro.com
Panhandleastronomyclub.com
www.universetoday.com/
www.planetary.org/home/
http://www.darksky.org/

NGC4603 Credit: NASA

Measuring and Calculating the True Field of View—Dave Knisely

Although the True Field of View of an eyepiece/telescope combination can be calculated with at least two common formulae, its actual size can only be accurately determined by using a star field of known size, or by using the star-drift method (a better choice). To use the star-drift method, take a star of known declination and, with any drive systems turned off, time exactly how long it takes for the star to go from one field edge directly through the center of the field and over to the opposite field edge. For equatorially-mounted telescopes, this can be done for any convenient star, but for altazimuthly-mounted "Dobsonians", it is a bit easier to use a star near the meridian (ie: pretty much straight south but fairly high above the southern horizon). The True Field Of View (TFOV) is then:

TFOV = 15.04*T*Cos(delta)

where "delta" is the star's declination, "Cos" is the Cosine function, and "T" is the measured drift time interval. If the time is measured in minutes, the true field will be in minutes of arc, and if the time is in seconds, the true field will be in seconds of arc. For example, if a star has a declination of 25.5 degrees (ie: 25 degrees 30 minutes), and a measured drift time of 2.75 minutes (ie: 2 minutes 45 seconds), the true field of view is then 37.3 arc minutes in diameter. For stars within 3 degrees of the celestial equator, the Cosine function can be approximated to 1, and the formula becomes:

TFOV = 15.04*T (*only* for near-equatorial stars)

Alternatively, a near-equatorial timing in minutes can also be divided by 3.989 to get the true field in degrees. Some useful stars for this kind of measurement are: Zeta Aquarii, Delta Ceti, 10 Tauri, Delta Orionis, Alpha Sextantis, Zeta Virginis, and Nu Aquilae. Generally, a stopwatch that is accurate to a tenth of a second or better should be used to do the timings and an average of several timings should be take to reduce the effects of timing measurement errors.

Calculating Approximate True Field of View

It can also be nice to have a simple formula which can give the amateur a rough idea of what true field of view an eyepiece will give in a telescope without the amateur having to buy the eyepiece and go out to measure things. Two such formula do indeed exist: the Apparent Field of View method, and the Eyepiece Field Stop method.

1. APPARENT FIELD OF VIEW METHOD: this calculates the true angular field on the sky a telescope will show using a given eyepiece by dividing the Apparent Field of View of that eyepiece (the angular span your eye sees when looking into the eyepiece) and divides it by the magnification that eyepiece gives when used in the telescope:

TFOV = AFOV/Mag

where "AFOV" is the eyepiece apparent field of view and "Mag" is the magnification or "power" that eyepiece yields when in the telescope. For example, if an eyepiece has an apparent field of 50 degrees and yields 45x in the telescope, the true field will be approximately 1.1 degrees. Generally, with accurate Apparent Field figures, the Apparent Field of View method can often get within 10 percent of the actual true field of view on the sky. However, some eyepiece retailers or manufacturers don't always provide extremely accurate figures for their eyepieces, although many amateurs are able to measure the apparent field with simple "optical bench" setups.

2. EYEPIECE FIELD STOP METHOD: involves measuring the physical diameter of the Field Stop at the front of the eyepiece. The field stop is usually a ring or narrow baffle located just in front of the front "field" lens of the eyepiece. In some more complex wide-field designs, the field stop may be inside the front field lens between the elements, and in some less-expensive eyepieces, the field stop is the eyepiece barrel itself. The field for a given eyepiece is given by:

TFOV = (180/Pi)*EFSD/FL

Field of View, Continued

where "EFSD" is the eyepiece field stop diameter and "FL" is the telescope's focal length. The "180/Pi" out front is just the number of degrees in a radian, so the formula can be approximated as 57.296*EFSD/FL. For example, if the eyepiece has a field stop diameter of 25.40mm (1 inch), and the telescope focal length is 1410mm, the true field of view with that eyepiece will be about 1.032 degrees. The Eyepiece Field Stop method tends to be somewhat more accurate than the Apparent Field of View method (often within two percent of the actual field on the sky) as long as an accurate value for the field stop diameter can be obtained.

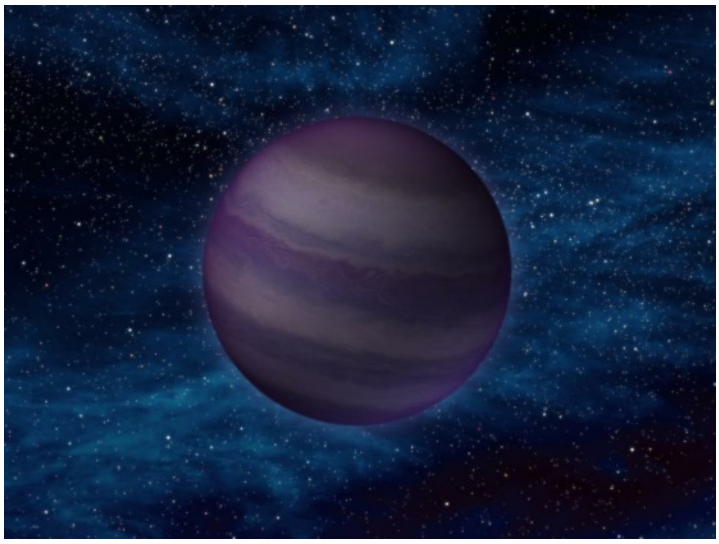
When Is a Star Not a Star?—Jason Major, Universe Today

When it's a brown dwarf — but where do we draw the line?

Often called "failed stars," brown dwarfs are curious cosmic creatures. They're kind of like swollen, super-dense Jupiters, containing huge amounts of matter yet not quite enough to begin fusing hydrogen in their cores. Still, there has to be some sort of specific tipping point, and astronomers (being the scientists that they are) would like to know: when does a brown dwarf stop and a star begin?

Researchers from Georgia State University now have the answer.

From a press release issued Dec. 9 from the National Optical Astronomy Observatory (NOAO):



Artist's impression of a brown dwarf. (NASA/JPL-Caltech)

For most of their lives, stars obey a relationship referred to as the main sequence, a relation between luminosity and temperature – which is also a relationship between luminosity and radius. Stars behave like balloons in the sense that adding material to the star causes its radius to increase: in a star the material is the element hydrogen, rather than air which is added to a balloon. Brown dwarfs, on the other hand, are described by different physical laws (referred to as electron degeneracy pressure) than stars and have the opposite behavior. The inner layers of a brown dwarf work much like a spring mattress: adding additional weight on them causes them to shrink. Therefore brown dwarfs actually decrease in size with increasing mass.

As Dr. Sergio Dieterich, the lead author, explained, "In order to distinguish stars from brown dwarfs we measured the light from each object thought to lie close to the stellar/brown dwarf boundary. We also carefully measured the distances to each object. We could then calculate their temperatures and radii using basic physical laws, and found the location of the smallest objects we observed (see the attached illustration, based on a figure in the publication). We see that radius decreases with decreasing temperature, as expected for stars, until we reach a temperature of about 2100K. There we see a gap with no objects, and then the radius starts to increase with decreasing temperature, as we expect for brown dwarfs. "

Dr. Todd Henry, another author, said: "We can now point to a temperature (2100K), radius (8.7%

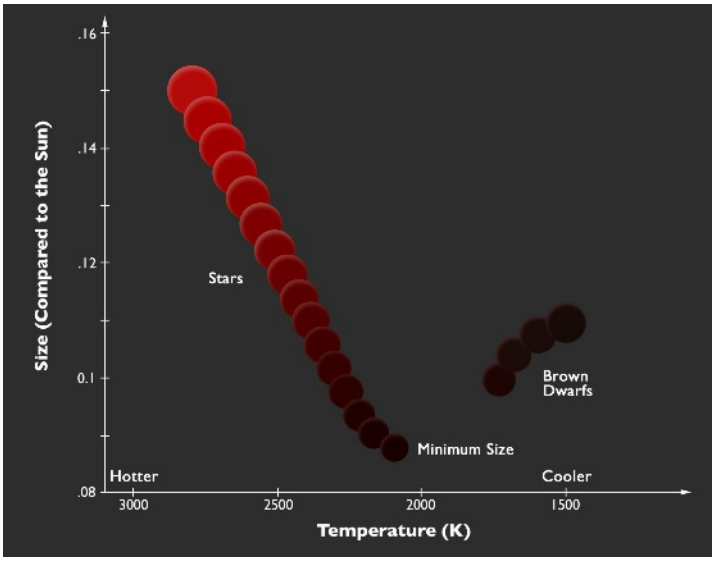
When Is a Star Not a Star?, continued

that of our Sun), and luminosity (1/8000 of the Sun) and say 'the main sequence ends there' and we can identify a particular star (with the designation 2MASS J0513-1403) as a representative of the smallest stars."

Aside from answering a fundamental question in stellar astrophysics about the cool end of the main sequence, the discovery has significant implications in the search for life in the universe. Because brown dwarfs cool on a time scale of only millions of years, planets around brown dwarfs are poor candidates for habitability, whereas very low mass stars provide constant warmth and a low ultraviolet radiation environment for billions of years. Knowing the temperature where the stars end and the brown dwarfs begin should help astronomers decide which objects are candidates for hosting habitable planets.

The data came from the SOAR (SOuthern Astrophysical Research) 4.1-m telescope and the SMARTS (Small and Moderate Aperture Research Telescope System) 0.9-m telescope at the Cerro Tololo Inter-American Observatory (CTIO) in Chile.

Read more at Universe Today.



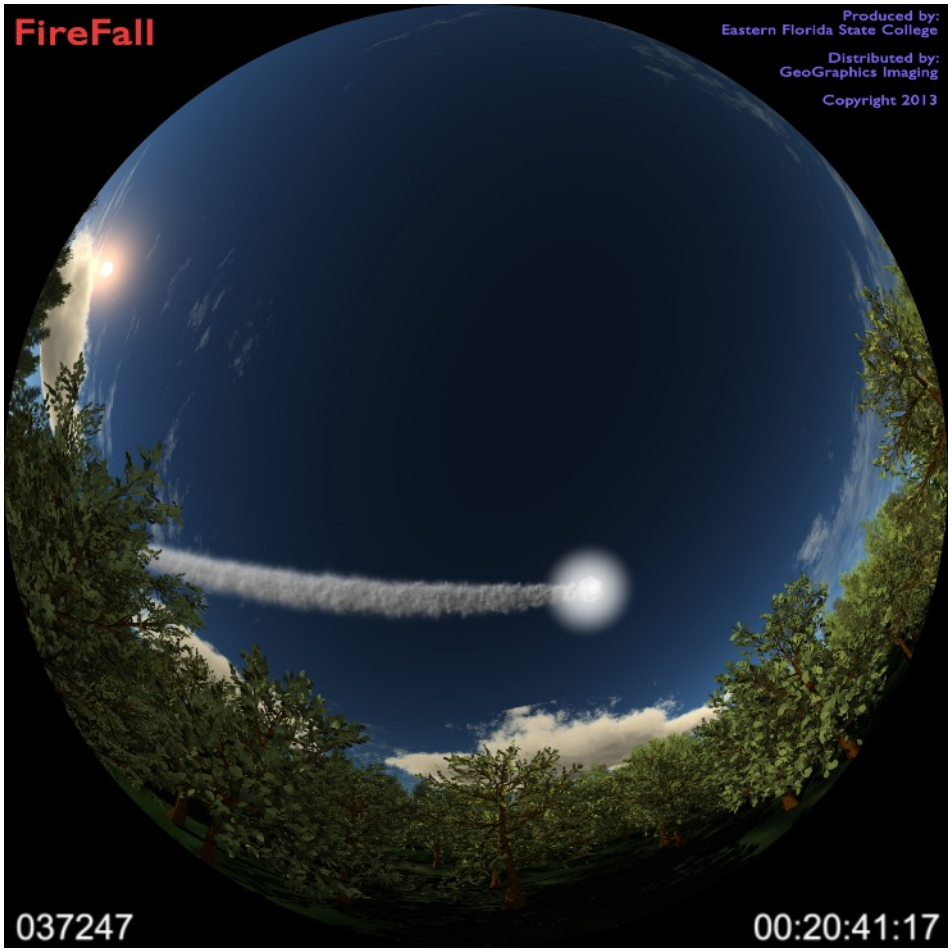
The relation between size and temperature at the point where stars end and brown dwarfs begin (based on a figure from the publication) Image credit: P. Marenfeld & NOAO/AURA/NSF.

PAC Holiday Gathering, Dec 28 at Mueller Planetarium—Jack Dunn

PAC will have its annual private holiday gathering for members on Saturday, December 28th at 6:30 p.m. at Mueller Planetarium. This invitation is open to you and members of your immediate family. In order to get enough snacks, please RSVP to my e-mail. We will only provide snacks, not a full meal like the Hyde Volunteer Dinner. But we'll have a great time anyway. I have two new planetarium shows: "Firefall" (meteors, comets and asteroids) and "Into the Deep," (the history of deep sea diving and creatures that live at those depths). Those two shows are each about 35 minutes in fulldome. But we also expect some special guests to visit us. No, Larry Stepp will not be back to Lincoln this year. But the Cox family of engineers are expected to be here. 20 years at NASA, and more.

This is NOT a public event and will not be announced publicly. You need to come to the Museum's West door (by the bell tower) starting around 6 p.m. there will be someone to open the door. Since the university will be shut down for the holidays, you don't need a parking permit.

So have a great holiday and join us if you can on Dec. 28th. If you are planning to come, reply to this e-mail so I can put you in the count. If you can't come, you don't need to reply. I just need a count of those that will be there. And of course, if you have questions, you can also e-mail me.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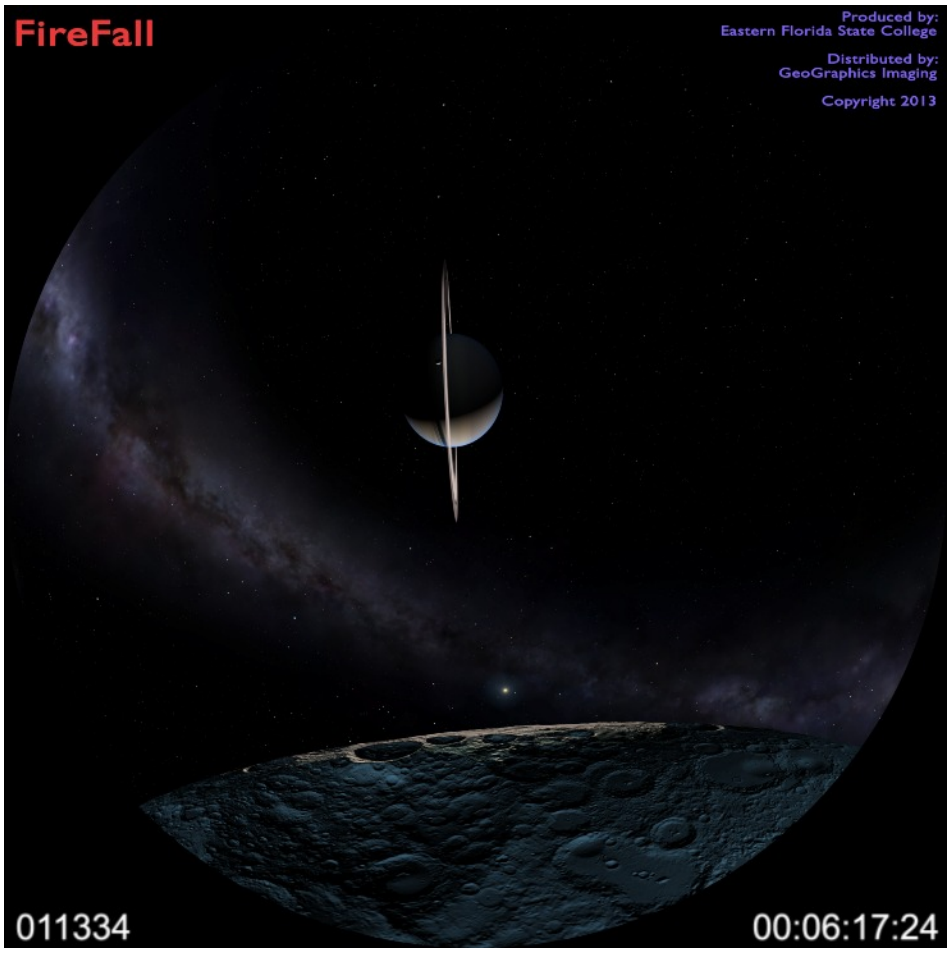
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January Observing—Jim Kvasnicka

This is a partial list of objects visible for the upcoming month.

Planets
Venus: Starts the month as an evening star and ends the month in the morning.
Uranus/Neptune: In Pisces and Aquarius.
Jupiter: Visible all night in Gemini at magnitude -2.7 and its disk is at 46".
Mars: Rises around midnight in Virgo.
Saturn: Rises around 3 am in Libra to start the month and by 1:30 at the end.
Mercury: Starts the month low in the WSW at dusk.

Messier List
M33: The Pinwheel Galaxy in Triangulum.
M34: Open cluster in Perseus.
M52: Open cluster in Cassiopeia.
M74: Galaxy in Pisces.
M76: The Little Dumbbell planetary nebula in Perseus.
M77: Galaxy in Cetus.
M103: Open cluster in Cassiopeia.
Last Month: M2, M15, M29, M31, M32, M39, M110
Next Month: MM1, M35, M36, M37, M38, M42, M43, M45, M78, M79

NGC and Other Deep Sky Objects
Cr 50: The Hyades in Taurus.
Cr 69: Open cluster in Orion.
NGC 2266: Open cluster in Gemini.
NGC 2301: Open cluster in Monoceros.
NGC 2419: Class II globular cluster in Lynx.

Double Star Program List
Beta Orionis: Rigel, bright white primary with a dim blue secondary.
Delta Orionis: Mintaka, white and pale blue pair.
Struve 747: Equal pair of white stars in Orion.
Lambda Orionis: Pair of white stars.
Theta 1 Orionis: The Trapezium.
Iota Orionis: Bright white and blue pair.
Theta 2 Orionis: Three white stars.
Sigma Orionis: White primary with three pale blue secondary stars.
Zeta Orionis: Alnitak, bright white star with two white secondary stars.

Challenge Object
NGC 2158: A dim rich open cluster just SW of M35 in Gemini. Look for a faint glow and haze that covers a 4' area.

NGC Objects—Jim Kvasnicka

The Intergalactic Wanderer
NGC 2419

NGC 2419 is a Class II globular cluster in Lynx. It was discovered by William Herschel on December 31, 1788.

It is known as the "Intergalactic Wanderer" because it lies 300,000 light years from our Solar System and the Galactic Center. It is nearly double as far out as the Large Magellanic Cloud. It lies on the side of the sky opposite the globular-rich interior of our Galaxy. No other globular clusters are to be found anywhere near it.

It is in the range of medium size telescopes and is the most remote Milky Way object visible in moderate amateur telescopes. It can be located at the east end of a slightly curved E-W row of stars. Through an 8-10 inch telescope it has a faint round 2' halo of unresolved stars.

Image: NGC 2419, Credit: NASA/HST

THE *Prairie Astronomy Club*

Amateur Astronomy — A Hobby as Big as the Universe

The Prairie Astronomer
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FIRST CLASS MAIL

Next PAC Meeting
SATURDAY
December 28, 2013
6:30 PM
Hyde Observatory