



# The Prairie Astronomer

The Official Newsletter of the Prairie Astronomy Club

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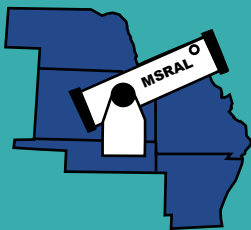
Curiosity Finds Meteorite

Gravitational Lens

NSP 2014

There will be no July PAC meeting because it overlaps with the Nebraska Star Party, July 27-August 1<sup>st</sup>. The next meeting will be August 26<sup>th</sup> at 7:30pm.

Featured astrophoto: by Rick Johnson. NGC 1003 is a somewhat unsymmetrical near edge on blue spiral galaxy on the western border of Perseus. 14" LX200R @ f/10 L=4x10' RGB=2x10, STL-11000XM, Paramount ME.



### 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](mailto: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

Jack Dunn called to order at 7:28.

Program was introduced: Solar Observing by Dave Churilla

Jack reminded of next package meeting August 26. No July meeting due to NSP July 27-August 1, 2014.

Reminded about PAC/oaks dinner July 12 Parkers in Ashland, NE. Tickets are for sale. 25 at door. Speaker will be Jack Dunn 40 Years of Astronomy in Eastern Nebraska.

Zach announced dinner Tuesday July 16 at 6:30 at Valentinos on 70th to celebrate Jack Dunn's retirement.

Jack went through benefits and dues for PAC. Two visitors were welcomed and introduced themselves.

July observing report was shown by Jack Dunn. July 18 and July 25 Star Parties at the farm.

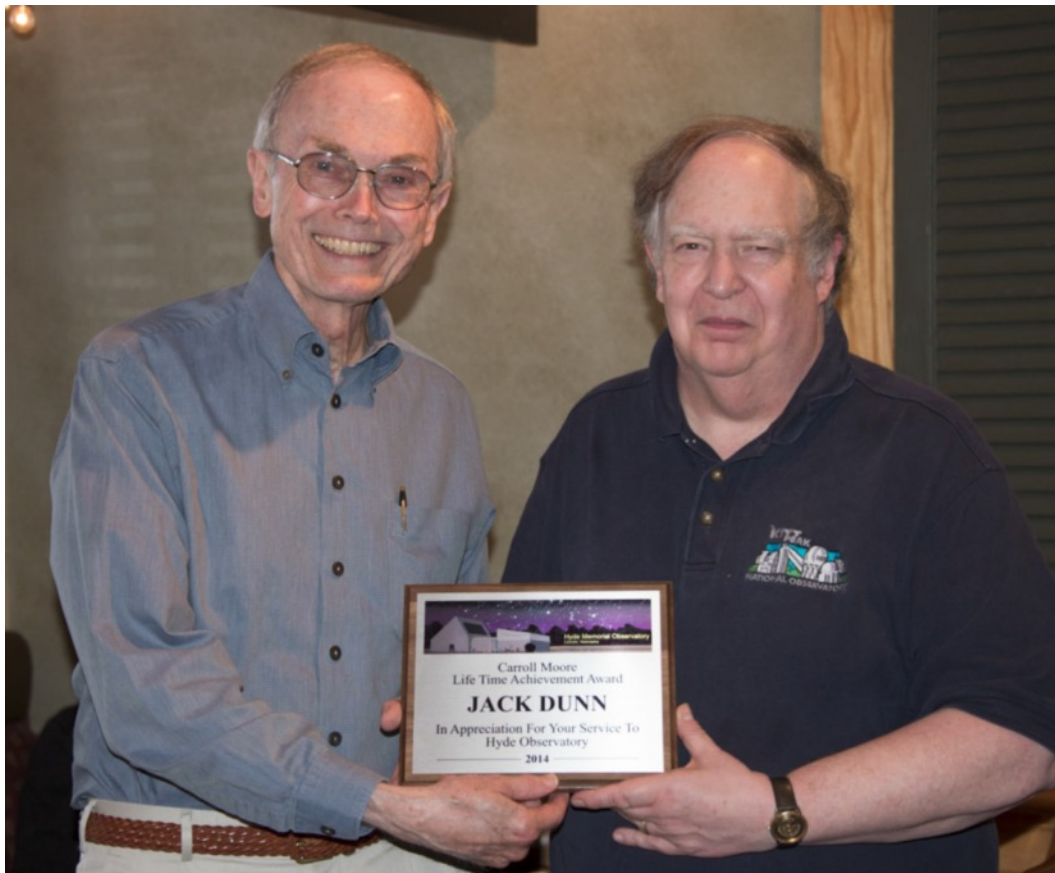
Cassie Spale announced July 18 public star party at Homestead National Monument and asked for volunteers. More information to follow via email/Night Sky Network.

Treasurer was not present to provide financial report.

MSRAL review was provided by John Johnson.

Other business followed solar observing program. Jack Dunn shared some pictures and described what he would be doing during retirement in South Carolina, volunteering at South Carolina State Museum in Columbia, SC. Also shared some history through pictures.

Meeting adjourned at 8:50.



*Congratulations Jack Dunn! Lee Thomas presented Jack with the first and only Carroll Moore Lifetime Achievement Award, in appreciation for his many years of service to Hyde Observatory.*

## 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 Spale. 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

### 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](mailto: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](mailto:pac-list@prairieastronomyclub.org)

# Events

Nebraska Star Party  
July 27-August 1.

## THERE WILL NOT BE A JULY PAC MEETING

PAC Meeting  
Tuesday August 26th, 2014  
@Hyde Observatory

PAC Meeting  
Tuesday September 30th,  
2014 @Hyde Observatory

PAC Meeting  
Tuesday October 28th, 2014  
@Hyde Observatory

Newsletter submission  
deadline August 17, 2013

## Links

PAC: [www.prairieastronomyclub.org](http://www.prairieastronomyclub.org)

Night Sky Network: <https://nightsky.jpl.nasa.gov/>

CafePress (club apparel) [www.cafepress.com](http://www.cafepress.com)

[www.hydeobservatory.info](http://www.hydeobservatory.info)

[www.nebraskastarparty.org](http://www.nebraskastarparty.org)

[www.OmahaAstro.com](http://www.OmahaAstro.com)

[Panhandleastronomyclub.com](http://Panhandleastronomyclub.com)

[www.universetoday.com/](http://www.universetoday.com/)

[www.planetary.org/home/](http://www.planetary.org/home/)

<http://www.darksky.org/>

NGC4603 Credit: NASA



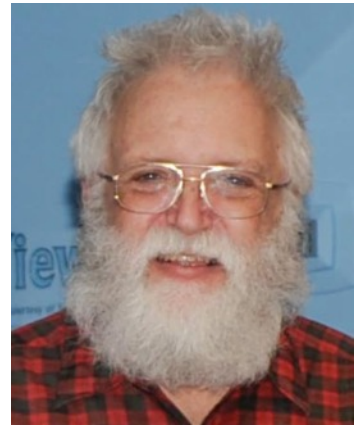
## Designing My Remote Observatory Part V—Rick Johnson

### Guiding and Focus Issues Resolved

I needed more rigidity, a better means of focusing and guiding through filters. While I could guide well through the luminance filter, guide stars were few and far between in blue light and invisible through the H alpha filter. The software with the Paramount ME included Tpoint and an option to invoke "Pro Track". Tpoint was adapted from software used to control the Gemini 8 Meter telescopes. By mapping points in the alt-azimuth sky the software learns where the scope really points when it thinks it is pointing to a specific alt-azimuth coordinate. While I enter right ascension and declination coordinates those are converted to alt-azimuth positions for pointing the scope even with it polar aligned. When Pro Track is enabled the computer then can use this map to accurately point the telescope as it tracks across the sky. It knows, based on the map, how gear errors and various gravity induced sagging as well as atmospheric refraction alters the pointing of the scope and can compensate for it. How well it does this depends on how accurate the map is and how close together the mapped points are. The mount had virtually no periodic error right out of the box being only about +/- 1.3" of arc. Typical imaging mounts have this much error after periodic error control but the Paramount had it before it was applied. After periodic error compensation that was reduced to where it was so small seeing induced errors were covering up any remaining error. Combining these two concepts gave me the idea that if the camera could be mounted solidly enough then guiding wouldn't even be necessary.

Before laying out big bucks I borrowed a 3" adapter that screwed onto the scope and into the camera providing rigid mounting without any sag or flex issues. Then I tried imaging without guiding after making a very dense Tpoint map of the small area of the sky I was using for testing this concept. It was only about 2 fields tall and three hours long but included 60 mapped points. I then took a series of 10 minute images for three hours along this band. I then stacked them without alignment. The result was each star was repeated 4 times with virtually no visible trail

between them. Total error was about 6" of arc. Why was it jumping like that? I had taken the image with the Meade provided "mirror lock" on. The motion was in a slight arc indicating gravity was to blame as each movement was toward the center of the earth. I tried again with mirror lock off. Now the trail was continuous with only minor hitches in the smooth arc. This told me the mirror was only sort of locked. Under gravity it held then would suddenly release and hold again with the cycle repeating at irregular intervals. My nice idea wasn't going to work with a moving mirror scope. Besides if I was to use RoboFocus to control the SCT focus the mirror had to be unlocked. I'd need a guider.



But another imager who used to have an older Meade SCT before mirror lock said he could lock the mirror rigidly in place as he had done with his. Fine but how do you focus? Then you use a far better focuser than Meade's to control focus. He used a focuser by a one man company in Colorado called Van Slyke Engineering. It was rock solid and judging by the price made of pure titanium reinforced gold. It was 3.1" so no vignetting and RoboFocus compatible. A sampling of other focusers showed they were often more expensive and had far less focus travel. With the mirror locked temperature changes move focus a long ways so the range would be needed.

One issue I had with the old Meade setup was that when I wanted to use the scope visually removing the camera always resulted in dust motes changing on the various filters. That meant I had to take new flats every time I used the scope visually. That was a major pain and time waster. Van Slyke offered a solution for that. He made a multi port device that allowed the image to go straight through to the camera or a diagonal could be inserted to send the image to one of two side ports. A third port could be used by a guide

## Designing My Remote Observatory Part V, Continued

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camera to guide before the filters. This solved two problems. Visual observing without need for new flats and a way to guide without loss from the filters. For that though I needed another camera. Also the price of both the focuser and the multi-port device was over half the cost of the 14" scope! No one else made such a device.

I was thinking of photometric work though my camera being a non blooming one wasn't linear over its entire range. In fact tests showed it was linear for only about the first 40% of its range. This would be a problem for good photometric work. The ST-7 I'd borrowed was a very linear camera perfect for photometric work. It also can function as a guide camera. I asked him what he wanted for it and got the first reasonable price I'd heard so snapped it up. I could only afford the focuser at the website's prices. I called Mr. Van Slyke to order the focuser and attachments to mate it to the camera and scope. He said most also got the multi-port unit as well. I told him the two were way beyond budget. Turned out he haggles and I eventually got both for only about 10% more than the focuser alone. Still the black hole was getting larger by the minute and I still had to order the RoboFocus unit to run it. Soon I had the gear attached to the scope and ready to test out. Amazingly it all installed and interfaced with my other software without a hitch. The focuser was very precise and could hit a focus position every time within 4 microns. That was its default step size and worked well with my system so I didn't change it. But the dang mirror would move forward and back as well as side to side making all this precision moot.

A call went out to fix the mirror. He drove down (lives in Canada) and soon had the back of my scope in pieces. He found the mirror lock was not assembled right or had jarred apart in shipment. He said even correct it would move so we went ahead and fixed its position and reassembled everything. That meant collimation was all wrong and had to be corrected that night. I was done right. Nope finding the correct locked position for winter and summer was a hit and miss affair. His guess was close but I found at -25C or colder it wouldn't go out far enough and in the heat of summer it just went in far enough. Van Slyke

made a quarter inch extension which was just right to allow it to work in winter. It too seemed to be made of solid gold from the price tag. He didn't haggle on it either. I have to remove it for summer. While the focuser is made to run from the computer it came with a hand controller that plugs in in place of the computer for visual use. The multi-port unit was designed to be nearly parfocal with individual cameras so the focus range also accommodates the visual range of my eyepieces. One eyepiece has to be inserted slightly less than all the way. It is one I rarely use so not an issue. Again he makes an extension that would solve the problem but I'd bought enough "gold" for now. By the way, the Colorado fires last summer burned him to the ground and he is out of business with his shop a total loss. He's my age so now retired. So if I need any more parts I'll have to find a good machine shop. With the fixed mirror it was time to try out the Tpoint-ProTrack idea again. This time the star size of a one hour stack was only a half second of arc larger than that of an individual 10 minute image. The 10 minute image was smaller than one I guided for 10 minutes. Limiting the stack to 30 minutes it was also smaller than an individual 10 minute guided image. So I spent two very long nights making a Tpoint map for the part of the sky I normally image in and tested various areas. In no test was the star size of a 30 minute non aligned stack larger than that of a 10 minute image taken right after it. SUCCESS. Later I found software to automatically make the map faster and more accurately than I could by hand. With that I now often have no need to align images taken up for up to two hours unless the temperature changed changing my image scale. The fixed mirror can be returned to factory condition at any time if I want to. As to what was done I watched but didn't always follow so I can't explain very well and won't try as I'll likely get something wrong as this was done 8 years ago now.

Temperature created an issue I was warned about. Since the mirror is fixed to the scope its separation from the secondary changes as the tube expands and contracts. With a moving mirror scope refocusing keeps the separation constant. With my system that changes. That

## Designing My Remote Observatory Part V, Continued

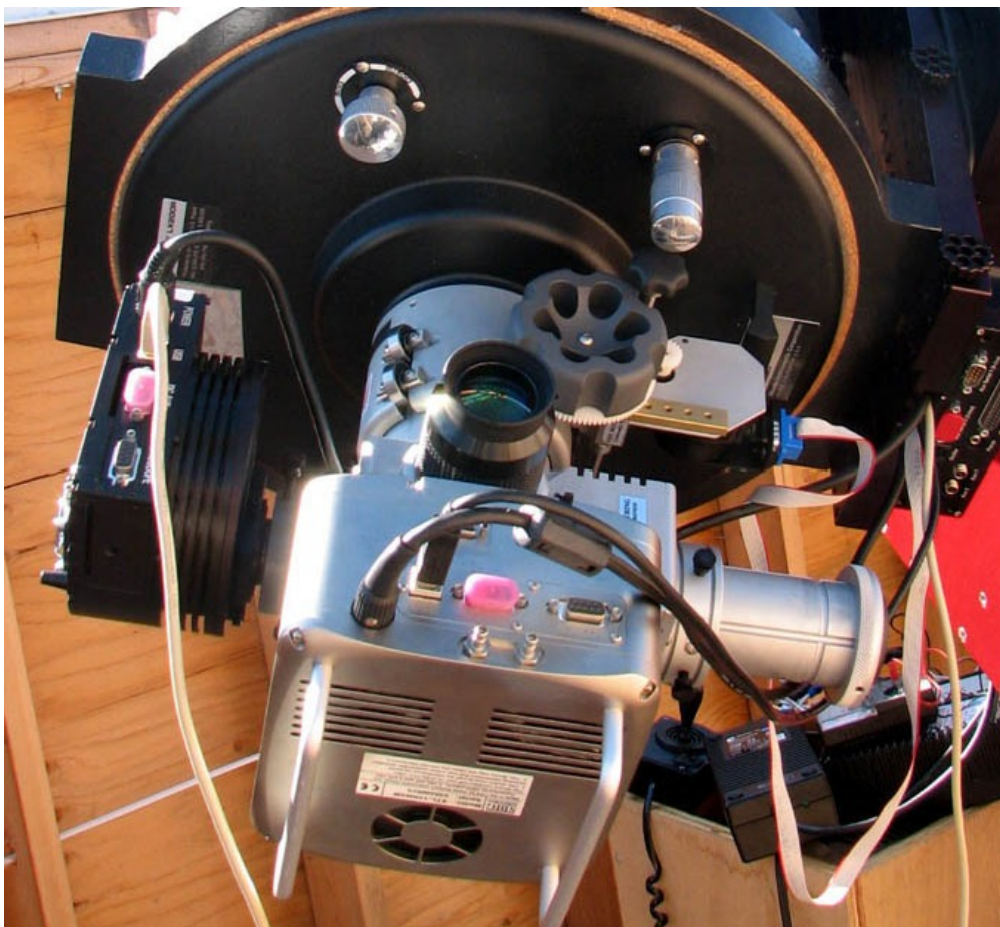
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distance changes the amplification of the secondary so as temperature drops my image scale increases. The increase can be as much as 5 or 6 pixels. Standard stacking software will correct for star position and rotation but won't correct for a change in image scale. More money to feed the black hole. At the time there was only one piece of software that would do this (now there are others to choose from and they do far more than just adjust image scale while aligning but at the time RegiStar was the only option. "Only" \$135 (more today). Our galaxy's massive black hole wasn't looking all that massive any more.

I now had a system that could do everything I'd wanted when I started the project. I wasn't close to being able to do it yet unfortunately but the gear could be in the right hands. My software for processing images was weak and my abilities to use it even weaker. I was still only doing mono imaging. I knew there was much more in the mono images than I was getting out of them so I

still had a lot of learning to do. Feeding the black hole was looking like a never ending affair. I was taking color data but didn't have software for processing it very well so was concentrating on getting the most out of the mono images for now. I'd tried putting a couple together but ended up with colors that were odd. I called M74 the "Dirty Motor Oil Galaxy" as that's the color of its dust lanes I was coming up with. Everything also seemed to have a green tint. Removing it created more issues than it solved. I was totally lost and drowning in data I didn't know how to process effectively. Other's with the right software and skill to use it could get a lot more out of my data than I was. I needed both better software and the skills to use it. This after nearly a year of operation. It seemed the fog of ignorance was just getting thicker the more I learned.

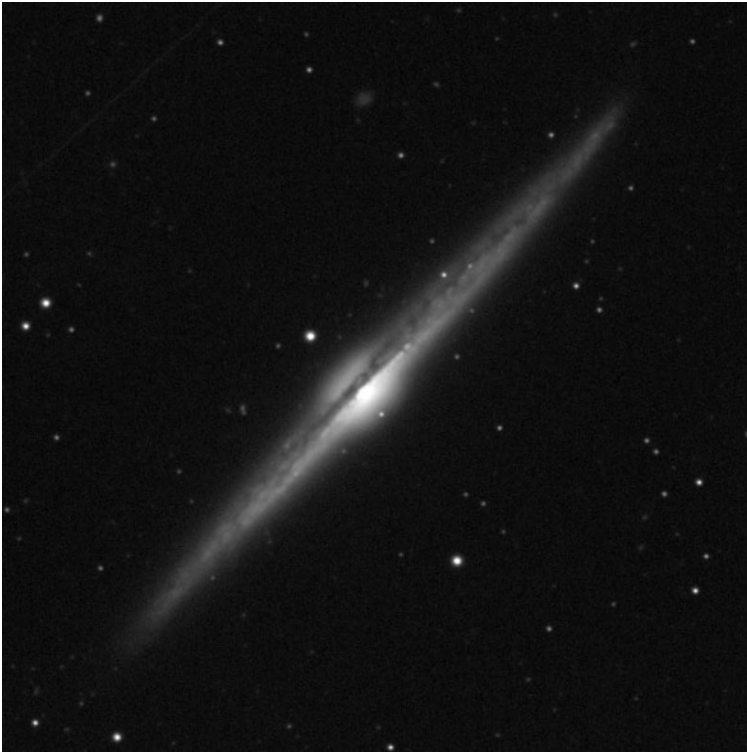
Next time I'll cover how I've reduced but never eliminated that fog. Of course that also meant keeping the black hole well fed.



*System with the good focuser, the main imaging camera and the ST-7 mounted in the guide port. An eyepiece is one of the visual ports. The eyepiece must be replaced with an opaque cap for imaging as even under my dark skies light gradients can enter through the eyepiece. A fact I learned the hard way.*

## Designing My Remote Observatory Part V, Continued

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*Mono image of NGC 4565 with the 14" of the same field as the 6" image last month. I still had a long climb up the learning curve of both taking and processing data ahead of me. Still, at the time, it looked pretty good to me. I might have given up if I knew how bad it really was.*

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## A Rare Photo of a PAC Star Party - 50 Years Ago!



*Pete Schultz sent this photo taken on Earl Moser's farm in 1964 during the Perseid Meteor Shower. It's a triple exposure created by a flash set up at different places. You can see Earl, Rick Johnson (glasses), Jim Hoskins, and Pete (hoodie). "The flash was overpowering but at least you can make us out with the different telescopes: an 8" belonging to Earl (right); Questar belonging to Hoskins (middle background) and astro-camera I made (middle foreground); and my home-made 10" (far left)."—Pete Schultz.*

## August Observing—Jim Kvasnicka

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

### Planets

**Mercury:** Very low at dusk and difficult to see.

**Mars and Saturn:** Both are in view at dusk in the SW. Saturn is at magnitude 0.5 and is 13° to the upper left of Mars which shines at magnitude 0.4.

**Neptune:** In Aquarius at magnitude 7.8. It reaches opposition on August 29<sup>th</sup>.

**Uranus:** In Pisces at magnitude 5.8.

**Venus and Jupiter:** Jupiter will become visible to the lower left of Venus a week into August.

The morning of August 18<sup>th</sup> the two are just 0.2° apart.

### Meteor Showers

**Perseids:** Late night to dawn on August 12-13. The waning gibbous Moon will be up.

### Messier List – The Virgo Galaxy Cluster

**M6:** The Butterfly Cluster in Sagittarius.

**M7:** Ptolemy's Cluster in Scorpius.

**M8:** The Lagoon Nebula in Sagittarius.

**M9/M10:** Class VIII and VII globular clusters in Ophiuchus.

**M12/M19:** Class IX and VIII globular clusters in Ophiuchus.

**M20:** The Trifid Nebula in Sagittarius.

**M21/M23:** Open clusters in Sagittarius.

**M62/M107:** Class IV and X globular clusters in Ophiuchus.

**Last Month:** M3, M4, M5, M53, M68, M80, M83

## NGC Objects—Jim Kvasnicka

### The Saturn Nebula **NGC 7009**

NGC 7009 is a planetary nebula located in the constellation Aquarius. It is 2,400 light years distant and has a magnitude of 8.0 with an apparent size of 1.6' x 0.4'.

NGC 7009 was discovered by William Herschel on September 7, 1782. Its common name comes from the thin extensions or ansae on both sides of the planetary nebula's disk which gives it a similar appearance like Saturn. The ansae

**Next Month:** M13, M14, M22, M28, M54, M69, M70, M92

### NGC and other Deep Sky Objects

**NGC 6960:** The Veil Nebula – Western Segment.

**NGC 6974/6979:** The Veil Nebula – Central Segment.

**NGC 6992/6995:** The Veil Nebula – Eastern Segment.

**NGC 7009:** The Saturn Nebula in Aquarius.

**NGC 7023:** The Iris Nebula in Cepheus.

**IC 5146:** The Cocoon Nebula in Cygnus.

### Double Star Program List

**Struve 2404:** Close pair of orange stars.

**57 Aquilae:** White pair.

**Beta Cygni:** Albireo, yellow-gold primary with a blue secondary.

**31 Cygni:** Yellow and blue stars.

**61 Cygni:** Two close orange stars.

**Epsilon Lyrae:** The Double Double.

**Zeta Lyrae:** Pair of yellow stars.

**Beta Lyrae:** Yellow primary with multiple white stars.

### Challenge Object

**NGC 6603:** A small rich open cluster located within M24, The Small Sagittarius Star Cloud.



represent material ejected from the nebula in two directions.

The ansae are visible in amateur telescopes. When observing the Saturn Nebula people have reported the color to be green to light blue.

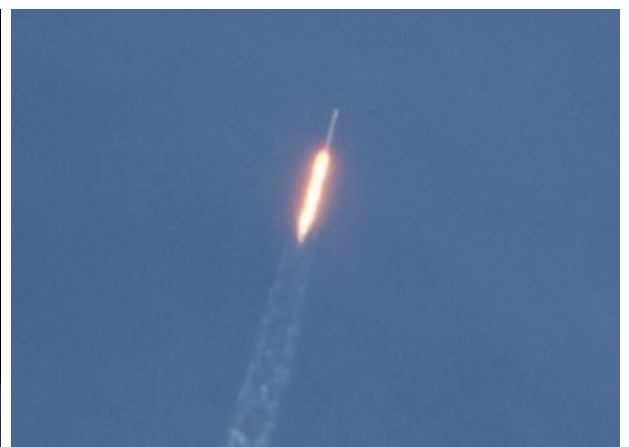
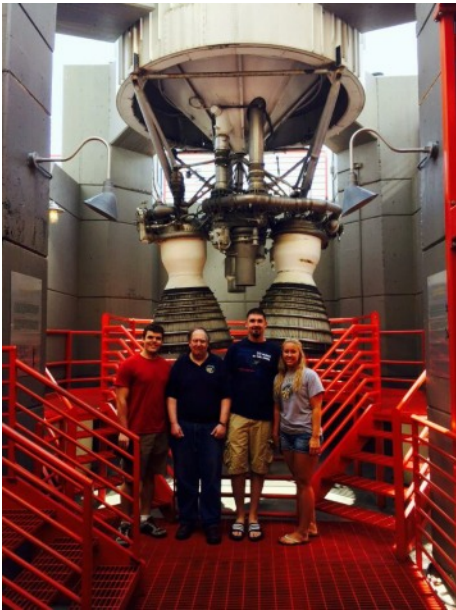
NGC 7009 is part of the Herschel 400 list and also Caldwell object 55.





## A Trip to the Kansas Cosmosphere

On July 5<sup>th</sup>, Jack Dunn, Cassie Spale, Brett Boller and Zach Thompson went on a road trip to the Kansas Cosmosphere and Space Center.



Go SpaceX! This photo was taken by Mark Dahmke on July 14, 2014 from Port Canaveral. Sony NEX-7, 55mm lens (cropped). Distance: 14 miles.

## Star Party Report-Bob Kacvinsky

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### Star Party July 3 @The Farm

On July 3rd Jim Kvasnicka and I traveled to The Farm for an impromptu star party. We wanted to catch a few Hershall's in the western sky before the season passed.

We both arrived a little after 9 as the sun had just gone down. We set up and proceeded to wait till the twilight would go away.

A little after 10 we spent a few minute observing the moon. It was about a quarter lit and provided a great opportunity to see the shadow contrasts in the mountain/crater regions. At 203 power in the 16" Meade I could make out great details of valleys, riffs, cracks, and ridges in the mare floors. At +300X the details were washing out so seeing was only a little better than average.

Mars is getting further away so only the general darker to red zones were viewable. Saturn though was a great sight. There were 5 visible moons with one just off the rings making it look like a bump on the outer rings. Two cloud zones were clearly visible with the equatorial line having color variations from brown, gray, to a blue hue. Saturn came through as very clear and looked great for viewing.

Finally at 10:30 we were able to begin our object quest. I had 5 very dim objects in Coma Berenices and 5 in Ursa Major that I need to capture to

finish out that area of space. These were objects that were both dim and also located away from visible finding stars so they were hard to star hop to.

NGC 3077 is in this area near M81 & M82 in Ursa Major. At first it was difficult to identify as a very dim patch of light but once located it showed a brighter core and slight oval shape. NGC 4293 has a star located right off of one end of the a rather rectangular shape. The rectangle shape is unique.

NGC 4394 is located just to the east of M85 in Coma Berenices. It had a dim cloud like pattern with a hint of spiral arms at 203X. The moon produced a lot of glare along the western sky and washed out some of the details. This created more challenge in the areas we were trying to observe.

The last item to highlight was Caldwell object NGC 4889 in Coma Berenices. It is the brightest of a small trio of galaxies that can be seen in a single view. At first the 2 companions are not apparent, but after looking at the chart and using averted vision they both pop out.

Overall both Jim and I logged 8 of our Hershalls and I also picked up 2 Caldwells. At 12:45 the dew began to develop and by 1:10 we had to pack up.

## Homestead Monument Star Party Report-Bob Kacvinsky

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PAC members Dan Delzell, Jim Kvasnicka, John Lammers, and Bob Kacvinsky traveled to the Homestead Monument in Beatrice to provide a Star Party for their twilight prairie tour participants.

We arrived around 9 PM to a light wind and mostly overcast skies. There was a small area of lightening skies in the SW so we set up with hopes of being able to at least get Saturn to burn through the haze and high clouds.

By 9:40 Saturn began to pop in and out of visual view so we were able to get it into the scopes just as the guests were arriving. Titan was also visible along with a second moon just above the rim of the rings which added a few extra "wows" and "cool" comments.

Jim switched over to Mars and we were able to keep the crowd viewing till about 10:20 when the sky opened up and allowed for additional objects. During the next 45 minutes we were able to show M13 Great Hercules Cluster, M3, Albario, Ring Nebula, Dumbbell Nebula, M4, Mizar Alcor, M3 and several other objects. We even had the veil nebula in dimly at the end.

The participants were engaged and the few kids had fun looking through a scope for the first time. In spite of clouds, the skies opened just enough to allow the team to provide a nice hour plus of enjoyable viewing and "first looks" for many Beatrice citizens.

## Rock On! Curiosity Spots a Heavy Metal Meteorite-Jason Major, Universe Today

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Talk about heavy metal! This shiny, lumpy rock spotted by NASA's Curiosity rover is likely made mostly of iron — and came from outer space! It's an iron meteorite, similar to ones found in years past by Curiosity's forerunners Spirit and Opportunity, but is considerably larger than any of the ones the MER rovers came across... in fact, at 2 meters (6.5 feet) wide this may very well be the biggest meteorite ever discovered on Mars!

Click the image for a supermetallicious high-resolution version from JPL's Planetary Photojournal.

The picture above was made by combining high-resolution circular images (outlined in white) acquired with the Remote Micro-Imager (RMI) of Curiosity's ChemCam instrument with color and context from the rover's Mastcam. The images were taken on mission Sol 640 (May 25, 2014) and have been adjusted to simulate more Earth-like illumination.

Dubbed "Lebanon," the large meteorite has a smaller fragment lying alongside it, named "Lebanon B."

While iron meteorites are fairly common on Earth, on Mars they are by far the most common types of meteorites that have been discovered — if just for the sheer fact that they are highly resistant to erosion.\*

Find more news and images from the MSL mission on the JPL site [here](#).

Image credit: NASA/JPL-Caltech/LANL/CNES/IRAP/LPGNantes/CNRS/IAS/MSSS

Source: NASA

[Read more](#)



*2-meter wide iron meteorite dubbed "Lebanon," as imaged by Curiosity's ChemCam and Mastcam on May 25, 2014*

## A Glorious Gravitational Lens, Dr. Ethan Siegel

Whether you look at the planets within our solar system, the stars within our galaxy or the galaxies spread throughout the universe, it's striking how empty outer space truly is. Even though the largest concentrations of mass are separated by huge distances, interstellar space isn't empty: it's filled with dilute amounts of gas, dust, radiation and ionized plasma. Although we've long been able to detect these components remotely, it's only since 2012 that a manmade spacecraft -- Voyager 1 -- successfully entered and gave our first direct measurements of the interstellar medium (ISM).

What we found was an amazing confirmation of the idea that our Sun creates a humongous "shield" around our solar system, the heliosphere, where the outward flux of the solar wind crashes against the ISM. Over 100 AU in radius, the heliosphere prevents the ionized plasma from the ISM from nearing the planets, asteroids and Kuiper belt objects contained within it. How? In addition to various wavelengths of light, the Sun is also a tremendous source of fast-moving, charged particles (mostly protons) that move between 300 and 800 km/s, or nearly 0.3% the speed of light. To achieve these speeds, these particles originate from the Sun's superheated corona, with temperatures in excess of 1,000,000 Kelvin!

When Voyager 1 finally left the heliosphere, it found a 40-fold increase in the density of ionized plasma particles. In addition, traveling beyond the heliopause showed a tremendous rise in the flux of intermediate-to-high energy cosmic ray protons, proving that our Sun shields our solar system quite effectively. Finally, it showed that the outer edges of the heliosheath consist of two zones, where the solar wind slows and then stagnates, and disappears altogether when you pass beyond the heliopause.

Unprotected passage through interstellar space would be life-threatening, as young stars, nebulae, and other intense energy sources pass perilously close to our solar system on ten-to-hundred-million-year timescales. Yet those objects pose no major danger to terrestrial life, as our Sun's invisible shield protects us from all but

the rarer, highest energy cosmic particles. Even if we pass through a region like the Orion Nebula, our heliosphere keeps the vast majority of those dangerous ionized particles from impacting us, shielding even the solar system's outer worlds quite effectively. NASA spacecraft like the Voyagers, IBEX and SOHO continue to teach us more about our great cosmic shield and the ISM's irregularities. We're not helpless as we hurtle through it; the heliosphere gives us all the protection we need!



*Want to learn more about Voyager 1's trip into interstellar space? Check this out:*  
<http://www.jpl.nasa.gov/news/news.php?release=2013-278>.

*Kids can test their knowledge about the Sun at NASA's Space place:*  
<http://spaceplace.nasa.gov/solar-tricktionary/>.



*Image credit: Hubble Heritage Team (AURA / STScI), C. R. O'Dell (Vanderbilt), and NASA, of the star LL Orionis and its heliosphere interacting with interstellar gas and plasma near the edge of the Orion Nebula (M42). Unlike our star, LL Orionis displays a bow shock, something our Sun will regain when the ISM next collides with us at a sufficiently large relative velocity.*

## The Nebraska Star Party - 2014

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Mark Dahmke

Photo Credit: Fred Hultstrand History in Pictures Collection, NDIRS-NDSU, Fargo.

NSP has finally come of age! This year NSP turns 21. Join us this summer as we gather families from all over the US and around the world in the sparsely populated sand hills of North Central Nebraska to spend a good week under a galaxy of stars.

This year our keynote speaker is Fred Espanak, "Mr. Eclipse." As a scientist emeritus and NASA's expert on eclipses, Espanak maintains NASA's eclipse website as well as his own MrEclipse website. He is co-author of the popular book, *Totality- Eclipses of the Sun*, the enormous *Five Millenium Canon of Solar Eclipses* with 5000 years of eclipse maps, and most recently *Lessons from the Masters: Current Concepts in Astronomical Imaging Processing*. An avid eclipse chaser, he's participated in dozens of eclipse expeditions around the world. In 2003, the International Astronomical Union honored him by naming an asteroid Espanak. Now retired to rural Arizona, Fred spends clear nights photographing

the stars ([astropixels.com](http://astropixels.com)).

NSP Schedule of Events (July 27-August 1):

Sunday: registration and check-in, optional dinner.

Monday: registration and check-in, field school, optional dinner.

Tuesday: registration and check-in, swap meet, field school, free "Cattle Country" hamburger dinner.

Wednesday: (All at Valentine High School) field school, registration, swap meet, speaker program, children's program, dinner on your own.

Thursday: Brewer's Niobrara Canoe or tube float, optional dinner.

Friday: public star party at 9pm.



**Amateur Astronomy —  
A Hobby as Big as the  
Universe**

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FIRST CLASS MAIL

**NO MEETING IN JULY!**

**Next PAC Meeting  
TUESDAY  
August 26, 2013  
7:30 PM  
Hyde Observatory**