The Prairie Astronomer

June 2024 Volume 65, Issue #6

IN THIS ISSUE:

Night Sky Network

The Newsletter of the Prairie Astronomy Club

The Prairie Astronomer

The next club meeting is June 25th at 6:00pm at Hyde Observatory

NEXT MEETING AND PROGRAM

We will not have a regular meeting in June but will instead have our annual "Nearest Star Party" for solar observing at Hyde Observatory, **starting at 6pm.**

Please note that since the Nebraska Star Party is the week of July 28th, our **July meeting has been canceled.**

The next regular meeting will be in August.

UPCOMING PROGRAMS

June: Nearest Star Party

July: No meeting

August: Lunar Photogrammetry by Mark Dahmke, and NSP review

CONTENTS

Cover: MSRAL 2024 Group Photo by Mark Urwiller.

Background photo: Brett Boller

CALENDAR

Most of our club meetings are held at Hyde Memorial Observatory in Holmes Park.

The Observatory is owned and maintained by the City of Lincoln Parks and Recreation Department, but is operated by volunteers, many of whom are also members of the Prairie Astronomy Club.

PAC Meeting
Tuesday, June 25th, 6pm at Hyde Observatory
Nearest Star Party

Nebraska Star Party
July 28-August 2, Merritt Reservoir, Valentine, NE

PAC Meeting
Tuesday, August 27th, 7:30pm at Hyde Observatory
Lunar Photogrammetry: 3D Views of Apollo landing sites created from Apollo Mission Photos.- Mark Dahmke

https://www.prairieastronomyclub.org/event-calendar/

Night Sky Network

www.prairieastronomyclub.org

2024 STAR PARTY DATES

	Date	Date
January	5	**12**
February	2	**9**
March	1	**8**
April	3/29	**5**
May	4/26	**3**
June	5/31	**7**
July	6/28	**5**
NSP	**7/28**	**8/2**
August	7/26	**2**
September	8/30	**6**
October	9/26	**4**
November	11/22	**29**
December	20	**27**

Dates in BOLD are closest to the New Moon.

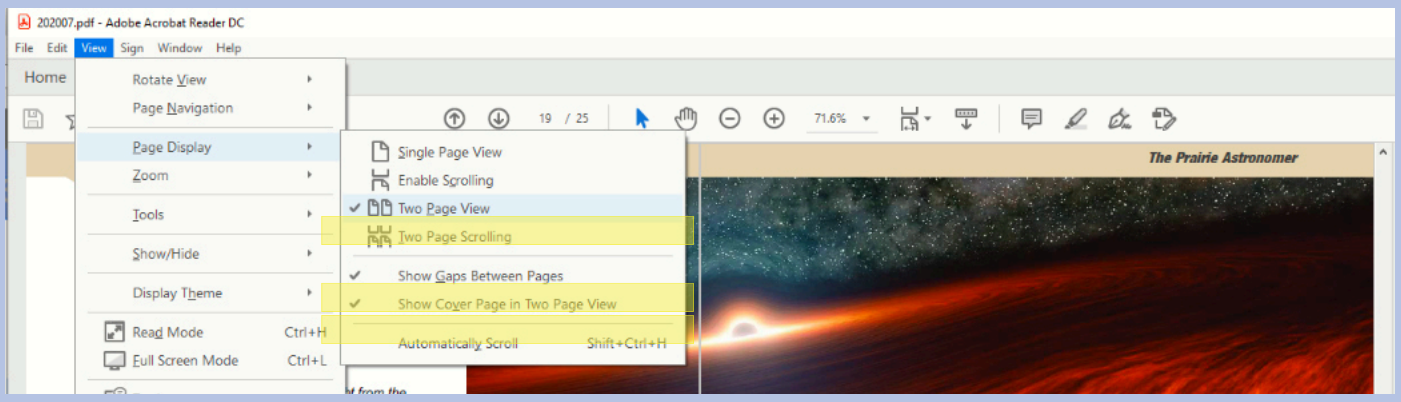
CLUB OFFICERS

President	**Jason O'Flaherty** **jflaher@gmail.com**
Vice President	**Brett Boller** **proboller86@yahoo.com**
2nd VP (Program Chair)	**Bill Lohrberg** **wmlohrberg89@gmail.com**
Secretary	**Jim White** **jrwhite2188@gmail.com**
Treasurer	**John Reinert** **jr6@aol.com**
Club Observing Chair	**Jim Kvasnicka** **jim.kvasnicka@yahoo.com**
Outreach Coordinator	**Don Hain** **dhain00@gmail.com**
Website and Newsletter Editor	**Mark Dahmke** **mark@dahmke.com**

Notices

Newsletter Page View Format

How to Adjust Adobe Acrobat Settings for Two Page View



To view this newsletter in magazine spread format in Acrobat, select View ->Page Display->Two Page View. Acrobat will then show two pages side by side. Also make sure the checkboxes "Show Cover Page in Two Page View" and "Show Gaps Between Pages" are checked. If you have it setup correctly, the cover page will be displayed by itself and subsequent pages will be side by side with the odd numbered pages on the left.

PAC Newsletter Archive

Back issues of the Prairie Astronomer from 1962 to present are available online: https://newsletters.prairieastronomyclub.org/

Pay Dues Online

https://www.prairieastronomyclub.org/pay-dues-online/

If you're already a member and are renewing within 30 days of your anniversary date, select the early renewal option for a discount.

PAC-LIST

Subscribe through GoogleGroups or contact Mark Dahmke to be added to the list. You'll need a Google/gmail account, but if you want to use a different email address, just associate that address with your google account to access Google Groups. Once subscribed, you can view message history through the GoogleGroups website.

To post messages to the list, send to this address: pac-list@googlegroups.com

The President's Message

Jason O'Flaherty

Dear PAC Members,

I wish you all an excellent start to your summer! Despite the late sunsets, I hope you find time to get out and do some stargazing. Summer is a fantastic time for astronomy, especially globular clusters, open star clusters, and double stars.

I want to extend a big thank you to Jim Kvasnicka for his excellent presentation on Observing Programs at our last meeting. His knowledge is invaluable, and I'm sure many of you found new inspiration for your observing activities. Jim has kindly made his slideshow available for download. You can access it here.

Looking ahead, I want to remind everyone that the Nebraska Star Party (NSP) is coming up in about one month. As of the writing of this letter, there are still hotel rooms available in Valentine for the dates of the event, July 28-Aug 2nd. For more information about NSP, please visit their official website: https://www.nebraskastarparty.org/.

Our next club meeting will be on Tuesday, June 25th, at 6:00 PM. This will be our annual Solar Party, held informally on the Observatory lawn. It's a wonderful opportunity to observe our nearest star. There will be snacks and drinks, so bring your safe solar observing equipment to share with the club. In the event of bad weather, we'll find something to chat about inside. There won't be a Zoom invite for this meeting.

Please note that there will be no meeting in July due to the overlap with NSP. I encourage all members to participate in the Nebraska Star Party and make the most of this incredible event.

Clear skies and happy stargazing!

Jason O'Flaherty

New Members

Welcome to the club!

Scott Schnirl, Lincoln, NE

Meeting Minutes

Jim White

Jason O'Flaherty started the meeting at 7:32 PM. Jason stated that this is our monthly May meeting and that we are going to go over club business and then Jim Kvasnicka, our observing chairperson, will give us a presentation on observing programs. Jason asked if there were any new members present and there were two in attendance, Brian Stork and Scott (I didn't get Scott's last name). Jason asked if there were any guests and Bob Kacvinsky introduced his grandson Matthew who is visiting from Huntsville Alabama.

Jason turned the meeting over to Jim Kvasnicka, PAC's observing chairperson, for his monthly observing report at 7:34 pm. Club star parties for the upcoming month are Friday 5/31 and Friday 6/7, both star parties will be held at the Clatonia Recreation Area which is approximately 1 ½ miles north of Clatonia NE. Jim said that in the news there was talk of six planets aligning on June 3rd but you won't be able to see much. Jupiter, Uranus and Mercury are all lost in the glow of the sun, Neptune is to dim to see with the naked eye so all that will really be visible is Mars and Saturn. Jim's complete observing report can be found in this newsletter.

Jim turned the meeting over to John Reinert at 7:37 pm for his monthly treasurer's report. John started his report with the club's account balances which are;

Checking $5,069.92
CD1 $26,742.39
CD2 $5,286.54
PayPal $328.62
Total $37,427.47

John stated that if anyone is having difficulty using the online dues payment application or would rather do it the old-fashioned way just let him know and he can take your dues payment in person. John is working toward getting ready for the yearly audit. He is trying to get the Stripe and PayPal transactional records listed line by line so everything is clear and concise. John has updated the spreadsheet for February and March and compared it with the banks records and things do agree. If anyone has any questions about anything let John know and he can answer any questions after the meeting. There will be a couple of people needed to help with the audit so please consider helping out if you are approached about it.

John completed his report and turned the meeting back over to Jason at 7:38 pm.

The June PAC meeting will be our annual solar observing meeting which will meet outside on the lawn next to Hyde Observatory. There will not be a formal meeting that evening but if it's cloudy we may gather inside Hyde. If you have a solar telescope or a telescope with a proper solar filter you are encouraged to bring it to Hyde and share the view with others.

There will not be a meeting in July because the date falls during the week of The Nebraska

Star Party.

The August meeting program will be a time to allow people to present astronomy pictures and videos that they have taken at The Nebraska Star Party or any other astronomy related pictures or videos they have taken. If you have some photos or video's that you would like to share, get them to Mark Dahmke or Jason so that they can get added to the presentation.

The 2024 club survey has been completed and about 1/3 of the club participated. Jason will get the survey results put together so that they can shared.

Jason announced that Don Hain is our new Outreach Coordinator and he also wanted to thank Christine Parkyn who has been the Outreach Coordinator for the past two years. If you hear of someone wanting the club to participate in an event, please reach out to Don through the Night Sky Network or you can fill out a form on the PAC website that will get routed to Don or you can reach out to any of the club officers and they can put you in touch with Don.

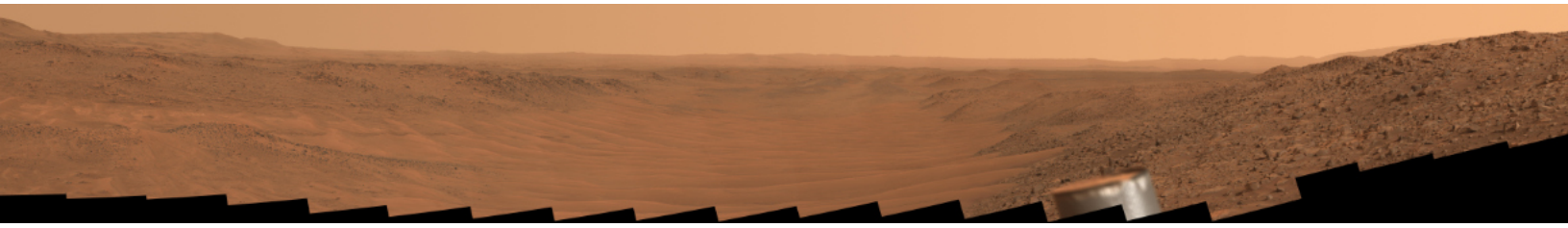
MSRAL is coming up June 7th-9th at Mahoney State Park and is being hosted by the Omaha Astronomical Society. If you are interested in participating you can register online and OAS would appreciate the participation by PAC members. One side note you will need a park sticker to enter Mahoney State Park and they can be purchased at the gate.

Alcon is July 17th-20th in Kansas City.

The 31st annual Nebraska Star Party is July 28th-August 2nd at Merritt Reservoir.

Tonight's meeting adjourned at 7:45 pm.

Tonight's program is "An Overview of Observing Programs" presented by Jim Kvasnicka.



Perseverance's View of Neretva Vallis River Channel

Stitched together from 56 images from NASA's Perseverance Mars rover, this natural-color mosaic looks downstream of the Neretva Vallis river channel, which fed Jezero Crater with fresh water billions of years ago. Credit: NASA/JPL-Caltech/ASU/MSSS

ARP 68

The Mantrap Skies Image Catalog

Arp 68/NGC 7757 is a Sc spiral galaxy in Pisces at about 120 million light-years. Arp included it in his category Spiral Galaxies with small high surface brightness companions on arms. I'd have put it in his heavy arm category as the "companion" appears to be in the distant background. Arp said the companion was NGC 7756. Lord Rosse who discovered NGC 7756 said this about NGC 7756 "Another neb about 5' sp (NGC 7757)." By "sp" he means south preceding which is south-west. The only object 5' south-west of NGC 7757 is a 12.8 magnitude rather white star. His description is a match for NGC 7757. No one doubts this is a double sighting of NGC 7757. The problem is some sources, like Arp, claim the companion is NGC 7756. This obviously isn't the case. The Kanipe-Webb book gets it right as does NED and the NGC Project. But what is the designation of the companion? It doesn't seem to have one, at least in NED! NED does list an HII region within a couple seconds of arc of its position, however. I can't see it against the distant galaxy. In fact, most of the fuzzy objects

Rick Johnson

Rick Johnson, a founding member of the Prairie Astronomy Club, passed away in January, 2019. His legacy lives on through his comprehensive catalog of over 1600 images at www.mantrapskies.com.

ARP68, continued.

in my image don't have any catalog entry that NED shows. Within 15' radius of Arp 68, NED lists only 6 other galaxies, only one of which has a redshift listed. You'll find this galaxy due east (left) of Arp 68 just above a rather bright star. It is the X-ray galaxy GALEX 2690243303817875752 also at 120 million light-years. The very blue galaxy just below Arp 68 and a tad to the east of its center is [HDL96] 407-017. I have nothing much on it.

While Lawrence Parsons did see NGC 7757 it was discovered by John Herschel 43 years earlier on September 24, 1830.

Most sources consider the companion just a coincidence of line of sight that isn't related to Arp 68 in any way. It shows no sign of interaction though NGC 7757 does seem somewhat disturbed. Arp noted the arm saying "Many star-like knots lined up along straight arm." If it has interacted with anything recently the only candidate appears to be the other one at 120 million light years. Being an X-ray galaxy it has apparently been fired up. But there's no real evidence the two ever interacted. A better candidate might be be NGC 7750 about 39 minutes southwest of Arp 68 so well out of my image. It also is about 120 million light years distant and is classed as (R')SB(rs)c pec:. They are too far apart for one frame but I wish I'd realized it was there last fall. I'll try for it this fall weather willing.

The image has quite a few asteroids in it. What's really annoying to me is that THREE (now two) of them are unknown to the Minor Planet Center. Unfortunately, I took this back last September and just recently found the asteroids so there's no way to follow up. They are still lost awaiting discovery it seems. I've "found" about 8 now that I've seen months too late to follow up on. This is getting to be routine with me it seems. I've included an annotated image that shows that identifies the asteroids.

(91197) 1998 SD115 magnitude 18.3

2002 PY124 magnitude 19.2

2005 SZ152 magnitude 19.7

2015 AY94 magnitude 20.2 New since this image was first prepared

2 are still unknown

This field is out of the Sloan survey area so there's very little data available and no professional images, other than Arp's, that I could find on the net.

Arp's image

http://ned.ipac.caltech.edu/level5/Arp/Figures/big_arp68.jpeg

His image appears to have a plate defect at the southwest end of the companion (right in his photo). It appears to be a round stain of some sort.


Nebraska Star Party
July 28th - August 2nd, 2024
JUST
IMAGINE
Merritt Reservior • Nebraska • USA • Earth • Sol System • Orion-Cygnus Arm • Milky Way Galaxy

July Observing

Jim Kvasnicka

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

Planets

Mercury: Evening planet, best seen mid-month.

Venus: Evening at magnitude -3.8.

Mars: Morning planet in Aries at magnitude +1.0 with a disc 5.5" wide.

Jupiter: Morning planet in Taurus at magnitude -1.9 and a disc 34" wide.

Saturn: Morning planet in Aquarius at magnitude +1.0 and a disc 18.2" wide.

Uranus and Neptune: Morning planets in Taurus and Pisces.

Messier List

M3: Class VI globular cluster in Canes Venatici.

M4: Class IX globular cluster in Scorpius.

M5: Class V globular cluster in Serpens Caput.

M53: Class V globular cluster in Coma Berenices.

M68: Class X globular cluster in Hydra.

M80: Class II globular cluster in Scorpius.

M83: Galaxy in Hydra.

Last Month: M58, M59, M60, M84, M86, M87, M88, M89, M90, M91, M98, M99, M100

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

NGC and other Deep Sky Objects

NGC 6210: Blue colored planetary nebula in Hercules.

NGC 6229: Class IV globular cluster in Hercules.

NGC 6302: The Bug Nebula in Scorpius.

NGC 6309: Planetary nebula in Ophiuchus.

NGC 6369: The Little Ghost Nebula in Ophiuchus.

NGC 6543: The Cat's Eye Nebula in Draco.

IC 4703: The Eagle Nebula in Serpens, M16 is the open cluster embedded in the nebula.

Double Star Program List

Nu Draconis: Equal pair of white stars.

Psi Draconis: Pair of light-yellow stars.

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

Xi Scorpii: Yellow primary with a light blue secondary.

Struve 1999: Two yellow-orange stars.

Beta Scorpii: Bluish white primary with a light blue secondary.

Nu Scorpii: Yellow and light blue pair.

Delta Serpentis: Light yellow stars.

Theta Serpentis: Two blue-white stars.

Challenge Object

NGC 6144: Faint Class XI globular cluster just 40' NW of Antares.

Focus on Observing Programs

Jim Kvasnicka

Open Cluster Observing Program

Open clusters come in a variety of sizes, star numbers, concentrations, and textures. Some open clusters such as M11 in Scutum are nearly as populous and concentrated as Class XI and XII globular clusters. Others are little more than an enhancement of the background star field.

Open clusters can be found in almost every direction of the sky. Certain directions in the Milky Way are especially rich in open clusters, specifically towards Cassiopeia, Monoceros, and Puppis. These are relatively dust free windows in which we can see thousands of light years along the plane of our Milky Way.

Open clusters are not as old as globular clusters. The oldest known open clusters in our Milky Way are only about half as old as the youngest globular clusters.

Open clusters are classified using the Trumpler Classification, which is a three part code using concentration, range of brightness, and the degree of richness. You will see it listed as Tr Type.

Trumpler Classification

Concentration

I. Detached, strong concentration toward the center.

II. Detached, weak concentration.

III. Detached, no concentration.

IV. Not well detached from surrounding stars.

Range in Brightness

1. Small range in brightness.
2. Moderate range in brightness.
3. Large range in brightness.

Richness

p – Poor, less than 50 stars.
m – Moderate, 50 – 100 stars.
r – Rich, more than 100 stars.
n – Nebulosity is associated with the cluster.

You would combine the three classification codes for the Tr Type. Example: M41 in Canis Major - Tr Type II 3 m

Once you complete the Open Cluster Observing Program you will need to submit your observing logs to me for review. I will contact the Open Cluster Observing Program chair for approval. Once I receive your certificate and pin I will present them to you at the next PAC meeting.

Where to Point your Seestar?

Larry Stepp

Last year I bought a Seestar S50 electronic telescope. I've used it to image a few Messier objects, the moon and the sun, and I used it to take a time lapse of the partial phases of the April solar eclipse. Recently, I've been thinking about shooting more long-exposure deep-sky images, so I started making a list of target objects, and thinking about where in the sky I should try to catch them.

Atmospheric seeing is normally best near the zenith, but you can't image close to the zenith with an alt-azimuth mount. Large observatories with alt-az mounts define a circular zone of avoidance around the zenith, e.g., with a radius of a degree or two. You can't observe in that zone because the mount would have to spin around in azimuth at too high a rate as the star tracks through; there are limits to the achievable azimuth rotation velocity and acceleration.

A Seestar has that same issue, but it also has another related issue because it doesn't have an instrument rotator. With an equatorial telescope, the orientation of the image remains fixed relative to the camera as the object tracks across the sky, but with an alt-az mount, the image rotates. That image rotation will smear the image on the detector unless you rotate the camera during the exposure. In a computerized alt-az telescope, the control system controls three axes: azimuth, elevation, and instrument rotation.

A Seestar gets around this by limiting the length of each exposure, then making small rotation corrections when the frames are stacked to form the final image. Over most of the sky, this results in acceptable image quality. Originally, the sub exposures were limited to 10 seconds, but in more recent software updates the option has been added to choose 20 or 30 second subs.

Seestar S50 Electronic Telescope (image from ZWO website)

But, I wondered, what parts of the sky should you favor, and what parts should you avoid? How does the rate of image rotation vary as you track across different parts of the sky? And do you need to consider where you're pointing when deciding what length of sub exposure to use?

The rotation of the image is defined by the parallactic angle. As described in Wikipedia, the parallactic angle is the angle between: (1) the great circle through a celestial object and the zenith, and (2) the object's hour circle, i.e., the great circle through the celestial poles and

Seestar, continued.

the object. The rate of change of parallactic angle is the rate of image rotation.

Searching online, I found a paper[1] that provides an equation for the rate of change of the parallactic angle with hour angle, i.e., as the earth turns:

$\psi' = - \cos \varphi \cos A / \sin z$

where:

ψ' = rate of change of parallactic angle with hour angle

φ = latitude

A = azimuth angle

z = zenith angle

Knowing your latitude, you can calculate the rate of image rotation for different values of A and z. (It's worth noting that if the latitude is 90 degrees, $\cos \varphi = 0$ and there is no relative image rotation; an alt-az is an equatorial at the north pole.)

I explored this equation using an Excel spreadsheet, and found that the areas of highest image rotation form a figure 8 shape extending north and south from the zenith. That got me interested, and I found another paper[2] that provides more information about how zones of avoidance are calculated based on telescope azimuth tracking, slew rate and acceleration limits. That paper includes diagrams like the one below, but allowing higher rates and therefore with a smaller exclusion zone.

A key question is: how much rotation is acceptable in a single sub exposure? A Seestar S50 has a 50mm aperture. The diffraction limited image size is about $1.22 \lambda/d$, expressed in radians, where λ is the wavelength and d is the aperture diameter. For a 50mm objective, and for yellow light of wavelength 580 nm, the diffraction-limited image size is about 14 microradians, which is 2.9 arc seconds.

The pixel size of the Sony IMX462 sensor in the Seestar is 2.9 microns square; with a lens focal length of 250 mm a pixel subtends 11.6 microradians, which is about 2.4 arc seconds. Seestar sampling is essentially diffraction limited.

We should also consider atmospheric seeing, which is seldom less than an arc second and often is 2 or 3 arc seconds. And there will also be tracking errors. When I look at my Seestar images, the smallest star images (on fainter stars that aren't overexposed) seem to be 2 or 3 pixels across. That would be around 5-7 arc seconds in diameter. Compared to that size, you could clearly see image smear of, say, 5 arc seconds.

So, let's say that we want to limit the image smear at the corners of the field of view to be no more than 5 arc seconds of image motion. The field of view is 1.48 degrees corner-to-corner, so the radius is 0.74 degrees. 5 arcseconds of motion at a radius of 0.74 degrees is a rotation of 1874 microradians.

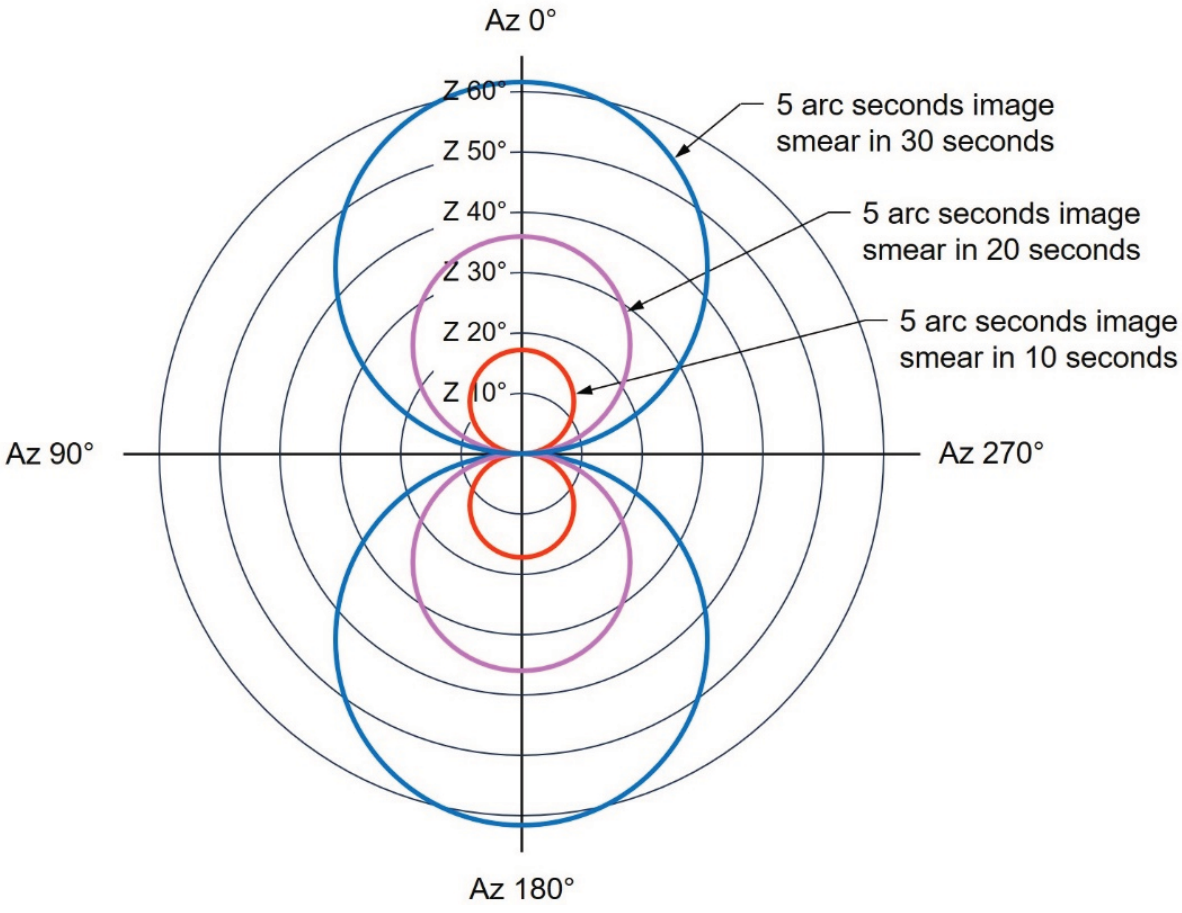
For comparison, the rate the earth turns is 73 microradians per second (remember, the equation

Seestar, continued.

we're using is relative to the change in hour angle, i.e., relative to the earth's rotation rate). For a 10 second exposure, we would want the field rotation rate to be no more than 1874/10 = 187 microradians per second. This is 2.57 times as fast as the sidereal rate.

For a 20 second exposure, the field rotation rate should be half of this, or 1.28 times sidereal. For a 30 second exposure, the field rotation rate should one third, or 0.86 times sidereal.

If we set each of these numbers in turn as the criterion, and plot the resulting zones of avoidance, we get the curves in the figure below, calculated for a latitude of 40.78 degrees, the latitude of Hyde Memorial Observatory. The view is as though



Zones of avoidance to limit image smear in 10, 20 and 30 second exposures with a Seestar S50, calculated for a latitude of 40.78 degrees. The areas with greater than 5 arc seconds image smear are inside the colored circles.

Seestar, continued.

looking up, with north at Az 0 degrees and east to the left, the zenith is in the center, and the area to avoid is inside the colored circles.

Directly to the north or south, the zone of avoidance for a 10 second exposure extends to a zenith distance of 17 degrees. For a 20 second exposure, it extends to 36 degrees. And for a 30 second exposure, the zone of avoidance extends to a zenith distance of 62 degrees!

At the latitude of my home in Arizona, 32.4 degrees, the zone of avoidance is 28% larger than at Hyde for the blue curve, 14% larger for the magenta curve, 12% larger for the red. Near the equator it will be even larger.

Image rotation causes another issue – as the rectangular field of view rotates relative to the object, the edge of the stacked image gets ragged, which may necessitate cropping down the image to get a clean edge. This effect will be reduced if you stay away from the zones of avoidance shown in the diagram.

Of course, if you plan to crop your image to only use the central part of the field, you would have proportionally less image smear in the cropped portion.

Also, these calculations don't consider the question whether the tracking accuracy of a Seestar is degraded close to the zenith because of the higher rate of azimuth rotation and acceleration. Reports indicate Seestar automatically avoids exposures closer than 5 degrees from the zenith for this reason, but there could be degraded tracking even farther north and south from the zenith, as you pass the meridian where azimuth tracking rates are highest. This would add to the image smear caused by field rotation.

The lessons are clear:

- with a Seestar S50 the best imaging will be east or west of zenith;
- this is particularly an issue for longer exposures of 20 or 30 seconds, so if you need to image in the north or south, use 10 second exposures;
- and if your object of interest is just crossing the meridian, you might want to wait an hour before imaging it, unless it's far from the zenith.

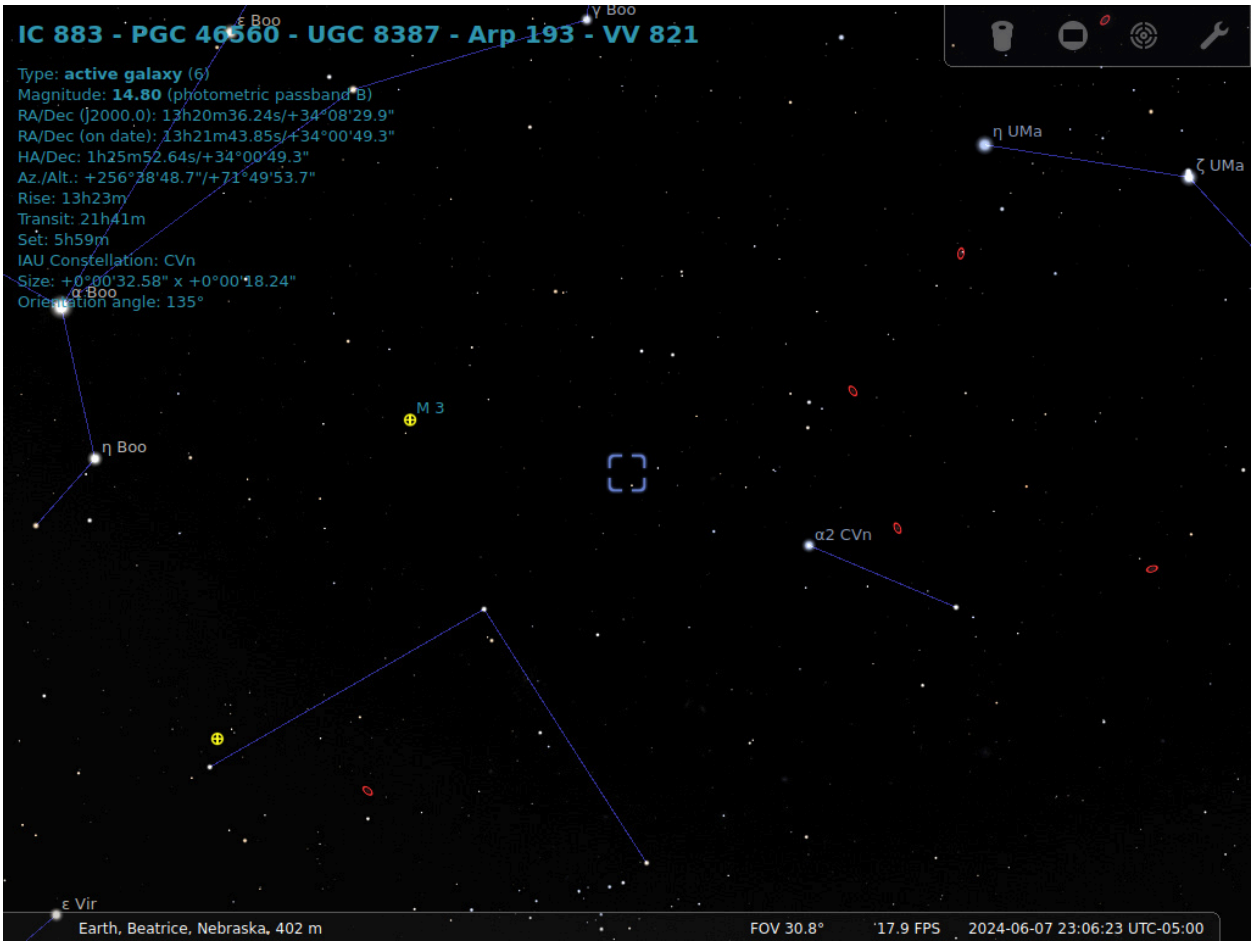
References

1. *A Mathematical Description of the Control System for the William Herschel Telescope, R.A. Laing*
2. *The zenithal blind spot of a computer-controlled altazimuth telescope, F. G. Watson, Mon. Not. R. astr. Soc. (1978) 183. 277-284*

The Angel Flight Galaxy

David Knisely

After observing the regular showpieces of the deep sky year after year, I eventually adopted an observing philosophy that is off the beaten path. I just pick some obscure object on Megastar or Stellarium that might be within range of the instrument I am using and that I have rarely or never observed before and go after it. Once found, I then work outwards to try for all the objects within 10 degrees of that first one, which makes for some interesting challenges and keeps my observing skills fresh. I especially like doing this at the Nebraska Star Party, where conditions are ideal for pushing your limits. Founding PAC member Rick Johnson had this idea years before I began doing this, as when he built his fine observatory well out in the woods of Minnesota, he rarely went after the showpiece objects and picked out the most obscure or unusual ones to image. We see regular examples of this each month in our newsletter, but one thing he liked to do is select some Hubble Space Telescope image of something obscure but interesting and go after it to see what he could do with his 14 inch LX200R

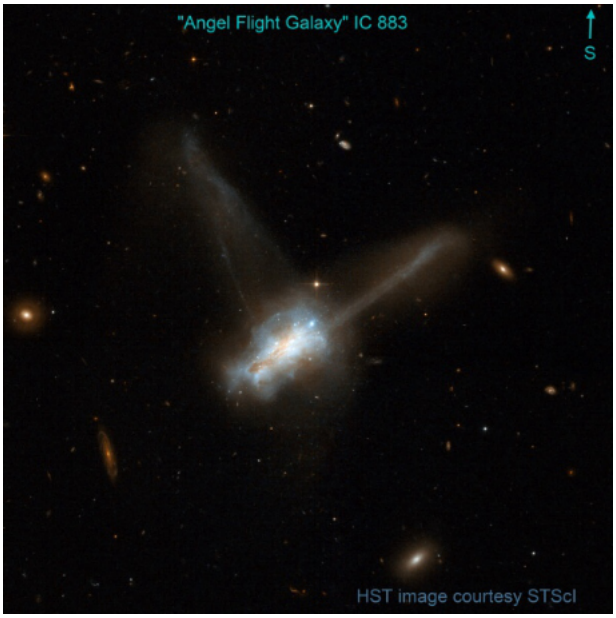


Angel Flight Galaxy, continued.

telescope and his various cameras. One of the objects he selected was a distant galactic collision known as IC 883 (a.k.a. Arp 193) in the constellation of Canes Venatici (see finder chart). When I saw the HST image of it, I immediately named the object, *The Angel Flight Galaxy*, as it looked like an angel with its wings spread high. Rick sent me his image of it, and he did surprisingly well on it, although nothing like the space-based Hubble did (see Rick's and HST's images).

I had been unable to get out much over the winter and spring, so a few nights ago, the sky was clear, so I headed down to Big Indian Lake southwest of Wymore to get some time under the stars with my 14 inch Dobsonian which I call, "The Black Mamba." I thought back to Rick's targets, and decided that I might want to try for IC 883 to see if it could even show up visually. The galaxy is small (1.6' x 0.6' arc) and fainter than 14th magnitude, so even under fairly dark skies, it wouldn't exactly be easy. However, like the time I went after the almost "impossible" object known as "Hoag's Galaxy" (another HST target), I would not be denied. Fortunately, Stellarium showed the object was fairly near a 6th magnitude star and in a field with a formation of stars that would direct me to this galaxy. After looking for a while at the "lumpy darkness," I did finally find a tiny almost rectangular patch of light right at the limit of vision. I didn't see the "wings," but I did catch the main body of this distant celestial wonder.

If you are getting tired of going after the same things at star parties, why not try working the "back woods" of the Deep Sky for a change. You may be glad you did. Clear skies to you.



Mid-States Astronomical League Conference

MSRAL 2024 was held at Mahoney State Park Lodge and hosted by the Omaha Astronomical Society. Above left: Diana Hannikainen, Observing Editor at Sky & Telescope gave a talk on Radio Astronomy: From the 1930s to Today. Right: photo contest entries and winners. The keynote speaker was Kevin Schindler – Historian at Lowell Observatory, and his talk was titled: "Clyde Tombaugh, Lowell Observatory, and the Discovery of Pluto."

Phone cameras can take in more light than the human eye — that's why low-light events like the northern lights often look better through your phone camera

Douglas Goodwin, Visiting Assistant Professor in Media Studies, Scripps College

Smartphone cameras have significantly improved in recent years. Computational photography and AI allow these devices to capture stunning images that can surpass what we see with the naked eye. Photos of the northern lights, or aurora borealis, provide one particularly striking example.

If you saw the northern lights during the geomagnetic storms in May 2024, you might have noticed that your smartphone made the photos look even more vivid than reality.

Auroras, known as the northern lights (aurora borealis) or southern lights (aurora australis) occur when the solar wind disturbs Earth's magnetic field. They appear as streaks of color across the sky.

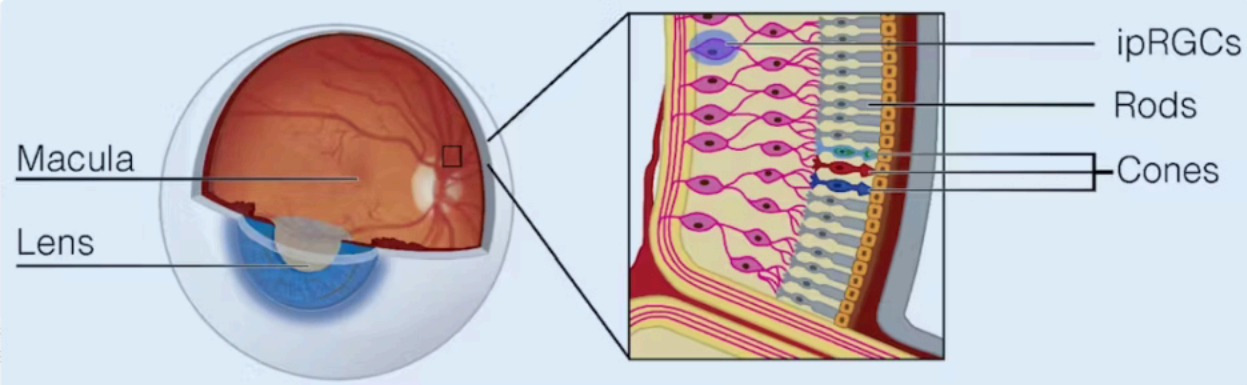
What makes photos of these events even more striking than they appear to the eye? As a professor of computational photography, I've seen how the latest smartphone features overcome the limitations of human vision.

Your eyes in the dark

Human eyes are remarkable. They allow you to see footprints in a sun-soaked desert and pilot vehicles at high speeds. However, your eyes perform less impressively in low light.

Human eyes contain two types of cells that respond to light – rods and cones. Rods are numerous and much more sensitive to light. Cones handle color but need more light to function. As a result, at night our vision relies heavily on rods and misses color.

The result is like wearing dark sunglasses to watch a movie. At night, colors appear washed out and muted. Similarly, under



Rods and cones in your eyes are photoreceptors that process black and white as well as color. Blume, C., Garbazza, C. & Spitschan, M., CC BY-SA

Phone cameras, continued.

a starry sky, the vibrant hues of the aurora are present but often too dim for your eyes to see clearly.

In low light, your brain prioritizes motion detection and shape recognition to help you navigate. This trade-off means the ethereal colors of the aurora are often invisible to the naked eye. Technology is the only way to increase their brightness.

Taking the perfect picture

Smartphones have revolutionized how people capture the world. These compact devices use multiple cameras and advanced sensors to gather more light than the human eye can, even in low-light conditions. They achieve this through longer exposure times – how long the camera takes in light – larger apertures and increasing the ISO, the amount of light your camera lets in.

But smartphones do more than adjust these settings. They also leverage computational photography to enhance your images using digital techniques and algorithms. Image stabilization reduces the camera's shakiness, and exposure settings optimize the amount of light the camera captures.

Multi-image processing creates the perfect photo by stacking multiple images together. A setting called night mode can balance colors in low light, while LiDAR capabilities in some phones keep your images in precise focus.

LiDAR stands for light detection and ranging, and phones with this setting emit laser pulses to calculate the distances to objects in the scene quickly in any kind of light. LiDAR generates a depth map of the environment to improve focus and make objects in your photos stand out.

Artificial intelligence tools in your smartphone camera can further enhance your photos by optimizing the settings, applying bursts of light and using super-resolution techniques to get really fine detail. They can even identify faces in your photos.

AI processing in your smartphone's camera

While there's plenty you can do with a smartphone camera, regular cameras do have larger sensors and superior optics, providing more control over the images you take. Camera manufacturers like Nikon, Sony and Canon typically avoid tampering with the image, instead letting the photographer take creative control.

These cameras offer photographers the flexibility of shooting in raw format, which allows you to keep more of each image's data for editing and often produces higher-quality results.

Unlike dedicated cameras, modern smartphone cameras use AI while and after you snap a picture to enhance your photos' quality. While you're taking a photo, AI tools will analyze the scene you're pointing the

Phone cameras, continued.

camera at and adjust settings such as exposure, white balance and ISO, while recognizing the subject you're shooting and stabilizing the image. These make sure you get a great photo when you hit the button.

You can often find features that use AI such as high dynamic range, night mode and portrait mode, enabled by default or accessible within your camera settings.

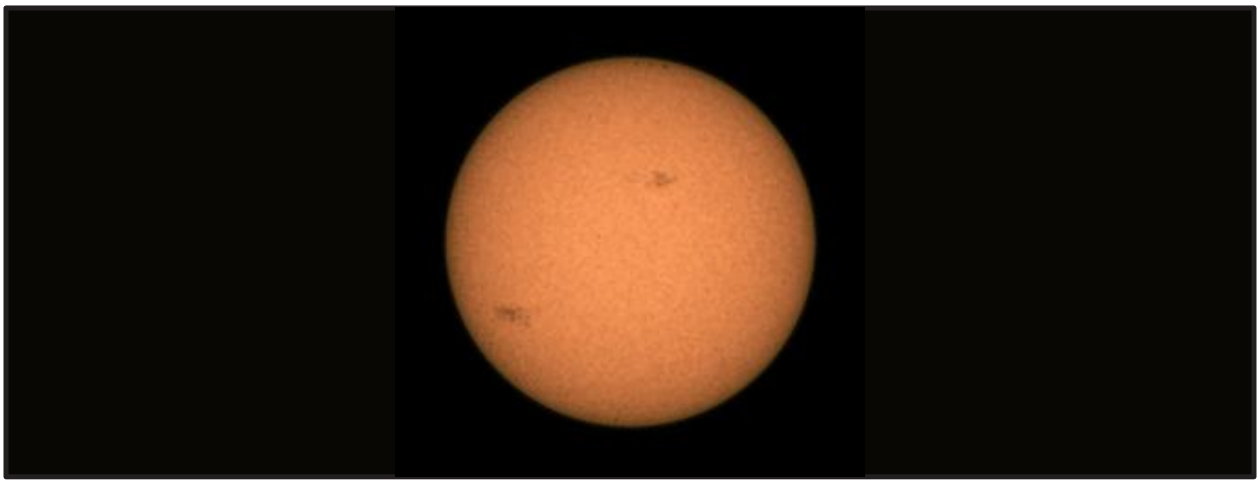
AI algorithms further enhance your photos by refining details, reducing blur and applying effects such as color correction after you take the photo.

All these features help your camera take photos in low-light conditions and contributed to the stunning aurora photos you may have captured with your phone camera.

While the human eye struggles to fully appreciate the northern lights' otherworldly hues at night, modern smartphone cameras overcome this limitation.

By leveraging AI and computational photography techniques, your devices allow you to see the bold colors of solar storms in the atmosphere, boosting color and capturing otherwise invisible details that even the keenest eye will miss.

This article is republished from The Conversation under a Creative Commons license.



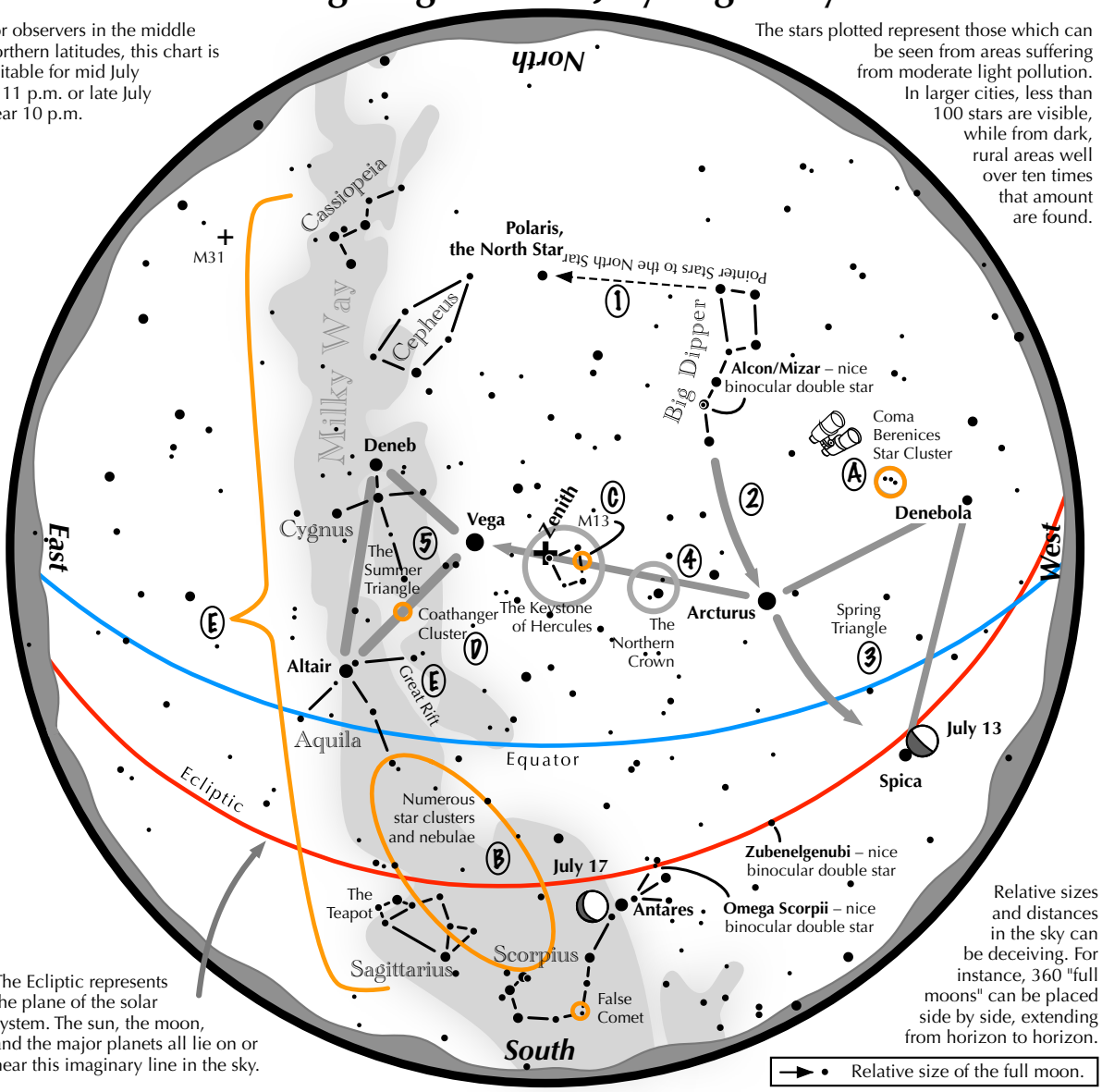
NASA's Perseverance Mars rover captured a series of images of sunspots using its Mastcam-Z cameras between May 8 and 20, 2024 (the 1,144th and 1156th Martian days, or sols, of the mission). The Perseverance mission frequently uses Mastcam-Z to capture images of the Sun to help scientists assess how much dust is in the atmosphere, because airborne dust affects the brightness of the Sun. Inadvertently, the camera can also capture sunspots, which are relatively cool areas of the Sun with intense magnetic fields.

Navigating the July Night Sky

Navigating the mid July Night Sky

For observers in the middle northern latitudes, this chart is suitable for mid July at 11 p.m. or late July near 10 p.m.

The stars plotted represent those which can be seen from areas suffering from moderate light pollution. In larger cities, less than 100 stars are visible, while from dark, rural areas well over ten times that amount are found.



The Ecliptic represents the plane of the solar system. The sun, the moon, and the major planets all lie on or near this imaginary line in the sky.

Relative sizes and distances in the sky can be deceiving. For instance, 360 "full moons" can be placed side by side, extending from horizon to horizon.

Relative size of the full moon.

Navigating the mid July night sky: Simply start with what you know or with what you can easily find.

1. Extend a line north from the two stars at the tip of the Big Dipper's bowl. It passes by Polaris, the North Star.
2. Follow the arc of the Dipper's handle. It first intersects Arcturus, the brightest star in the July evening sky, then continues to Spica. Arcturus, Spica, and Denebola form the Spring Triangle, a large equilateral triangle.
3. To the northeast of Arcturus shines another star of similar brightness, Vega. Draw a line from Arcturus to Vega. It first meets "The
4. Northern Crown," then the "Keystone of Hercules." A dark sky is needed to see these two dim stellar configurations.
5. High in the East lies the Summer Triangle stars of Vega, Altair, and Deneb.

Binocular Highlights

A: Between Denebola and the tip of the Big Dipper's handle, lie the stars of the Coma Berenices Star Cluster.
B: Between the bright stars Antares and Altair, hides an area containing many star clusters and nebulae.
C: On the western side of the Keystone glows the Great Hercules Cluster, containing nearly 1 million stars.
D: 40% of the way between Altair and Vega, twinkles the "Coathanger," a group of stars outlining a coathanger.
E: Sweep along the Milky Way for an astounding number of faint glows and dark bays, including the Great Rift.

Hyde Observatory Needs You!

Volunteer at Hyde

Our crew of unpaid volunteers share an interest in Astronomy and they enjoy passing on that interest to the public.

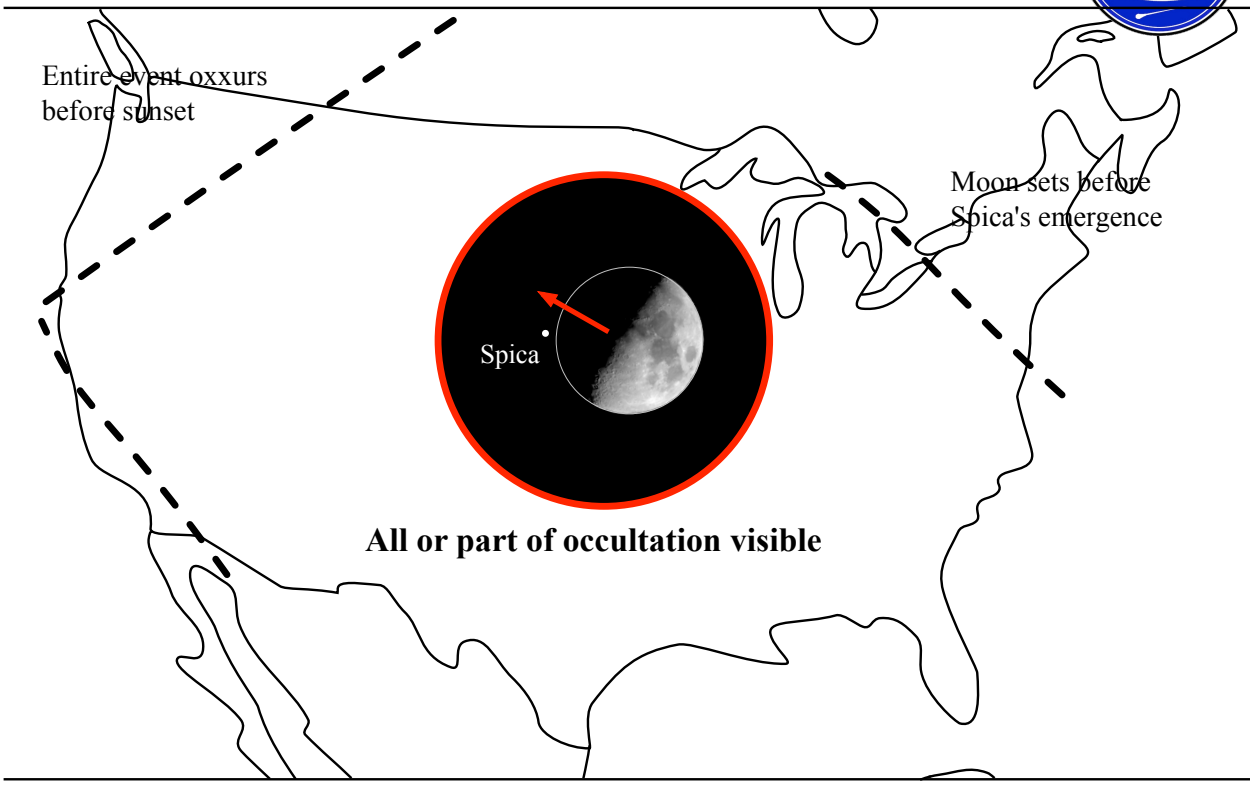
- [x] You don't need to be an expert in astronomy or telescopes. **We'll teach you what you need to know.**

- [x] Volunteers start as telescope operators on the observing deck, which involves keeping one of the three telescopes focused on the sky objects we are showing and explaining them to our visitors. Experienced volunteers can become Deck Leaders who determine what objects to train the telescopes on, and answer the really difficult questions.

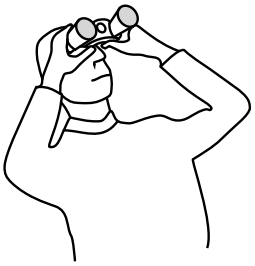
For more information, visit our website

Astronomical League Outreach

If you can see only one celestial event this month, see this one. The first quarter moon occults Spica on July 13.



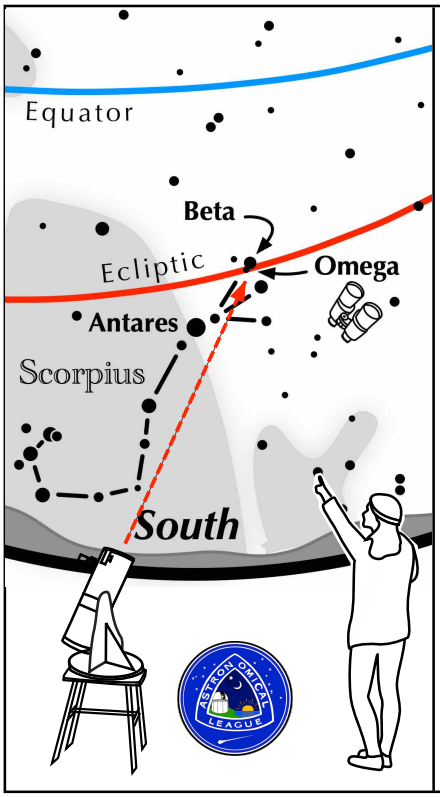
Occultation of Spica occurs in the evening hours for most of the US. The moon sets before Spica's emergence for viewers in the northeast. Viewers in the northwest see the event before sunset.



A great binocular event

City	Start	Altitude	End	Altitude	Notes
Boston	11:24	6º	------	----	12:03 moonset
Washington	11:26	11º	12:34	----	12:32 moonset
Atlanta	11:28	19º	12:41	5º	1:08 moonset
Miami	11:48	15º	12:54	1º	12:59 moonset
Chicago	10:10	19ª	11:23	8º	8:24 sunset
St Louis	10:12	23º	11:28	10º	12:25 moonset
New Orleans	10:29	24º	11:44	10º	
Minneapolis	9:57	22º	11:13	12º	
Kansas City	10:05	26º	11:23	14º	8:44 sunset
San Antonio	10:18	33º	11:37	18º	
Denver	8:48	33º	10:11	22º	8:27 sunset
Albuquerque	8:54	37º	10:17	25º	8:21 sunset
Tucson	7:54	41º	9:15	30º	7:31 sunset
Seattle	7:13	31º	8:33	28º	9:03 sunset
San Francisco	7:28	41º	8:44	36º	8:32 sunset
San Diego	7:44	44º	9:02	35º	7:57 sunset

Astronomical League Double Star Challenge



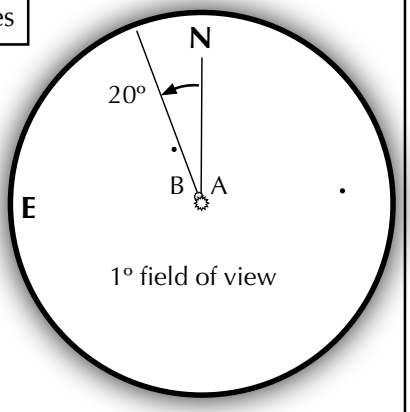
Other Suns: Beta Scorpii

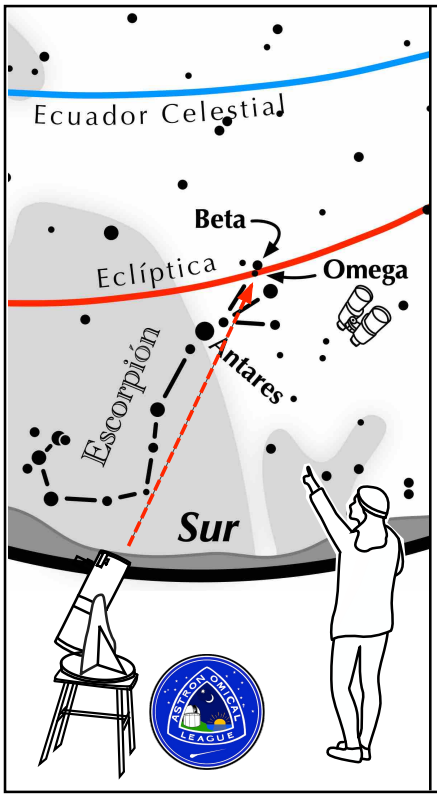
How to find Beta Scorpii on a July evening

Find the bright red star Antares low in the south. To its west shine three stars representing the claws of Scorpius. The northern star is Beta Scorpii. Immediately below Beta lies Omega, a very wide optical double star, easily separated in binoculars.

Suggested magnification: >40x
Suggested aperture: >3 inches

Beta Scorpii
A-B separation: 14 sec
A magnitude: 2.6
B magnitude: 4.5
Position Angle: 20º
A & B colors: white & blue





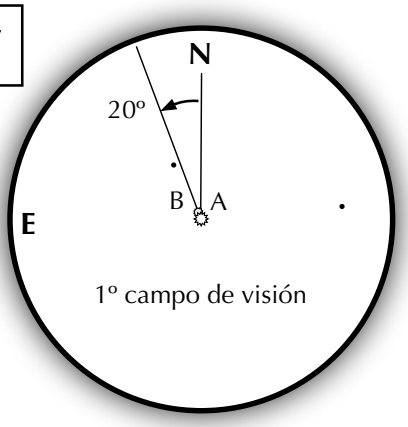
Otros Soles: Beta Scorpii

Cómo encontrar Beta Scorpii en una tarde de julio

Encuentra la brillante estrella roja Antares baja en el sur. Al oeste brillan tres estrellas que representan las garras de Escorpio. La estrella del norte es Beta Scorpii. Inmediatamente debajo de Beta se encuentra Omega, una estrella doble óptica muy ancha, que se puede distinguir fácilmente con binoculares.

Ampliación sugerida: >40x,
Apertura sugerida: >75 mm

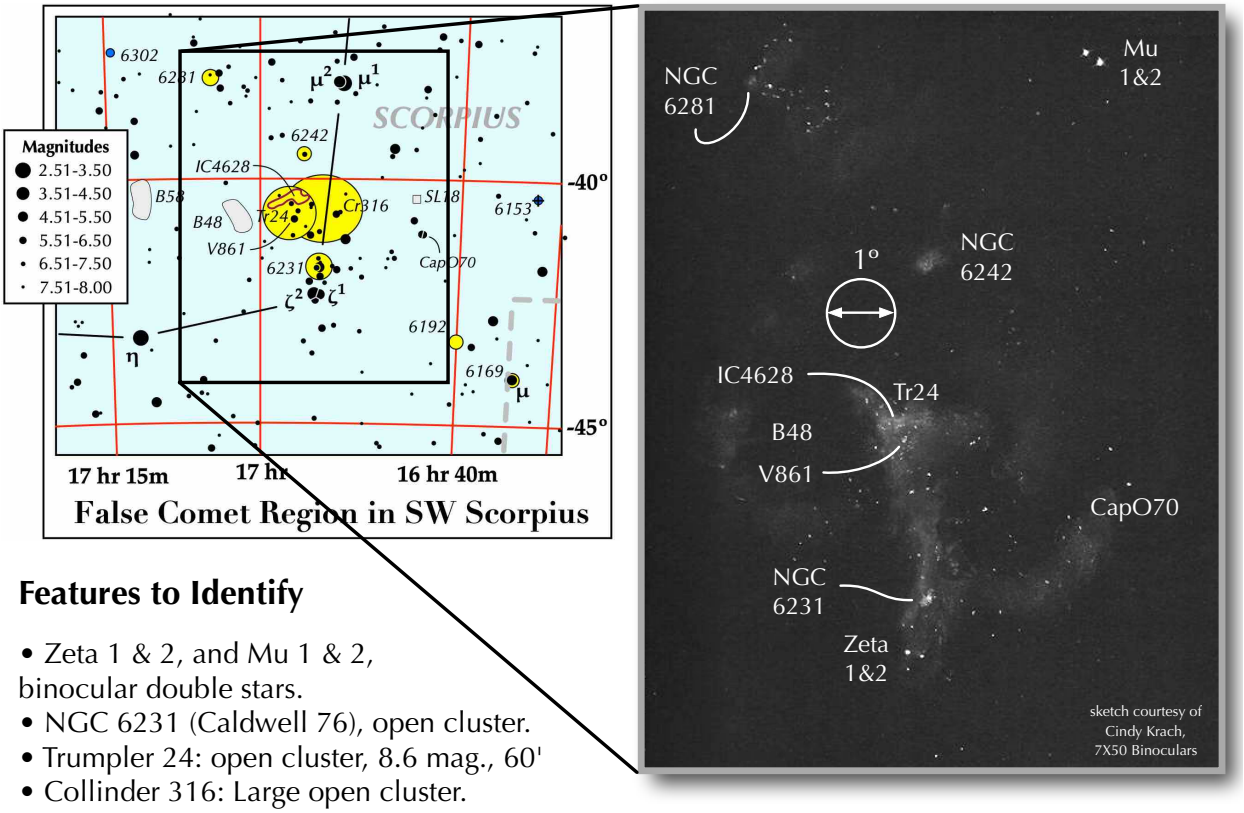
Beta Scorpii
A-B separación: 14 sec
A magnitud: 2.6
B magnitud: 4.5
PA: 20º
A & B colores: blanca & azul



Often ignored because of its southerly declination, this is a great region for binocular observers and telescope users!

False Comet, a closer look

Take your time and explore what this area offers: Open clusters, double stars, variable stars, dark nebulae, emission nebula, & planetary nebulae.



Features to Identify

- Zeta 1 & 2, and Mu 1 & 2, binocular double stars.
- NGC 6231 (Caldwell 76), open cluster.
- Trumpler 24: open cluster, 8.6 mag., 60'
- Collinder 316: Large open cluster.
- B 48 & B 58: dark nebulae
- NGC 6242: open cluster, 6.5 mag., 40'
- NGC 6281: open cluster, 5.4 mag., 8'
- NGC 6302: planetary nebula, "Bug," 9.2 mag., 50".
- V861: eclipsing binary with period of 7.85 days, 6.1 to 6.4 mag.
- IC 4628: emission nebula, the "Prawn."
- CapO70: binocular double star, 6.1 & 6.2 mag., 97" sep.

A great region for binoculars!

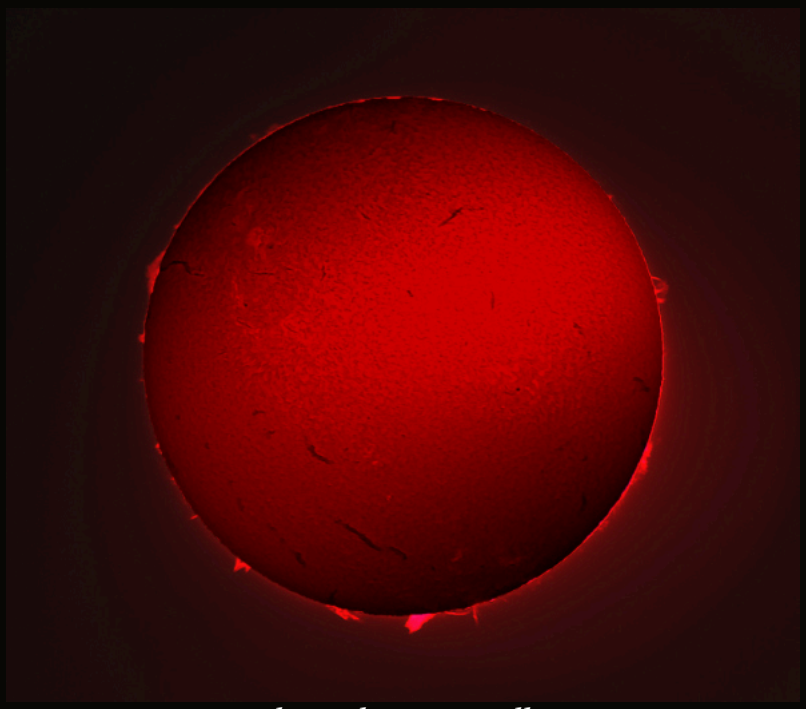
- 7x50 and 10x50 work nicely.
- Best when mounted on a tripod for steady viewing.
- Best to have high contrast, dark skies.

See more detail:

- Use a high contrast or deep sky nebula filter.
- Don't forget to try high magnification, >200.

Try your hand at sketching: Lay down the bright stars first to set relative distances, lightly outline bright nebula next, then fill in cluster stars and dimmer field stars. Add shading. Note dark areas. The more you look, the more you see!

Astrophotography

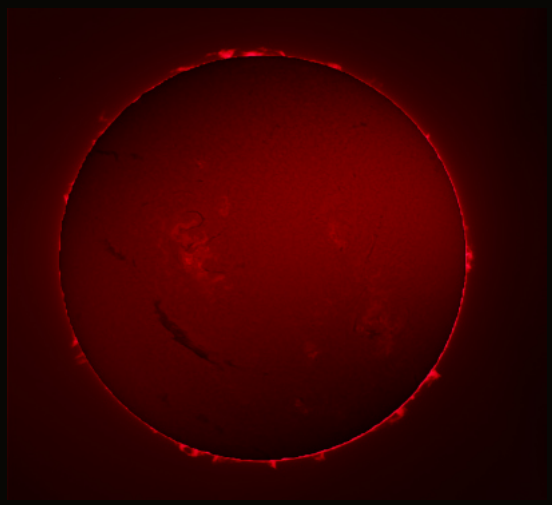


Photos by Brett Boller

Hydrogen Alpha Solar image from Branched Oak Observatory on June 9th 2024, 6:30pm. 100 images stacked and processed. Coronado 90mm Solarmax Double Stack Telescope, Canon t7i. Iso 400 1/800 sec solar face, iso 400 1/40sec for prominences.

Below right: The full disc of the sun was imaged using prime focus through the Coronado 90mm Solarmax Double Stack using my Canon T7i. 14 images stacked in Registax, ISO 800 1/1250second exposure for solar face, ISO 800 1/30 second for the solar prominences.

Below left: Lucky Shot, Single frame ISO 400 1/1000 of a second. 6/12/24 10:45 am



From the Archives

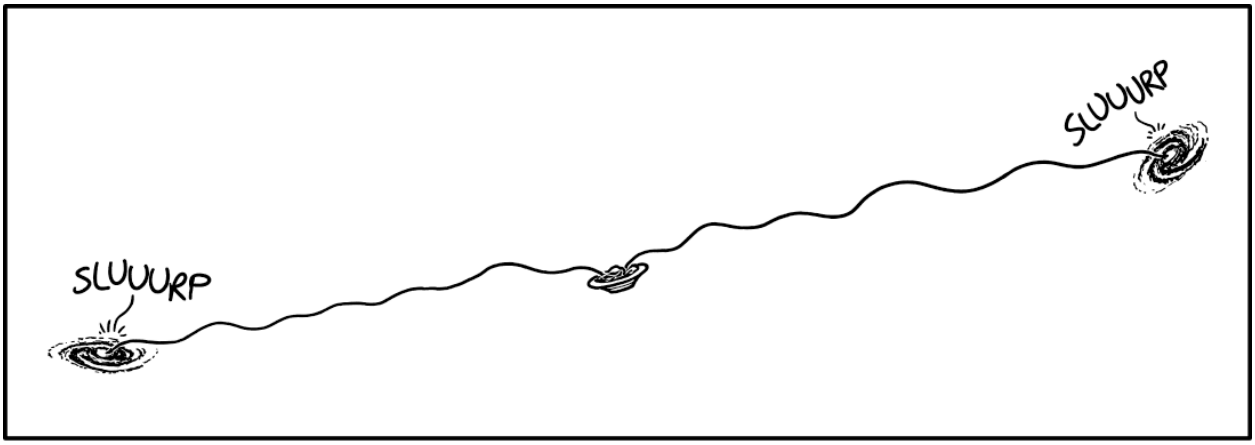
June, 1984

As you gaze up into the night sky, providing you can keep from squinting from all the rain drops falling in them, you might see something strange.

No, that bright abject in the southern sky is not the planet Jupiter. Nor is it Saturn. It is that poor planet that has been catching all the flak for the past several years. Up until now Mars was not the most intriguing object for viewing.

But now it is almost 17 seconds of arc in diameter. If you are patient and can wait for those brief periods when the humidity clears up it is quite a sight.

While observing during my sessions I was disappointed in not clearly seeing the land markings nor the polar hood. I have a 10" and knew I should be able to. I checked my optics, the alignment, even took my mirror out and cleaned it before the next night. But only after I read information supplied by the Kansas City Astronomical Society did I realize why. I was possibly seeing dust storms on Mars. Now don't race out and look. Most of my observations were done in late Feb. My most recent ones of early May and again Early June show a more clear aspect of the planet. But that is not to say the storms will not pick up again this summer. So keep an eye on Mars this summer and lets hear from you at the meetings on it. –Russ Genzmer



ASTRONOMERS HAVE DETERMINED THAT THE MILKY WAY AND ANDROMEDA ARE CURRENTLY SLURPING UP THE SAME STRAND OF COSMIC SPAGHETTI, SUGGESTING THAT IN 5 BILLION YEARS THEY WILL LIKELY KISS.

Xkcd.com

CLUB MEMBERSHIP INFO

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, please contact a club officer. Scopes can be checked out at a regular club meeting and kept for one month. Checkout can be extended for another month if there are no other requests for the telescope, but you must notify a club officer in advance.

100mm Orion refractor: Available
10 inch Meade Starfinder Dobsonian: Available.
13 inch Truss Dobsonian: Needs repair.
10 inch Zhumell: Needs mount.

Buy the book! The Prairie Astronomy Club: Fifty Years of Amateur Astronomy. Order online from Amazon or lulu.com.

ADDRESS

The Prairie Astronomer
c/o The Prairie Astronomy Club, Inc.
P.O. Box 5585
Lincoln, NE 68505-0585

info@prairieastronomyclub.org

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.