

The Prairie Astronomer

May 2023 Volume 64, Issue #5



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Calamus or Bust!
Webb Inspects Mini-Neptune
Astronomy Night at Morrill Hall



Night Sky Network



The Newsletter of the Prairie Astronomy Club

The Prairie Astronomer



The next regular meeting is May 30th at 7:30pm at Hyde Observatory

NEXT MEETING AND PROGRAM

We're going to do a hot dog and brat dinner for the May meeting and an informal presentation by Bob Kacvinsky. He'll be demoing free software called Eyes on the Solar System that allows you to view missions, planets, comets, and other objects. It uses actual photos and data from several missions to build out the visuals and lets you go forward or backward in time to see the mission highlights.

The menu will be: Hot dog or Bratwurst (Limit 2), Bag of Chips, Cookie, Soda or Water, \$5.

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UPCOMING PROGRAMS

June: Solar Star Party

July: Review of NSP

Cover: Gracie Creek Cabin at Calamus Reservoir. Photo taken by Brett Boller.

Background photo: Brett Boller



CALENDAR

The PAC Calendar is now available as a [Google Calendar](#).

Annual Club Dinner
 Tuesday, May 30th 7:30pm at Hyde Observatory
 Presentation on “Eyes on the Solar System” software.

PAC Meeting
 Tuesday, June 27th 6pm at Hyde Observatory
 Solar Star Party
 New Club Photo will be taken - bring your telescope!

Nebraska Star Party
 July 16-22 at Merritt Reservoir, Valentine, Nebraska

PAC Meeting
 Tuesday, July 25th, 6pm at Hyde Observatory
 Review of the Nebraska Star Party

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

2023 STAR PARTY DATES

	Date	Date
January	13	20
February	10	17
March	17	24
April	14	21
May	12	19
June	9	16
July	7	14
NSP	7/16	7/22
August	11	18
September	8	15
October	6	13
November	3	10
December	8	15

Dates in **BOLD** are closest to the New Moon.

CLUB OFFICERS

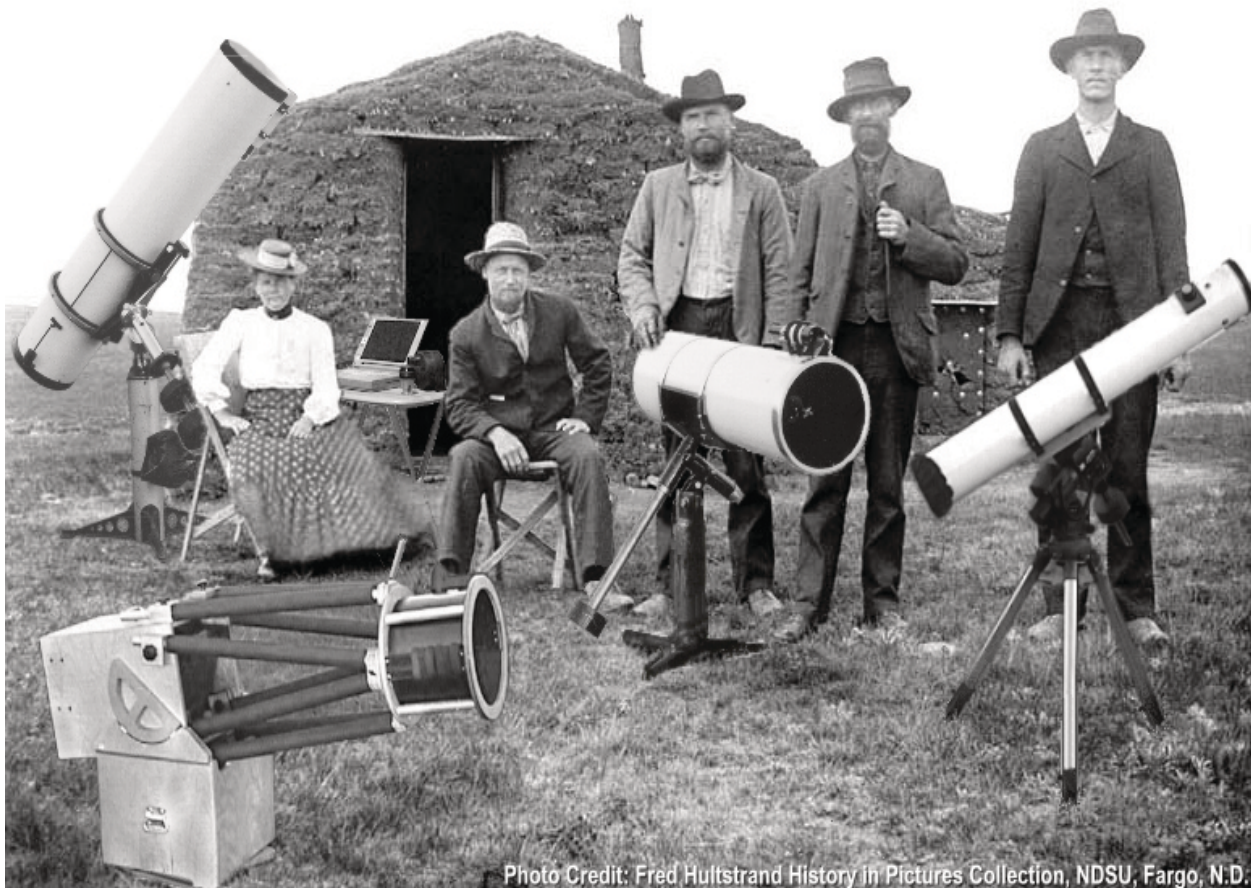
President	Jason O’Flaherty jflaher@gmail.com
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Secretary	Jim White jrwhite2188@gmail.com
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Website and Newsletter Editor	Mark Dahmke mark@dahmke.com

Night Sky Network



www.prairieastronomyclub.org

30th Annual Nebraska Star Party



Join us this summer as families from all over the US and around the world gather in the sparsely populated sand hills of North Central Nebraska to spend a good week under a galaxy of stars.

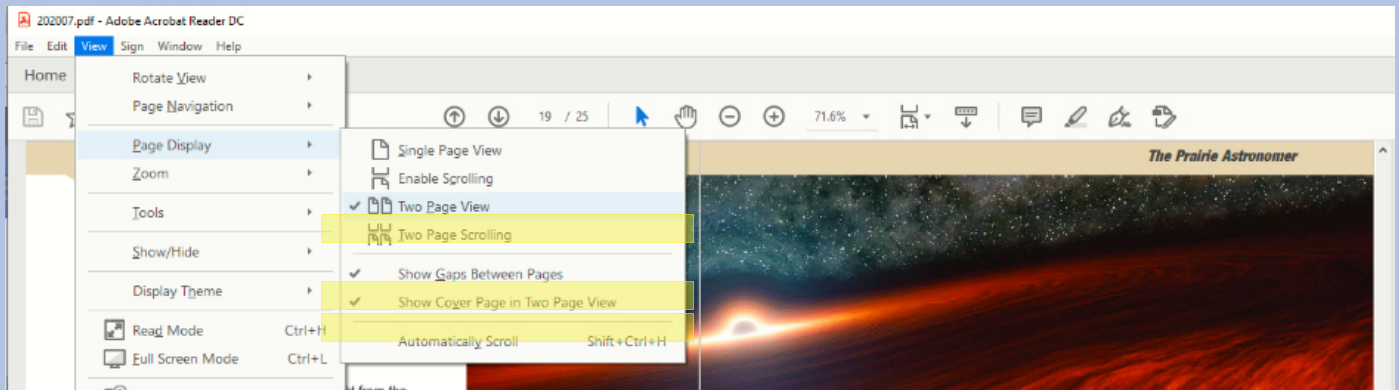
**July 16-22 at Merritt Reservoir, Valentine,
Nebraska**

[Online Registration is now open](#)

Notices

New Newsletter 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 now available online:

<https://www.prairieastronomyclub.org/newsletters>

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

Meeting Minutes

Jim White

Jason started the meeting at 7:34 PM, 4/25/23.

Tonight's meeting is being held at Hyde Observatory and online via Zoom.

Jason asked Kevin Gallagher, our guest program presenter, if it was okay to record tonight's program which will be presented via Zoom and Kevin responded that it was fine to record his presentation.

Jason welcomed everyone to tonight's meeting and asked if there were any new members or guests present and announced that we have four new members, Paul, Kale, Diana and Lindsey, there were a couple of guests in attendance also. Jason welcomed the new members and guests and then turned the meeting over to Jim Kvasnicka for his monthly observing report.

Jim started his observing report at

7:38. Star parties for the upcoming month of May will be on May 12th and May 19th at the Clatonia Recreation Area which is approximately 1 ½ miles north of Clatonia. Star parties for the month of June will be on June 9th and 16th. The star party for June 9th is tentatively planned to be held at Branched Oak Observatory depending on the weather and could possibly be moved to the 16th if weather on the 9th is bad, stay tuned for updates. Jim's complete observing report can be found in this newsletter. Jim's observing report was completed at 7:47 and turned back over to Jason.

Jason has some new things that he is trying for tonight's meeting, he would like to be able to showcase things that our members do whether that is taking pictures of the night sky, making sketches of objects they viewed or pictures of star parties or event's that they have

attended. Jason put together a short video tonight of pictures that were taken by a group of members that spent a few nights at Gracie Creek Cabin, near Calamus Reservoir northwest of the town of Burwell. If you have any pictures, sketches or anything else that you think the club may be interested in please get in touch with Jason so he can present it to the club at an upcoming meeting. You can also send items to Mark Dahmke for inclusion in an upcoming newsletter. Jason turned the meeting over to John Reinert at 7:47 for his monthly treasurer's report.

John reported that several members had renewed their membership's using the club's website and that things were going well using the new electronic option. John reported that we are approaching 70 active members which is an all-time high level for John since he has been treasurer. John has a signup sheet

Meeting Minutes, continued.

available for anyone that would like to be contacted about potentially joining the club. The clubs account balances being held at this time total \$35,491.82 and are spread out between Bank of the West, PayPal and Stripe. John says he will be filling the form 990 this month with the IRS. John turned the meeting back over to Jason at 7:48.

Jason reviewed the membership options available to anyone who may be interested in joining PAC and the benefits that come with membership including membership in the Astronomical League, help with your telescope or equipment is available from club members, access to our outstanding monthly newsletter and a subscription to the Reflector magazine. Jason reminded the group that the club has an electronic calendar that can be accessed online or added to your personal calendar so

that you can keep up to date with club activities and events. Upcoming events call for an annual club dinner in lieu of our May monthly meeting, which the club had done in previous years prior to Covid 19, but at this time nothing has been planned so stay tuned for more information on this. Our June meeting is going to be at 6:00 PM, outside at Hyde, and is our annual solar observing meeting. If you have equipment for solar observing please feel free to bring it and share the view with others. PAC would also like to get a new club photo taken so we would like to encourage any members that can make it to please show up so that we can get a group photo outside Hyde (you can see the last club photo on the last page of our monthly newsletters), we will try and take the photo early so that those that may not be able to stay can still get in the photo.

Jason shared photos and some drone video

of the trip that a group of members took to Gracie Creek Cabin a few weeks ago. Some members of the group brought along their disc golf discs so that those that were interested in giving it a try could go into Burwell and give it a try during the day. The group chipped in to buy steaks to grill for dinner one night and also chipped in for a brisket that Brett Boller smoked for the group that was really outstanding. There was some talk of possibly taking another trip to Calamus this fall but at this time it looks as though the cabin may already be booked for the fall. If anyone is interested in joining in on a trip sometime, please let Jason or anyone of the board members know so that if something comes up, we can keep you informed.

PAC had a couple of members volunteer to help with Astronomy Night on April 15th at Morrill Hall on UNL Campus and it sounds

Meeting Minutes, continued.

like the event was a success with between 200-300 attendees. There is another volunteer opportunity for Wild Adventures at Pioneer's Park on April 29th during the day which will be for solar observing and another event, lunar observing at The Filley Stone Barn also on April 29th.

Other astronomy events

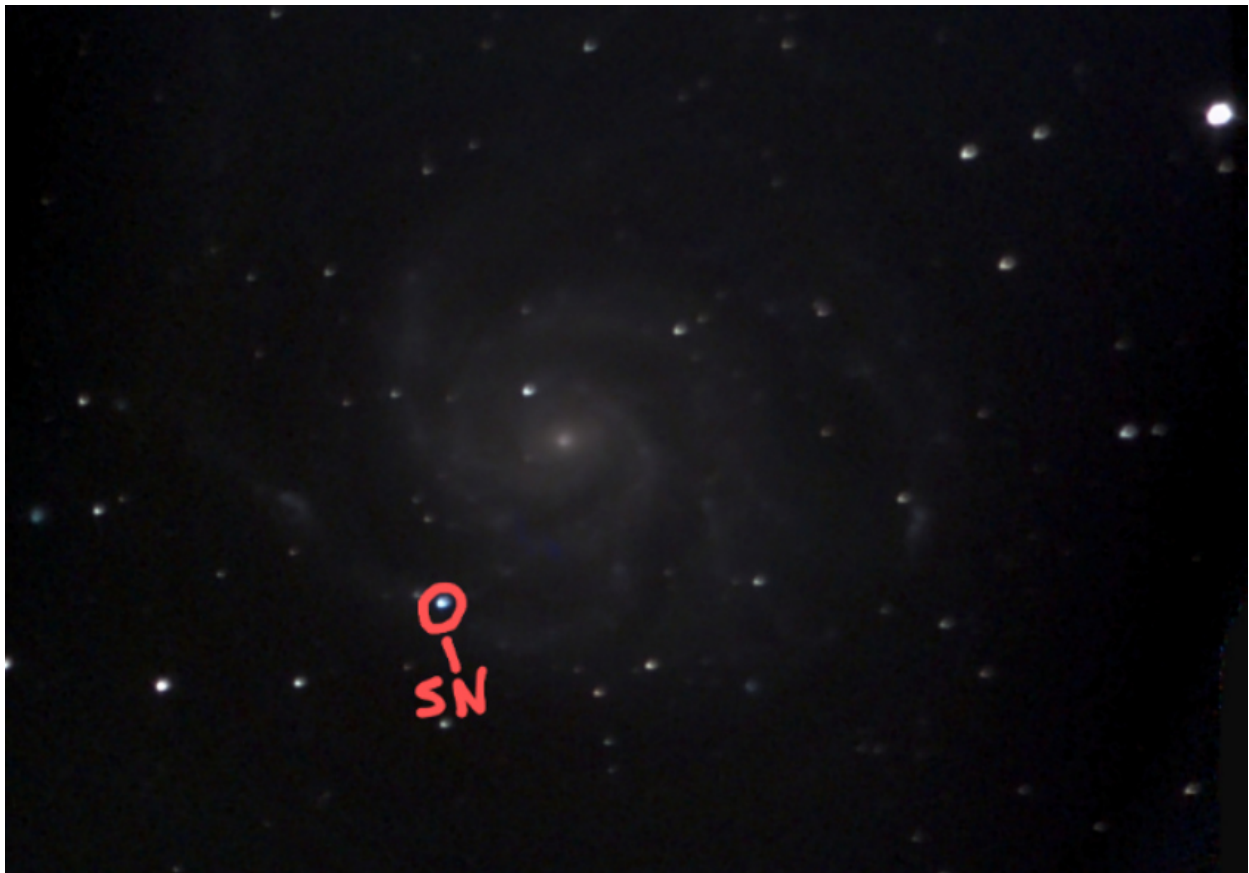
that are coming up are The Texas Star Party, MSRAL, The Rocky Mountain Star Stare and the 30th Annual Nebraska Star Party which is coming up in July at Merritt Reservoir in the Nebraska Sandhills near Valentine.

Tonight's meeting ended at 7:57 PM.

Tonight's program is being presented by Kevin Gallagher, a NASA ambassador, via Zoom and the topic is the Nancy Grace Roman Space Telescope which is due to launch in the mid 2020's.

There were 24 attendees' for tonight's meeting, in-person and online.

Supernova 2023ixf in M101



This photo of M101 (with newly discovered supernova) was taken on May 20th by Ethan Van Winkle using Hyde Observatory's eVscope.

The President's Message

Jason O'Flaherty

Dear fellow stargazers and astronomy enthusiasts,

The arrival of spring reminds us that the universe is alive and ever-evolving, mirroring the beauty and renewal we see around us. As the winter frost recedes and nature awakens with vibrant colors, sounds, and smells, we find ourselves embracing the enchanting season of spring.

First, I invite you to attend our May Club Meeting in person on May 30th at 7:30 p.m. We will be forgoing our regular format for a social grill out and an informal software demonstration by Bob Kacvinsky. We will be serving up hot dogs, bratwursts, chips, dessert, and a drink on the lawn of the Hyde Observatory for some social time before heading inside for the

presentation. It'll cost \$5 per person for the meal. We will not be hosting this meeting on Zoom, though we'll try to record Bob's demonstration for future viewing.

While on the subject of meetings, this is a reminder that our June 27th meeting will be earlier than usual, at 6 p.m. We will be taking a new club photo. Please bring your telescope if you'd like. To ensure everyone can participate, we will prioritize taking the picture first, accommodating those who need to leave for other commitments. After our photo, we'll stay on the lawn for our annual solar observing party. This event will be held exclusively in person and not include a Zoom online meeting.

Shifting our attention to star parties, if you are in the mood for good



food, pizza, or beer, some of our members will be volunteering at the Lazy Horse Brewery near Ohiowa, Nebraska, this Friday, May 26th. If you're up for a drive or live in the area, please stop out and join us.

In order to cater to our members needing locations closer to Lincoln, we have decided to periodically change the location of some star parties. Our June 9th Star Party will be at the Branched Oak Observatory near Malcolm. For the June 16th event, we'll return to Clatonia Creek Reservoir.

Wishing you clear skies and celestial wonders, sincerely yours,

Jason O'Flaherty

ARP 55

The Mantrap Skies Image Catalog

Arp 55/UGC 04881 is a pair of interacting galaxies in Lynx about 500 to 540 million light-years distant. Arp put it in his category for spirals with small, high surface brightness companions on their arms. The companion apparently is the galaxy seen against the very west end of the long arm. That galaxy is SDSS J091553.63+441937.4 but NED has no redshift data on it. So no way to know if this is just a line of sight galaxy or truly related. Or wasn't until Hubble imaged it. The HST image clearly indicates the companion is far beyond the colliding spirals as the level of resolution is very different. Arp apparently didn't care that there was no such data. It was appearance he was concerned with. Later astronomers could figure it out. It also appears he didn't realize the "spiral galaxy" is really two interacting galaxies. Or maybe he did but just didn't care. In any case, he never mentions this.

His comment indicates he was likely more interested in the four brightenings in the arm while it was going nearly straight south. It reads: "Arm has four separate



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.



ARP55, continued.

condensations in line." I can only see 3 in his image as reproduced. Four are clear in my image, however. NED considers the top one to be a separate galaxy rather than the small bright star cluster it most likely is. Adding to the confusion it appears there's a blue star in our galaxy right on top of the star cloud in Arp 55. To telescopes under our atmosphere, the combination looks a lot fuzzier than it does to the Hubble Space Telescope which clearly resolves the star and star cloud as two separate things separated by a half billion light-years. I don't think Arp understood how common line of sight coincidences like this happen. It also skewed his ideas on quasars. The HST image of this pair can be found at http://hubblesite.org/image/2336/news_release/2008-16 If you can, download the "Highest-quality" 10 meg JPG. NASA puts its distance at a nice round 500 million light-years while redshift data says about 540. I used

redshift data from NED for the annotated images.

The long tail and its condensations appear to be due to tidal effects from the collision of these two galaxies. Arp gives no indication he realized this at the time of the atlas. I see NASA refers to this pair as "The Grasshopper" galaxy. Looks more like a shrimp to me. I find no other group using this designation for this or any other galaxy. Seems to be a NASA/HST term. NED makes no attempt to classify the fainter southwestern member and labels the northeastern member with the long tail simply as "spiral" Both are listed as having HII emission which is common with interacting galaxies.

There are several galaxies in the image with the same redshift as Arp 55. It apparently anchors a small galaxy group. One of them, HS 0912+4433, overlaps a second galaxy to the northeast, SDSS J091546.16+442126.7.

It has no redshift data. It is much bluer in my image. No way to tell if they are at the same approximate distance or not. They don't appear to be interacting. HS 0912+4433 is classed at NED as a blue condensed galaxy. The neighbor seems bluer and more condensed if they are at about the same distance.

Another, smaller group of galaxies have a redshift that puts them 450 million light-years distant.

There's a galaxy cluster at 5 billion light-years that has the same position (within the 1.5" error circle of the cluster's center) of a faint galaxy. Several others are seen right around it. The cluster is WHL J091538.9+441107. NED shows it having 14 members though no diameter is given. One of the members does have a redshift distance and it too is 5.0 million light years.

To the west and a bit north of Arp 55 is a disk galaxy at 2.4 billion

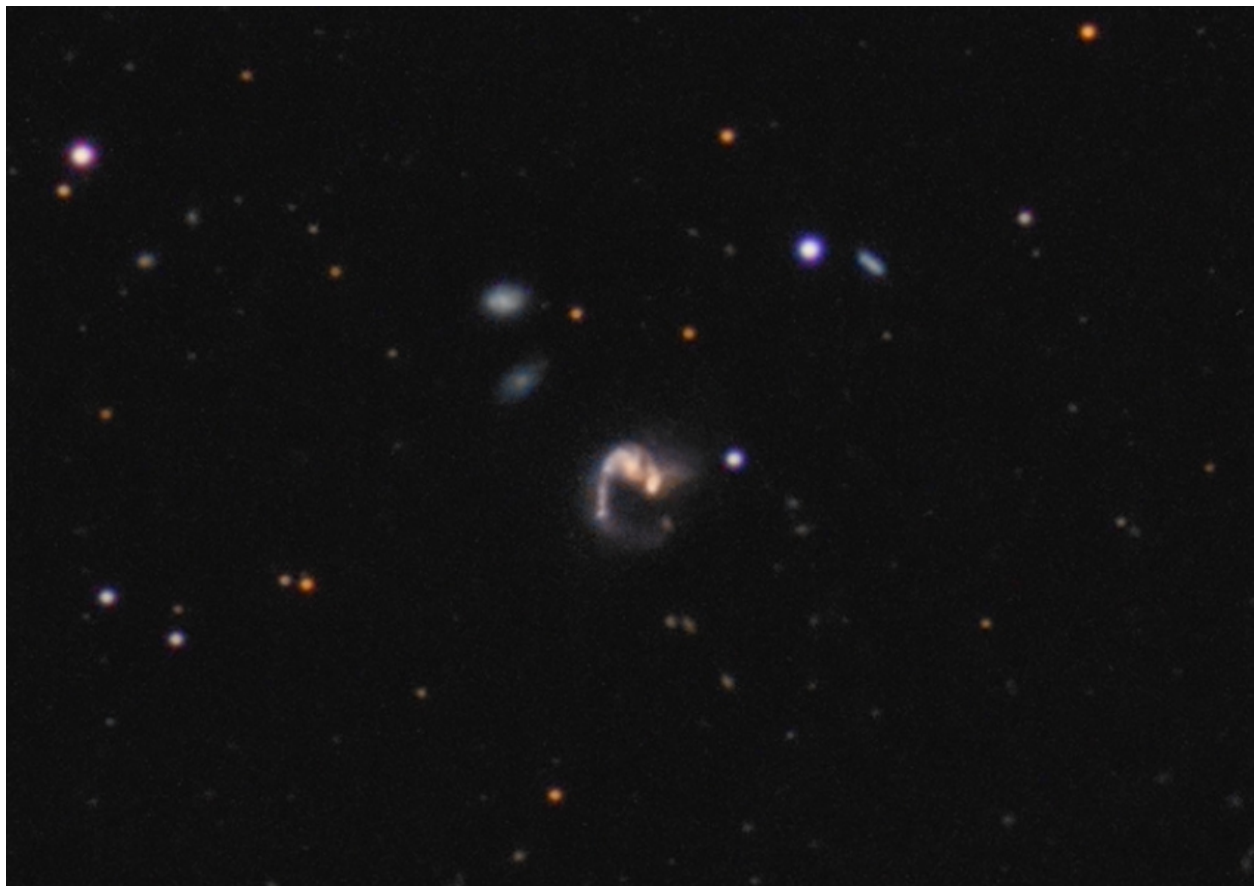
light-years. For it to show that size at that distance it would have to be about 150,000 light-years across. Probably bigger than our galaxy which far above average in size for a spiral galaxy.

I've been asked recently about how big some of these galaxies really are. This is something I give you all enough information to calculate. All my full-size images are at 1" of arc per pixel unless I

state otherwise (rare), the enlargements are given as well. Just count the pixels along a major axis and you have its diameter in seconds of arc. The tangent of this multiplied by the distance gives its size. Yes, I know this isn't exactly right. Radius should be used not diameter. The difference, in this case, is 0.00016 light-years! So I do it the faster way not the way your trigonometry teacher

would have you do it.

Asteroid (91131) 1998 HX144 to the west of Arp 55 is at an estimated magnitude of 18.3 per the Minor Planet Center. Doesn't seem that bright in my image. The image was taken over two nights. The asteroid was only in the first night's luminance frames. The trail represents 40 minutes of the 80 minutes I spent on the luminance data.



Focus on Observing Programs

Jim Kvasnicka

Double Star Observing Program

To the contrary, many of the stars we see at night are not a single point of light, but instead they are two or more stars. The Double Star Observing Program introduces observers to 100 of the finest double and multiple stars in the sky. You don't need expensive equipment to view the objects on the list. All the objects on the Double Star list were originally observed using a three inch refractor between 75X and 150X.

Double stars can be very forgiving. You don't need the darkest skies, the clearest skies, or a moonless night to observe many of the objects on the list. Some can even be observed under moderate light pollution.

To qualify for the Double Star certificate and pin you must observe the 100 selected objects on the Double Star Observing Program list. Any telescope may be used. It is preferred that you find the objects by using star hopping methods and not GO-TO, but they will accept them. It's encouraged to observe the stars with varying magnification. Some of the double stars are very close and require higher power to separate the stars.

To record your observations you can use the logs provided on the Astronomical League website or you can use your own. Your observing logs

should include: object, date, time, power, seeing conditions, telescope used, and a drawing of the double or multiple star. The drawing needs to show North and either East or West. Part of the observing program is to teach celestial direction. The angle and position of the stars will be judged by your directions.

Each month in my Observing Report in the Newsletter I list double stars from the Double Star Program. If you observe the double stars I have listed each month you can complete the Double Star Program in one year or sooner if you wish.

When you complete the Double Star Observing Program you will need to submit a copy of your observing logs to me for review. If your logs are accurate and complete I will submit your name to the Double Star Observing Program chair for approval. The chair will mail to me your Double Star certificate and pin which I will present to you at our monthly PAC meeting.

If you have any questions regarding the Double Star Observing Program or need help getting started please contact me and I will be glad to help.

June Observing

Jim Kvasnicka

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

Planets

Venus: Evening planet at magnitude -4.5. On June 12-13 Venus is just north of M44.

Mars: Very low in the evening. On June 2 Mars is among the stars in M44, The Beehive.

Jupiter: Very low in the morning at magnitude -2.1.

Mercury, Saturn, Neptune: Morning planets but difficult to see.

Uranus: Not visible.

Messier List

M58: Galaxy in Virgo.

M59/M60: Galaxies in Virgo that fit in the same FOV.

M84/M86: Galaxies in Virgo that fit in the same FOV.

M87: Round galaxy in Virgo.

M88: Oval shaped galaxy in Coma Berenices.

M89/M90: Galaxies in Virgo that fit in the same FOV.

M91/M98: Galaxies in Coma Berenices.

M99/M100: Galaxies in Coma Berenices.

Last Month: M49, M51, M61, M63, M64, M85, M94, M101, M102, M104

Next Month: M3, M4, M5, M53, M68, M80, M83

NGC and other Deep Sky Objects



NGC 5172: Elongated galaxy in Coma Berenices.

NGC 5248: Oval shaped galaxy in Bootes.

NGC 5676: Oval shaped galaxy in Bootes.

NGC 5689: Elongated galaxy in Bootes.

NGC 5927: Class VIII globular cluster in Lupus.

NGC 5986: Class VII globular cluster in Lupus.

Double Star Program List

Sigma Corona Borealis: Yellow stars.

16/17 Draconis: Equal pair of white stars.

Mu Draconis: Close pair of white stars.

Kappa Herculis: Pair of yellow stars.

Alpha Herculis: Orange primary with a greenish colored secondary.

Delta Herculis: White primary with a blue-purple secondary.

Rho Herculis: Two white stars.

95 Herculis: Light yellow pair.

Alpha Librae: Wide pair of yellow-white stars.

Challenge Object

NGC 5673 and IC 1029: Two galaxies in Bootes that fit in the same FOV.

Astronomy Night at Morrill Hall

Rachel Scheet

Morrill Hall brought back its celebration of astronomy this April with Astronomy Night. This event aimed to provide opportunities for the public to connect with and explore astronomy as they create positive

connections with science. Community partners helped make this night a success! Thank you to Prairie Astronomy Club, Branched Oak Observatory, NE Star Party, Omaha Astronomical Society,

NASA Ambassadors, UNL Astronomy Education Club, NCMN, SAC Museum, and Rolling Bluffs Planetarium for fostering connections to astronomy for almost 300 community members.



Solar Observing at Pioneers Park



Photos by Leona Barratt

Outreach Opportunities

Christine Parkyn

Thanks to all who supported our recent outreach events in April! Below are upcoming outreach events. To volunteer to support an event, let Christine Parkyn know at cpparky@gmail.com.

Lazy Horse Brewery: May 26, All volunteer slots filled

Constellation Talk/Stargazing: June 27, 2023 at Camp Carol Joy Holling from 10:30 to 11:30 p.m., Have 1 volunteer; would like 2-3 more.

Constellation Talk/Stargazing: July 25, 2023 at Camp Carol Joy Holling from 10:30 to 11:30 p.m., Have 1 volunteer; would like 2-3 more.

Stargazing for Camp Erin Johnson: September 22, 2023 at Carol Joy Holling from 9:00 to 10:00 p.m. Need 4 volunteers

Welcome New Members!

Lindsey Nielsen, Martha Gadberry, Ellen Vorderstrasse, Phillip Parks

Calamus or Bust!

Bob Kacvinsky

Every Amateur Astronomer dreams of clear, dark, cloudless, and moonless night skies. In many parts of the country clear dark skies are not possible, but in Nebraska we are blessed to have areas that include light free horizons, clear air, and key bodies of water that help to stabilize the atmosphere.

If you have ever been to the Nebraska Star Party, you know what I mean. In 2021 Merritt Reservoir received the designation as an International Dark Sky site. A few years ago, a few PAC members who were working on several AL observing programs that required the clear pristine skies needed to pick up objects that were up in the fall-spring time frame. Our initial fall/spring trips included the 5-hour drives to Valentine area to stay in cabins at the remote Lord's ranch. It is a great dark sky spot, with convenient parking and observing.



The long drive from Lincoln along with 40-minute drive to Valentine for “supplies” still posed a challenge.

In June 2022, Jim Kvasnicka and I were scheduled to attend the Rocky Mountain Star Stare. A couple of days prior to departure the weather forecast for Colorado was bleak and proved to be a mostly clouded out event. At the last minute, we rerouted our travels to Burwell, NE. It was an easy 2-hour drive from Lincoln and has several remote parking areas near the Calamus

reservoir. We experienced three exceptionally clear “NSP type” nights of viewing that week.

It was during that trip that we found the Gracie Creek Cabin. The cabin included 6 bedrooms that could handle 7 people easily with 6 bedrooms and 3 baths. The cabin is in the remote northern





end of the Calamus Reservoir. Most of our group arrived on Thursday, 4/13, as a cloud front arrived for the first two cloudy nights. One evening we spent in Burwell at the Pizza House which boost to have the best pizza for 100 miles – and it really is. Burwell has several restaurants and bars all within a central square.

Our group included John Speck (Chicago, MeadeLX-90), Eric Balcom (Omaha, SCT), Jason O’Flaherty (Fujifilm X-H2 Camera w/150-600 lens); Brett Boller (150mm Skywatcher Esprit RedCat 51mm), Dan Delzell (16” Teeter Dob),

Jim Kvasnicka (16” Teeter Dob), John Reinert (1100 CPU), Jim White (Celestron 925 EdgeHd SCT), and Bob Kacvinsky (16” Meade Dob).

The days were busy with activities including

a great afternoon playing Disc Golf in Burwell, a visit to Scratch Town Brewery in Ord, preparing meals including ribeye steaks and Brett’s smoked brisket, and enjoying the great scenery around the cabin.

Finally, Saturday and Sunday nights the clouds departed with dark clear skies. Most of the SCTs were gathering Astro photos on DSOs including the Markarian Chain and Messier objects (see page 21). Dan was working on observing programs Two in a View and Planetary Nebulas, Jim K was tracking down Bright Nebulas, and Bob focused on finishing up



Calamus, continued.

the Herschel II observing program. Jim White captured several great photos including the Leo Triplet and Whale galaxy (see pages 24-25). PAC has really become a great place for those interested in capturing Astro photos.

Overall, we had two exceptional nights of viewing. The high winds from midweek through Saturday afternoon

created a little dust issue that brightened the background sky a bit. Yet, the skies around Calamus easily rival those of NSP.

Calamus offers a great place for star gazing including an easy 2-hour drive from Lincoln, plenty of remote parking areas, access to food and entertainment within 30 minutes, hotel in

Burwell or many rental Airbnbs, nice reservoir for water sports including river tanking in summer, and most important the great dark clear skies that only the sandhills of Nebraska can offer. If you are looking for a great weekend getaway with your telescope, family and friends, Calamus is worth a visit.





Astrophotography *Brett Boller*



*Photos were taken by Brett Boller at Calamus.
Above: Whirlpool Galaxy, below: M106*



Astrophotography *Brett Boller*



Photos were taken by Brett Boller at Calamus. Above: NGC4565, below : M100



Astrophotography

Brett Boller



*Photos were taken by Brett Boller at Calamus.
Above: Sunflower Galaxy, below: M105*



Astrophotography *Jim White*



Jim White 2023

The Leo Triplet, NGC 3628 (AKA The Hamburger Galaxy) on the left, M65 on the upper right and M66 on the lower right. The Leo Triplet is an average of 30 million light years from earth. This was 90 1-minute exposures taken using a Celestron 925EdgeHD with an ZWO ASI2400MC Pro camera, N.I.N.A., CPWI and PHD2 used for mount control and guiding, stacked and processed in PixInsight and Lightroom. Processing also included bias, dark, flat and dark flat frames.

Taken at Gracie Creek Cabin by Calamus Reservoir on 4/17/2023.

Astrophotography

Jim White



Jim White 2023

The Whale Galaxy, NGC 4631, approximately 25 million light years from earth. This was 90 1-minute exposures taken using a Celestron 925EdgeHD with an ZWO ASI2400MC Pro camera, N.I.N.A., CPWI and PHD2 used for mount control and guiding, stacked and processed in PixInsight and Lightroom. Processing also included bias, dark, flat and dark flat frames.

Taken at Gracie Creek Cabin by Calamus Reservoir on 4/17/2023.

Astrophotography *Mark Dahmke*



The Moon and Venus, Salzburg, Austria, April 26, 2023. Panasonic Lumix GH5s, ISO 800, 20mm f/1.7 lens, 2 seconds at f/3.2 (2 photo stitched panoramic).

NASA's Webb Takes Closest Look Yet at Mysterious Planet

A science team gains new insight into the atmosphere of a “mini-Neptune,” a class of planet common in the galaxy but about which little is known.

NASA's James Webb Space Telescope has observed a distant planet outside our solar system – and unlike anything in it – to reveal what is likely a highly reflective world with a steamy atmosphere. It's the closest look yet at the mysterious world, a “mini-Neptune” that was largely impenetrable to previous observations.

And while the planet, called GJ 1214 b, is too hot to harbor liquid-water oceans, water in vaporized form still could be a major part of its atmosphere.

“The planet is totally blanketed by some sort of haze or cloud layer,” said Eliza Kempton, a researcher at the University of Maryland and lead author of a new paper, published in *Nature*, on the planet. “The atmosphere just

remained totally hidden from us until this observation.” She noted that, if indeed water-rich, the planet could have been a “water world,” with large amounts of watery and icy material at the time of its formation.

To penetrate such a thick barrier, the research team took a chance on a novel approach: In addition to making the standard observation – capturing the host star's light that has filtered through the planet's atmosphere – they tracked GJ 1214 b through nearly its entire orbit around the star.

The observation demonstrates the power of Webb's Mid-Infrared Instrument (MIRI), which views wavelengths of light outside the part of the electromagnetic spectrum that human

eyes can see. Using MIRI, the research team was able to create a kind of “heat map” of the planet as it orbited the star. The heat map revealed – just before the planet's orbit carried it behind the star, and as it emerged on the other side – both its day and night sides, unveiling details of the atmosphere's composition.

“The ability to get a full orbit was really critical to understand how the planet distributes heat from the day side to the night side,” Kempton said. “There's a lot of contrast between day and night. The night side is colder than the day side.” In fact, the temperatures shifted from 535 to 326 degrees Fahrenheit (from 279 to 165 degrees Celsius).

Such a big shift is only

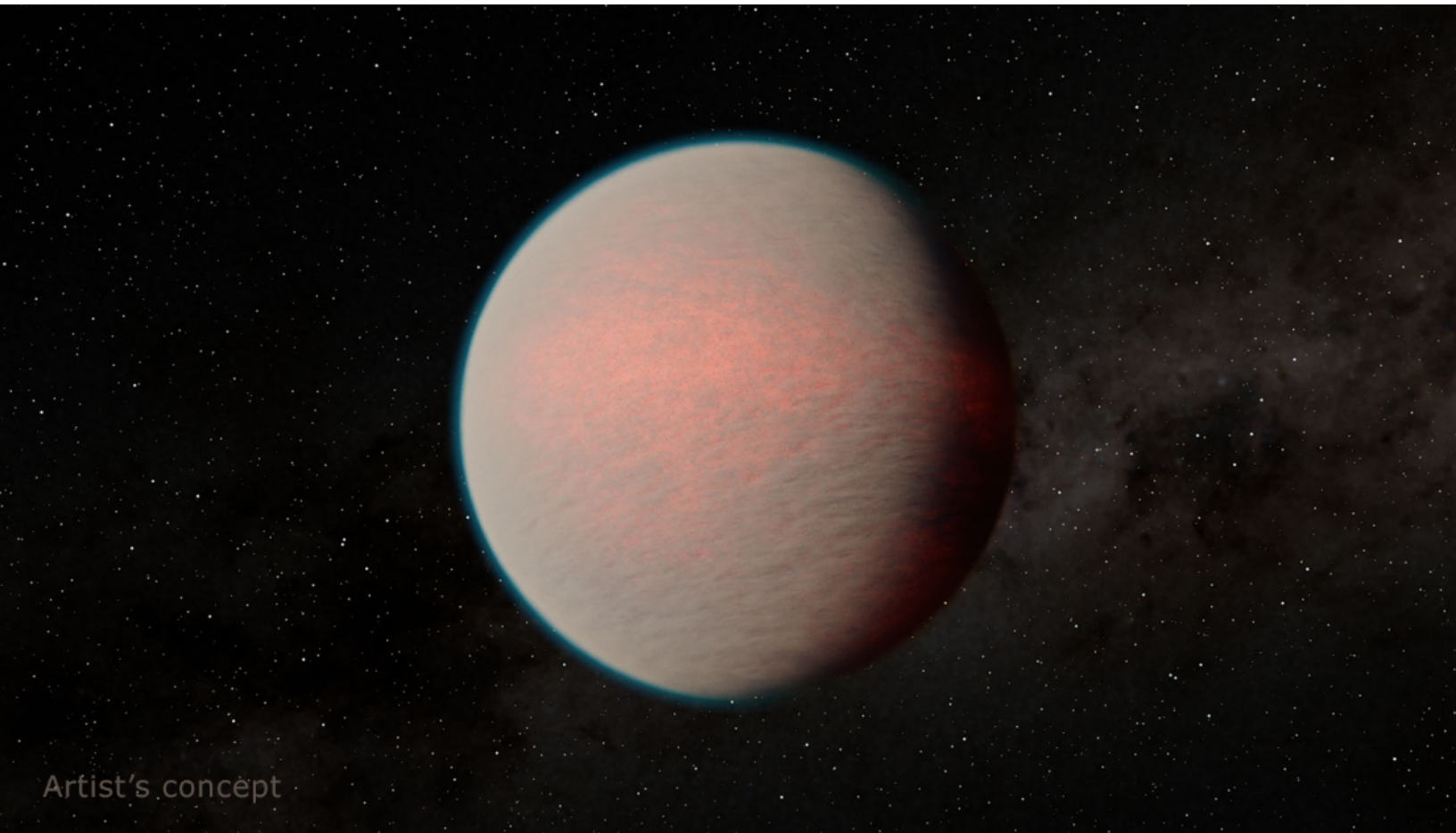
Webb Looks at Mini-Neptune, continued.

possible in an atmosphere made up of heavier molecules, such as water or methane, which appear similar when observed by MIRI. That means the atmosphere of GJ 1214 b is not composed mainly of lighter hydrogen molecules,

Kempton said, which is a potentially important clue to the planet's history and formation – and perhaps its watery start.

“This is not a primordial atmosphere,” she said. “It does not reflect the composition

of the host star it formed around. Instead, it either lost a lot of hydrogen, if it started with a hydrogen-rich atmosphere, or it was formed from heavier elements to begin with – more icy, water-rich material.”



Artist's concept

This artist's concept depicts the planet GJ 1214 b, a "mini-Neptune" with what is likely a steamy, hazy atmosphere. A new study based on observations by NASA's Webb telescope provides insight into this type of planet, the most common in the galaxy. Credit: NASA/JPL-Caltech/R. Hurt (IPAC)

Webb Looks at Mini-Neptune, continued.

Cooler Than Expected

And while the planet is hot by human standards, it is much cooler than expected, Kempton noted. That's because its unusually shiny atmosphere, which came as a surprise to the researchers, reflects a large fraction of the light from its parent star rather than absorbing it and growing hotter.

The new observations could open the door to deeper knowledge of a planet type shrouded in uncertainty.

Mini-Neptunes – or sub-Neptunes as they're called in the paper – are the most common type of planet in the galaxy, but mysterious to us because they don't occur in our solar system. Measurements so far show they are broadly similar to, say, a downsized version of our own Neptune. Beyond that, little is known.

“For the last almost decade, the only thing we really knew about

this planet was that the atmosphere was cloudy or hazy,” said Rob Zellem, an exoplanet researcher who works with co-author and fellow exoplanet researcher Tiffany Kataria at NASA's Jet Propulsion Laboratory in Southern California. “This paper has really cool implications for additional detailed climate interpretations – to look at the detailed physics happening inside this planet's atmosphere.”

The new work suggests the planet might have formed farther from its star, a type known as a red dwarf, then spiraled gradually inward to its present, close orbit. The planet's year – one orbit around the star – takes only 1.6 Earth days.

“The simplest explanation, if you find a very water-rich planet, is that it formed farther away from the host star,” Kempton said.

Further observations will be needed to pin down more details about GJ 1214 b as well

as the formation histories of other planets in the mini-Neptune class. While a watery atmosphere seems likely for this planet, a significant methane component also is possible. And drawing broader conclusions about how mini-Neptunes form will require more of them to be observed in depth.

“By observing a whole population of objects like this, hopefully we can build up a consistent story,” Kempton said.

More About the Mission

The James Webb Space Telescope is the world's premier space science observatory. Webb will solve mysteries in our solar system, look beyond to distant worlds around other stars, and probe the mysterious structures and origins of our universe and our place in it. Webb is an international program led by NASA with its

Webb Looks at Mini-Neptune, continued.

partners, ESA (European Space Agency), and CSA (Canadian Space Agency).

MIRI was developed through a 50-50 partnership between NASA and ESA. NASA's Jet Propulsion Laboratory led the U.S. efforts for MIRI, and a multinational consortium of

European astronomical institutes contributes for ESA. George Rieke with the University of Arizona is the MIRI science team lead. Gillian Wright is the MIRI European principal investigator. Alistair Glasse with UK ATC is the MIRI instrument scientist, and Michael Ressler is the U.S. project scientist at JPL. Laszlo Tamas

with UK ATC manages the European Consortium. The MIRI cryocooler development was led and managed by JPL, in collaboration with Northrop Grumman in Redondo Beach, California, and NASA's Goddard Space Flight Center in Greenbelt, Maryland. Caltech manages JPL for NASA.



By Dave Scherping

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From the Archives

May, 2003

The official dedication of the Hyde Memorial Observatory Photovoltaic system took place on April 30th, 2003. This project was conceived in November of 2000 as a replacement for the passive solar heating system that was in need of major repairs. Unlike the old system, which just collected heat energy, the Photovoltaic (PV) system is generating electricity. To date, it has provided over 60% of Hyde Observatory's electrical needs.

Hyde Chairman Erik Hubl welcomed the guests and provided opening remarks described the project from conception to completion. Todd Hall, Manager of the Consumer Services Division at LES (Lincoln Electric System) spoke highly of the project, its visible

Hyde Observatory Photovoltaic System Dedicated

location and of the goal to share PV performance information with the public.

Lynn Johnson, Director of the Lincoln Parks & Recreation department praised the observatory and its volunteers for providing over 25 years of astronomy education to the public.

After the dedication speeches, guests were shown a short Power Point program of the installation process and a Power Point clip containing solar images. Many of the guests had never before seen images of the sun in H-alpha or from the SOHO satellite.

The PV project was funded through a demonstration grant provided by LES. It is designed to demonstrate the process of capturing solar

energy, convert it to alternating current and supply about half of the observatory's electrical needs.

Lincoln Parks & Recreation provided several major improvements to the Observatory including a new shingled roof and new siding.

Information Analytics, Inc. of Lincoln installed the computer systems and provided programming services. Ron Veys designed and constructed the new cabinets that house the two computer systems. Alltel donated a ADSL service for the Observatory's use. Jon Dixon of Dixon Power Systems, Lincoln NE was the project contractor.

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

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