

The Prairie Astronomer

January 2015 Volume 56, Issue #1

January Program:

How to Use Your Telescope

Cover Photo: NGC 6255

By Rick Johnson

In This Issue:

Photos from the December PAC Meeting

More Large Planets in the Solar System?

Comet Lovejoy

Black hole mergers

And more...



Night Sky Network



The Newsletter of the Prairie Astronomy Club

The Prairie Astronomer

NEXT PAC MEETING

Tuesday January 27, 2015 7:30 PM
Hyde Observatory

Program

The Prairie Astronomy Club will offer its annual free session: "How to Use Your Telescope" at Hyde Observatory, Tuesday evening January 27th at 7:30 p.m.

Do you own a telescope and need help getting started using it?

The Prairie Astronomy Club would like to help. Every year at our January meeting, we offer a session to give hands-on assistance. There is no charge for this session. It is open to the public and if you have a telescope you want to use you are encouraged to bring it.

The Prairie Astronomy Club holds its meetings the last Tuesday of every month at Hyde Memorial Observatory in Holmes Park here in Lincoln. You do not need to be a member to attend one of these meetings.

Pac-list Has Moved

The old pac-list listserv has been moved to Google Groups. The new email address is pac-list@googlegroups.com. Everyone who was subscribed to the old list has been added to the new list. This list is open to anyone, not just PAC members. To subscribe click here: [GoogleGroups](#).

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.

Events

PAC Meeting
Tuesday January 27th, 2015, 7:30pm
Hyde Observatory

PAC Meeting
Tuesday February 24th, 2015, 7:30pm
Hyde Observatory

PAC Meeting
Tuesday March 31st, 2015, 7:30pm
Hyde Observatory

Newsletter submission deadline February 15, 2015

Club Officers

President Jim Kvasnicka
(402) 423-7390
jim.kvasnicka@yahoo.com

Vice President Brett Boller
proboller86@yahoo.com

2nd VP (Program Chair) Dave Churilla
dchurilla@neb.rr.com

Secretary Lee Taylor
otaylor88@gmail.com

Treasurer John Reinert
jr6@aol.com

Club Observing Chair Jim Kvasnicka
jim.kvasnicka@yahoo.com

Outreach Coordinator Dan Delzell
dan@delzell.net

Website and Newsletter Editor Mark Dahmke
Mark@dahmke.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, contact Dave Churilla. 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

Internet

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

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

PAC Star Party Dates

Dates in bold are closest to the new moon

2015 Star Party Dates

Jan 16,**23**, Feb 13,**20**
Mar 13,**20**, Apr 10,**17**
May 8,**15**, Jun 12,**19**
Jul 10,**17**
NSP Jul **12-17**
Aug 7,**14**, Sep 4,**11**
Oct **9**,16, Nov 6,**13**
Dec 4,**11**

Lunar Party Dates

Mar 27, Apr 24, Jul 24, Aug 21

(Lunar party dates are tentative, sites to be determined.)

PAC E-Mail:

info@prairieastronomyclub.org

PAC-LIST:

Subscribe through [GoogleGroups](#). To post messages to the list, send to the address:

pac-list@googlegroups.com

Club Apparel

Order club apparel from cafepress.com:



Address

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

PAC Board Meeting Minutes

PAC Board Meeting 1-15-15

President Jim Kvasnicka called the meeting to order

Present:

Jim Kvasnicka, President
Brett Boller, Vice President
Dave Churilla, 2nd Vice President, Program Chair
Lee Taylor, Secretary
John Reinert, Treasurer
Dan Delzell, Outreach Coordinator
Mark Dahmke, Newsletter editor

Jim discussed the January meeting, with a short business meeting, followed by a short general interest video to pass time for late arriving guests to show up. Dave and Jim will work on this. Following this, we'll open for questions for folks who need help, introduce ourselves, and break up into groups to help.

We will be asking members with some tools to bring them to help.

Jim asked about publicity for the meeting. Lee said he had posted to the 10-11 and KFOR websites. Jim has an announcement in the Neighborhood Extra and Journal Star. We discussed placing the meetings in each of these each month. We will be doing this, anywhere we can get a free announcement. Having a slide in the shows for Mueller Planetarium and at Hyde was discussed. Mark mentioned that

promotion on Facebook cost around \$20. We agreed to do these promotions for special occasions, such as solar observing.

Dave presented a tentative schedule for future programs. We discussed possible options and contingencies for the schedule. Dave also made several suggestions for programs, including astro photography from Brett, and various professors from local colleges.

Jim mentioned nominating Jack Dunn for an honorary, lifetime membership. After brief discussion, Dave motioned to nominate Jack, Lee seconded. The vote was unanimous in favor. We will present Jack Dunn with an honorary membership.

Audit

Jim and John have done some work on it, and are not yet ready, but progress is being made. John reported difficulties with converting and transferring the quicken files. Mark mentioned mint.com and its ease of use. We'll look into this. John asked about converting our accounts from a personal account to a business account. We gave John permission to make the necessary changes for personal to business accounts. John provided unreconciled balances and interest earned. There was discussion about

previous processes, and how to proceed. John will continue to work on this.

John also asked about Night Sky Network listings of memberships, and keeping track of addresses and emails. Mark suggested that this would be handled by the individual members. Also, several email issues were discussed.

Astronomy Day will be Sunday, April 12 from 1:30-4:30. We will be scaling down this year, with one floor, and fewer presentations. The theme will also be more generally science oriented not simply astronomy. We discussed what stations to keep and what we don't need. We discussed what, if any drawings we should have. Jim will discuss this with Zack.

Jim brought up the request for Bright Lights presentation at Randolph Elementary in June. We discussed age-appropriate presentations we could do for 1st and 2nd grade students. Dave and Jim will work on this.

Earl Moser Memorial

Brett said that his contact didn't have the equipment to do the sundial. We discussed alternatives. We also thought of asking the Hyde board for advise and assistance. Dave will look into these things.

Brett provided an update to the robotic observatory project with

Tom Miller. He talked about the problems with the dome, etc.

Mark noted that there hasn't been much activity on the PAC-list lately. Considering the other media available, the list-serv seems to have become obsolete. We discussed the consequences of discontinuing it, and providing notice to its users.

We discussed issues with using the night sky network, bouncing emails, etc. We will provide reminders to keep members information current.

Lee asked for help accounting for the PAC equipment for checkout, and sorting through it to make sure all accessories are with the proper telescopes. Dave and Lee will make some

time for this in the next couple of weeks.

Meeting Adjourned

Respectfully submitted by,

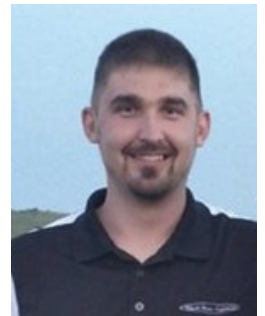
Lee Taylor

Help out the Prairie Astronomy Club with Amazon Smile

Brett Boller

Amazon Smile is an automatic way to support your favorite charities at NO cost to you. All you have to do is shop on www.smile.amazon.com. If you shop on Amazon then you are already doing this, but not passing on the rewards. It is the same site with the same prices but it donates to your local charities. The Prairie Astronomy Club is a 501(c)(3) public organization and is eligible for Amazon to donate to. It is very simple to setup, and you only have to do it once. On your first visit to www.smile.amazon.com you will need to select your charitable organization. Just search for the Prairie Astronomy Club and click search.

awhile if you would switch to smile if you go to www.amazon.com. This is a great way at NO COST to you to support the Prairie Astronomy Club. This is also probably something that you already do. Amazon donates 0.5% of the purchase price to the organization of your choice. For more information see <http://smile.amazon.com/about>.



After that just click select and you are all done.

Now all you have to do is remember to start at www.smile.amazon.com instead of www.amazon.com. Amazon will remind you for



Cover Photo: NGC 6255

Rick Johnson

NGC 6255 is a low surface brightness barred spiral galaxy toward the upper middle of the keystone of Hercules about 42 million light-years distant by red shift. Other measurements are all over the board ranging from 56 to 104 million light-years with a median of 68 million light-years. All indicate it is further than the redshift value. So I'll assume the median value is the more reasonable one. At that distance it is about 75,000 light-years across, rather typical for a spiral though large for most low surface brightness ones I've imaged. While it has a bright bar I see no core or central bulge.

On its east edge is a bright blue star cloud so bright it almost looks like a field star in my image. Several sources including NED say it is a separate galaxy with HII emission though what few notes I find on it say it is just a rich, dense star cloud in the galaxy. One reads: "The galaxy has been noted to have a possible companion (HS 1653+3634) which lies 75" to the east. It seems more likely from GALEX data that this object is just a particularly bright, blue cluster complex in the XUV-disk of NGC 6255." I tend to agree. Redshift would indicate that is the case as well with that side if the galaxy rotating toward us reducing the measured redshift slightly. In

any case I've marked it in the annotated image.

NGC 6225 was discovered on May 16, 1787 by William Herschel but being so faint it didn't make either of the Herschel 400 observing lists. I suspect it would be a difficult target for even a 16" scope seen visually.

I moved it to the west from center as even in the 10 second framing image I'd taken I saw what appeared to be two galaxy clusters well to the east and wanted to better include them in the frame. Turns out that was a good idea as they both show

quite nicely. The galaxy was so faint I'd hoped to get at least 8 frames of luminance

and 3 for each color but that meant two nights work in early July and the weather just didn't cooperate. I took this data on July 3, my first July image but the fifth luminance frame was severely hurt by dawn. I included it but doubt it helped much if any. I put it back on the list for a second run but that never happened so I went with the data I was able to get.



Venus and Mercury

Submitted by Bill Lohrberg.

This was taken by Greg Westphal last Friday evening Jan 9 around 6:30pm from Southwest Lincoln. I texted him to take a look as he was unaware this was happening. Finding himself at work unprepared he quickly improvised using his digital Olympus camera (optically zoomed) atop a surveyors transit tripod to keep as still as possible... I thought it was a very nice shot considering the circumstances.



February Observing: What to View

Jim Kvasnicka



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

Planets

Venus/Mars: Venus is at magnitude -3.9 and dimmer Mars is at 1.2. On February 7th Mars is 8° above bright Venus. They will get closer each evening and by February 20th they are less than 1° from each other until February 23rd.

Neptune: Near Venus but difficult to see in the evening twilight.

Uranus: About 4° to the upper left of Venus but difficult to see.

Jupiter: Reaches opposition on February 6th. It shines at magnitude -2.6 between Leo and Cancer with a disk 45" wide.

Saturn: Rises around 2 am to start February. The rings are tilted almost 25°.

Mercury: Low on the SE and difficult to see before dawn.

Messier List

M1: The Crab Nebula in Taurus.

M35: Open cluster in Gemini.

M36/M37/M38: Open clusters in Auriga.

M42: The Orion Nebula

M43: Nebula just north of M42.

M45: The Pleiades.

M78: Reflection nebula in Orion.

M79: Class V globular cluster in Lepus.

Last Month: M33, M34, M52, M74, M76, M77, M103

Next Month: M41, M44, M46, M47, M48, M50, M67, M81, M82, M93

NGC and other Deep Sky Objects

NGC 2571: Open cluster in Puppis.

NGC 2768: Galaxy in Ursa Major.

NGC 2841: Galaxy in Ursa Major.

NGC 2903: Galaxy in Leo.

NGC 3198: Galaxy in Ursa Major.

NGC 3242: The Ghost of Jupiter, planetary nebula in Hydra.

Double Star Program List

32 Eridani: Yellow primary with a white secondary.

55 Eridani: Yellow and pale yellow stars.

Gamma Leporis: Pair of yellow stars.

Epsilon Monocerotis: White primary with a pale yellow secondary.

Beta Monocerotis: Three bluish white stars.

Kappa Puppis: Equal white pair.

Alpha Ursa Minoris: Polaris, pale yellow and white stars.

N Hydrae: Equal yellow pair.

Challenge Object

NGC 2992/2993: Interacting galaxy pair in Hydra.

December PAC Meeting

Photos by Jim Atkins



Top left: our guest speaker, Larry Stepp and Jim Atkins.
Top right: Jim Kvasnicka, Larry Stepp, Rick Johnson and Holly Johnson.



Left: John Lammers
Below: Lee Thomas, Ron Veys, Mark Dahmke and Rick Johnson.
Right: Jack Dunn, via Skype.



Larry Stepp's presentation was an update on the start of construction of the Thirty Meter Telescope.



C/2014-Q2 Lovejoy

Jim Kvasnicka

Comet Lovejoy is in its best two weeks for observing. At the time I wrote this on January 12th it was at magnitude 3.8 in Taurus. It is expected to stay bright through the end of January.

It is an easy binocular object and is a naked-eye object in dark skies if you know where to look. I have observed it several nights with my 10x50 binoculars and it is a fuzz-ball with a bright core. On January 9th I went out into the 8 degree cold to observe it with my 10 inch Dobsonian telescope. At that time it had a bright nucleus 3 arc minutes in diameter with a fuzzy coma 20 arc minutes in diameter. I was not able to detect a tail when I observed it.

This is the fifth comet discovered by Terry Lovejoy of Australia. He found it last August in Puppis at 15th magnitude. Lovejoy will move from Taurus into Aries, Triangulum, and finish January very close to the double star Almach in Andromeda. Take the time to go out into the cold to observe Lovejoy, you will find it very worthwhile.

Below: Comet Lovejoy taken on 15 January by OAS member John Johnson. These were taken with a 50mm lens and Canon Xsi- a stack of four 2 minute exposures. You can see the Hyades and the Pleiades clusters as well.



Astronomers are Predicting at Least Two More Large Planets in the Solar System

Nancy Atkinson, *Universe Today*

Could there be another Pluto-like object out in the far reaches of the Solar System? How about two or more?

Earlier this week, we discussed a recent paper from planet-hunter Mike Brown, who said that while there aren't likely to be any bright, easy-to-find objects, there could be dark ones "lurking far away." Now, a group of astronomers from the UK and Spain maintain at least two planets must exist beyond Neptune and Pluto in order to explain the orbital behavior of objects that are even farther out, called extreme trans-Neptunian objects (ETNO).

We do know that Pluto shares its region Solar System with more than 1500 other tiny, icy

worlds along with likely countless smaller and darker ones that have not yet been detected.

In two new papers published this week, scientists at the Complutense University of Madrid and the University of Cambridge noted that the most accepted theory of trans-Neptunian objects is that they should orbit at a distance of about 150 AU, be in an orbital plane – or inclination – similar to the planets in our Solar System, and they should be randomly distributed.

But that differs from what is actually observed. What astronomers see are groupings of objects with widely disperse distances (between 150 AU and

525 AU) and orbital inclinations that vary between 0 to 20 degrees.

"This excess of objects with unexpected orbital parameters makes us believe that some invisible forces are altering the distribution of the orbital elements of the ETNO," said Carlos de la Fuente Marcos, scientist at UCM and co-author of the study, "and we consider that the most probable explanation is that other unknown planets exist beyond Neptune and Pluto."

He added that the exact number is uncertain, but given the limited data that is available, their calculations suggest "there are at least two planets, and probably more, within the confines of our solar system."

In their studies, the team analyzed the effects of what is called the 'Kozai mechanism,' which is related to the gravitational perturbation that a large body exerts on the orbit of another much smaller and further away object. They looked at how the highly eccentric comet 96P/Machholz1 is influenced by Jupiter (it will come near the orbit of Mercury in 2017, but it travels as much as 6 AU at aphelion) and it may "provide the key to explain the puzzling clustering of orbits



At least two unknown planets could exist in our solar system beyond Pluto. / Credit: NASA/JPL-Caltech.

around argument of perihelion close to 0° recently found for the population of ETNOs,” the team wrote in one of their papers.

They also looked at the dwarf planet discovered last year called 2012 VP113 in the Oort cloud (its closest approach to the Sun is about 80 astronomical units) and how some researchers say it appears its orbit might be influenced by the possible presence of a dark and icy super-Earth, up to ten times larger than our planet.

“This Sedna-like object has the most distant perihelion of any known minor planet and the value of its argument of perihelion is close to 0° ,” the team writes in their second paper. “This property appears to be shared by almost all known asteroids with semimajor axis greater than 150 au and perihelion greater than 30 au (the extreme trans-Neptunian objects or ETNOs), and this fact has been interpreted as evidence for the existence of a super-Earth at 250 au. In this scenario, a population of stable asteroids may be shepherded by a distant, undiscovered planet larger than the Earth that keeps the value of their argument of perihelion librating around 0° as a result of the Kozai mechanism.”

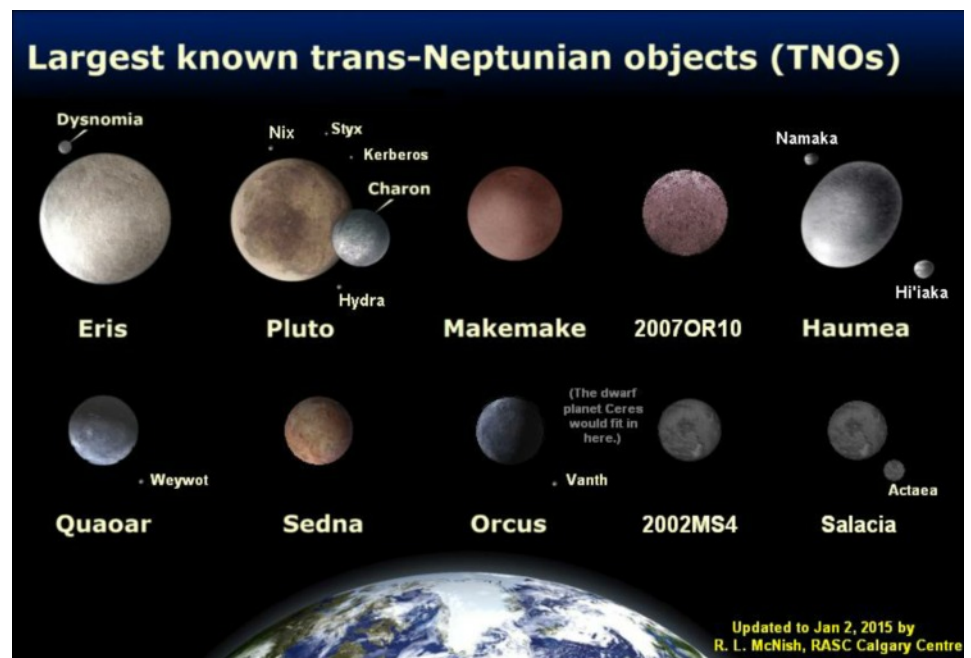
Of course, the theory put forth in two papers published by the team goes against the predictions of current models on the formation of the Solar

System, which state that there are no other planets moving in circular orbits beyond Neptune.

But the team pointed to the recent discovery of a planet-forming disk around the star HL Tauri that lies more than 100 astronomical units from the star. HL Tauri is more massive and younger than our Sun and the discovery suggests that planets

Further reading:

Carlos de la Fuente Marcos, Raúl de la Fuente Marcos, Sverre J. Aarseth. “Flipping minor bodies: what comet 96P/Machholz 1 can tell us about the orbital evolution of extreme trans-Neptunian objects and the production of near-Earth objects on retrograde orbits”. Monthly Notices of the Royal



The presently known largest small bodies in the Kuiper Belt are likely not to be surpassed by any future discoveries. This is the conclusion of Dr. Michael Brown, et al. (Illustration Credit: Larry McNish, Data: M. Brown)

can form several hundred astronomical units away from the center of the system.

The team based their analysis by studying 13 different objects, so what is needed is more observations of the outer regions of our Solar System to determine what might be hiding out there.

Astronomical Society
446(2):1867-1873, 2015.

C. de la Fuente Marcos, R. de la Fuente Marcos. “Extreme trans-Neptunian objects and the Kozai mechanism: signalling the presence of trans-Plutonian planets? Monthly Notices of the Royal Astronomical Society Letters 443(1): L59-L63, 2014.

Minor Mergers Have Massive Consequences for Black Holes

Dr. Ethan Siegel

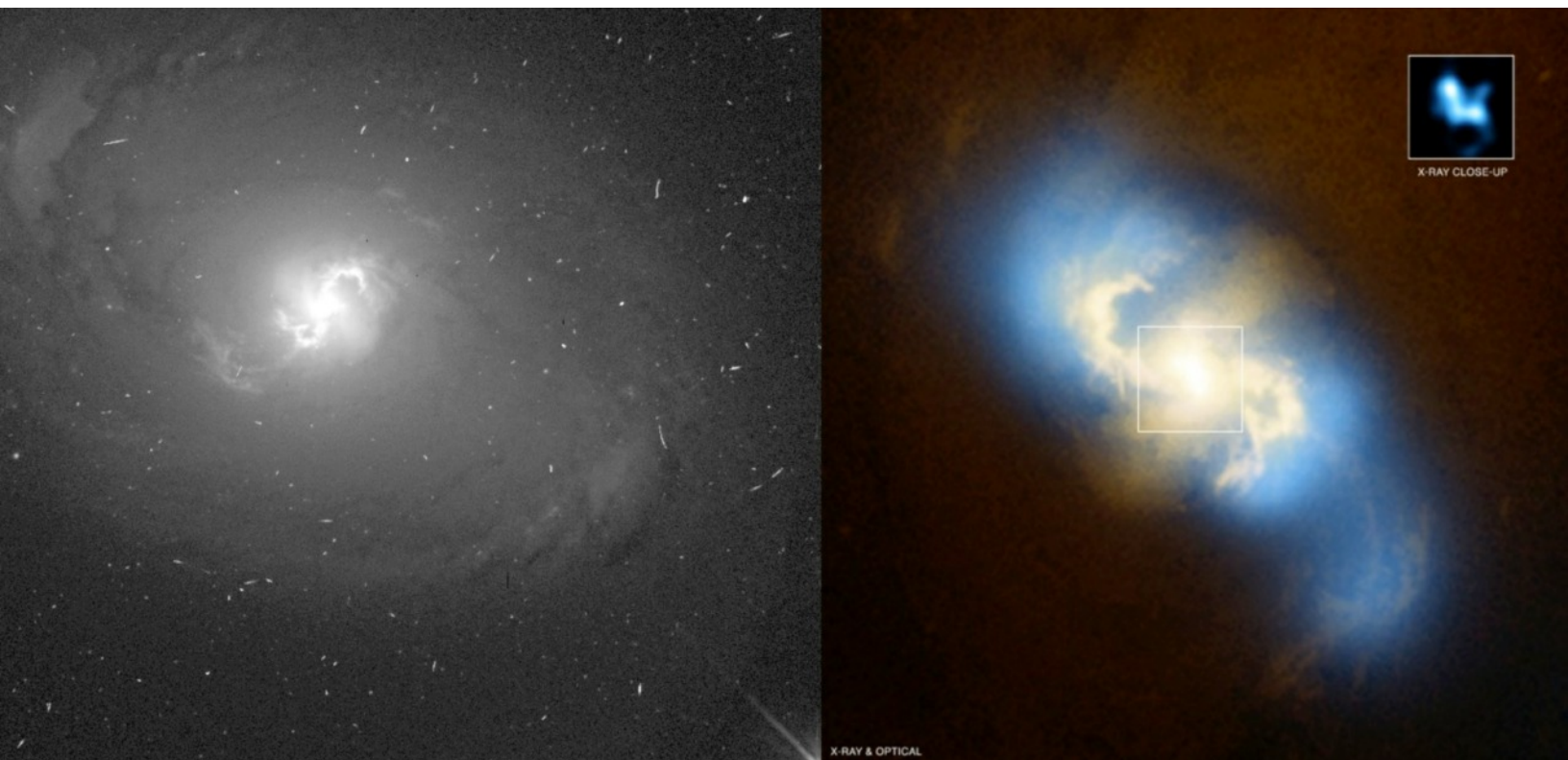
When you think of our sun, the nearest star to our world, you think of an isolated entity, with more than four light years separating it from its next nearest neighbor. But it wasn't always so: billions of years ago, when our sun was first created, it very likely formed in concert with thousands of other stars, when a giant molecular cloud containing perhaps a million times the mass of our solar system collapsed. While the vast majority of stars that the universe forms—some ninety-five percent—are the mass of our sun or smaller, a rare but significant fraction are ultra-massive, containing tens or

even hundreds of times the mass our star contains. When these stars run out of fuel in their cores, they explode in a fantastic Type II supernova, where the star's core collapses. In the most massive cases, this forms a black hole.

Over time, many generations of stars—and hence, many black holes—form, with the majority eventually migrating towards the centers of their host galaxies and merging together. Our own galaxy, the Milky Way, houses a supermassive black hole that weighs in at about four million solar masses, while our big sister, Andromeda, has one

nearly twenty times as massive. But even relatively isolated galaxies didn't simply form from the monolithic collapse of an isolated clump of matter, but by hierarchical mergers of smaller galaxies over tremendous timescales. If galaxies with large amounts of stars all have black holes at their centers, then we should be able to see some fraction of Milky Way-sized galaxies with not just one, but *multiple* supermassive black holes at their center!

It was only in the early 2000s that NASA's Chandra X-ray



Images credit: NGC 3393 in the optical (L) by M. Malkan (UCLA), HST, NASA (L); NGC 3393 in the X-ray and optical (R), composite by NASA / CXC / SAO / G. Fabbiano et al. (X-ray) and NASA/STScI (optical).

Observatory was able to find the first binary supermassive black hole in a galaxy, and that was in an ultra-luminous galaxy with a double core. Many other examples were discovered since, but for a decade they were all in ultra-massive, active galaxies. That all changed in 2011, with the discovery of two active, massive black holes at the center of the regular spiral galaxy NGC 3393, a galaxy that must have undergone only

minor mergers no less than a billion years ago, where the black hole pair is separated by only 490 light years! It's only in the cores of active, X-ray emitting galaxies that we can detect binary black holes like this. Examples like NGC 3393 and IC 4970 are not only confirming our picture of galaxy growth and formation, but are teaching us that supermassive relics from ancient, minor mergers might persist as

standalone entities for longer than we ever thought!

Check out some cool images and artist reconstructions of black holes from Chandra:
<http://chandra.harvard.edu/photo/category/blackholes.html>

Kids can learn all about Black Holes from this cool animation at NASA's Space Place:
<http://spaceplace.nasa.gov/black-holes>.

From the Archives

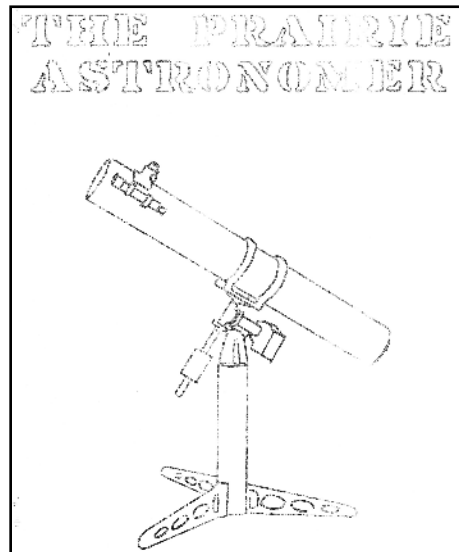
January, 1967:

Seven of our club members witnessed the grazing occultation of Eta Leonis on Dec 31st at 3:45 A.M.

A chilly wind made viewing difficult. The wind also shook my scope a bit so I could not time it, the disappearance and reappearance. Rick saw the star disappear then a heavy fog rolled in and ended the whole thing. These grazing occultations are new to our club and quite interesting. I look forward to doing it again, only in warmer weather.

The Club treasury was upped by some sixteen dollars from the

auction of [a] lens last meeting. There are a lot of lenses left and we will have more auctions.



The letter requesting funds for our observatory is nearly ready. It will be read at the meeting and any changes needed will be made. Next step will be to make a list of names of prospective donors.

The daylight savings thing has come to life again. It looks like our futile efforts to halt it will be in vain. It burns me up to think that we will have to give up an hour of darkness just so others can have an extra hour of daylight. If any one of you have any ideas or comments on this, please let me know.

Earl Moser, President.