Skylights

Newsletter of the Astronomical Society of Northern New England

APR2022

Member of NASA's Night Sky Network

Astronomical League

ASNNE MISSION

ASNNE is an incorporated, non-profit, scientific and educational organization with three primary goals:

1) To have fun sharing our knowledge and interest with others.

2) To provide basic education in astronomy and related sciences to all who are interested.

3) To promote the science of Astronomy.

What's Up In April

By Bernie Reim

The month of April is named for the Latin word aprilis, which means to open. That is what some buds and flowers will be starting to do later this month. Look for many other terrestrial signs of spring, including the spring peepers, skunk cabbages, and some early bird species returning to New England. Much more of that will happen next month, but it is interesting to try to catch the first signs of that this month, the first full month of spring.

We can also open our own views to the sky much more this month as it will get warmer even as the nights are already getting shorter. There will be several great highlights to entice us outside at night this month beyond just the warmer weather. These include a very close conjunction of Venus and Jupiter, all the planets visible and bunched fairly close together in the morning sky except Mercury, which makes its best appearance for the year later this month in the evening sky, the first good meteor shower since January, and another comet which might even become brighter than NEOWISE became in July of 2020.

On the last morning of this month, Venus and Jupiter, our two brightest planets, will form their closest conjunction from our perspective until 2039. They will be less than half a degree apart, which is the width of the full moon. Your index finger at arm's length covers about one degree of the sky.

You could fit both of these planets into the same field of view in a telescope, which would also enable you to see the four large Galilean moons, Ganymede, Io, Callisto, and Europa. Notice that Venus is just over 6 times brighter than Jupiter. The Juno mission that NASA launched to this planet in August of 2011 and arrived on July 4 of 2016 has already completed its scheduled 35 highly elliptical orbits of 53 days each last summer, but it was extended to September of 2025. This ingenious little spinning solar-powered spacecraft is the fastest craft humans have ever created. It is constantly zipping around Jupiter at 42 miles per second, just over twice as fast as the earth is orbiting the sun. Juno has discovered many new things about this planet already and will most likely discover much more in the next 3 years.

Juno has to plunge through the powerful plasma torus of charged particles trapped in the planet's strong magnetic fields for a few minutes each orbit. It also plunges through the even more powerful fields of the flux tube that connects Jupiter with Io, but it has not been damaged by that because it is diffuse enough. Io is the most volcanically active place in our whole solar system. It constantly pumps out 1 ton of particles every second, most of which get trapped in this flux tube.

I have heard the strong radio signals that this generates on two separate occasions. The long bursts sound a little like surf crashing on a beach with swishing sounds. The short bursts sound like pebbles on a tin roof or popcorn popping. They obviously did not say anything, but it was quite an experience to be able to literally tune in on an unseen aspect of nature audibly while Jupiter and Io were also visible in the sky above us. The terrestrial setting for one of these was a very cold night during the Bridgton Winter Festival with 2 feet of snow on the ground with a thick crust of ice. This added enormously to the other-worldly nature of the whole experience.

Saturn and Mars will also form a very close conjunction in the morning sky on April 4th. They will both rise around 5 a.m., closely followed by Jupiter. Then keep watching as Venus and Mars continue to trek eastward through Capricorn, while distant Saturn barely moves. Then the waning crescent moon will pass near all of these planets low in the morning sky from the 24th through the 27th. Notice that orange Mars and golden Saturn are about the same brightness and they are each about 100 times fainter than brilliant Venus to the left of the pair.

That leaves Mercury as the lone evening planet since the other 4 bright planets have long since

"Continued on page 2"

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What's Up "*Continued from page 1*"

migrated to the morning sky after gracing our evening skies for much of last year. It will make its best appearance for the whole year later this month and it will be just a few degrees to the right of Uranus in Aries below the Pleiades on the 17th, but you would need binoculars to see that.

The first good meteor shower since the January 4 Quadrantids will happen on Friday the 22nd, which is always also Earth Day. The first Earth Day didn't start until 1970, just after we obtained our first comprehensive and distant view of Earth on our way to and back from the moon. That new perspective of our precious planet also sparked some very necessary and overdue legislation like the Clean Air and Clean Water Act. In contrast, Comet Thatcher was discovered back in 1861 and has probably been creating these meteors in its debris trail that we pass through on this same day every year since long before that date.

You can expect about 18 meteors per hour from the Lyrids from a good dark sky sight on the night of Friday the 22nd. A nearly last quarter moon will rise around midnight, spoiling the show somewhat, but don't give up. I saw 21 Geminids with the moon still up on December 13 of last year. Comet Thatcher only orbits the sun once every 415 years. They will all emanate from their radiant in Lyra, just to the right of the bright star named Vega, which was the star Carl Sagan wrote about in his book CONTACT.

There is another very promising comet now in our skies that could potentially become brighter than NEOWISE was in July of 2020. NEOWISE reached about first magnitude, or 100 times brighter than the faintest object you can see with the unaided eye. It also sported a nice tail stretching over 10 degrees of the sky below the Big Dipper, making it the brightest comet since Hale-Bopp in 1997.

This comet was discovered last year with the PanSTARRS observatory in Haleakala Hawaii. It started searching the skies in 2010 and has already discovered dozens of comets. In contrast, SOHO (Solar and Heliospheric Observatory) orbiting the sun has discovered nearly 2000 comets in its 25 year history so far, many of which plunged into the sun with no return. C/2021 03 (PanSTARRS) can be seen in Cetus the whale and it will travel into Aries the Ram just to the left of Mercury and Uranus by the 27th and then it will continue into Taurus just to the right of the Pleiades by the 29th and 30th. It will reach perihelion with the sun on the 21st and it will reach its peak brightness a few nights later. You will need a good view of the western evening horizon to see this cosmic interloper paying us a short visit on its long journey.

We now have exactly 2 years to go until the next great American Total Solar Eclipse similar to the one on August 21 of 2017. That will happen on April 8 of 2024 and it will pass right over much of central and northern Maine. We will have to share this one with Mexico and Canada, but most of it will happen over the United States. Its path will stretch from Texas to Maine. Its path will form an X with the one in August of 2017, with Carbondale, IL, marking the center. Maybe there is some treasure there. In any case, having two total solar eclipses passing right over your house in less than 7 years when the average time between solar eclipses for any given place on Earth is 350 years is quite a treasure in itself. However, you can always travel to capture that treasure for yourself as I did in 2017.

April 1. New moon is at 2:24 a.m. EDT. On this day in 1997 Comet Hale-Bopp, a very bright once-in-a-lifetime comet, made its closest approach to the sun. Comet Hyakutake became nearly as bright just one year earlier, also qualifying as a once-in-a-lifetime comet.

April 4. Mars passes half a degree south of Saturn this morning.

April 6. The moon passes near the dwarf planet Ceres this morning in Taurus this morning.

April 7. The Compton Gamma Ray observatory was launched on this day in 1991. This was one of a family of 4 great space telescopes, each designed to study the skies in a different wavelength. Compton discovered about one extremely powerful gamma ray burst every day during its 9 short years of work. The Hubble Space Telescope is still working 32 years after its own launch having given us nearly 2 million great images that completely revolutionized our understanding of the cosmos.

April 9. First quarter moon is at 2:48 a.m.

April 11. On this day in 1986 Halley's Comet reached perihelion with the sun. I first saw his comet on 11/8/1985, exactly 329 years after Edmund Halley's birth in 1656.

April 12. On this day in 1961 Yuri Gagarin became the first human to orbit the earth. John Glenn became the first American to do so less than one year later on 2/20/1962.

April 16. Full moon occurs at 2:55 P.M. This is also called the Pink, Fish, Grass, or Egg Moon.

April 22. The Lyrid meteor shower peaks today, Earth Day.

April 23. Last quarter moon is at 7:56 a.m. EDT.

April 24. The moon passes 5 degrees south of Saturn this morning.

April 25. On this day in 1990 the Hubble Space Telescope was launched.

April 26. The moon passes near Venus this morning.

April 27. The moon passes near Jupiter this morning.

April 29. Mercury is at greatest eastern elongation at 21 degrees east of the sun this evening.

April 30. Venus passes less than half a degree north of Jupiter this morning. New moon is at 4:28 p.m. A partial solar eclipse will take place over South America today. The American astronomer Frances Wright was born on this day in 1897. She taught celestial navigation at Harvard and wrote 3 books on that subject.

★

Moon Phases

Apr 1
New

Apr 9
First Quarter

Apr 16
Full

Apr 23
Last Quarter

Apr 30
New

Moon Data

Apr 3
Uranus .6° north of Moon

Apr 7
Moon at apogee

Apr 19
Moon at perigee

Apr 24
Saturn 5° north of Moon

Apr 25
Mars 4° north of Moon

Apr 26
Venus 4° north of Moon

Neptune 4° north of Moon

Apr 27
Jupiter 4° north of Moon

OBSERVER'S CHALLENGE* – April, 2022

by Glenn Chaple

NGC 3079 Barred Spiral Galaxy in Ursa Major (Magnitude 10.9; Size 7.9' x 1.4')

If you're a fan of edge-on or nearly edge-on galaxies, you'll love this month's Observer's Challenge- the barred spiral galaxy NGC 3079 in Ursa Major. Modern observations reveal a 3000 light year wide gaseous "bubble" emanating from the galaxy's center, created either by a massive black hole or a burst of star formation.

By chance, I was in the neighborhood of NGC 3079 on the evening of April 28, 1976 when I viewed the double star Struve 1402 (magnitudes 8 and 9, separation 33") with a 3-inch f/10 reflecting telescope. The pair was faintly seen, as was a 10th magnitude companion, 132" south of the main star. NGC 3079 was less than a half degree north-northwest of Struve 1402, but there is no way I would have glimpsed the 11th magnitude galaxy with this little scope.

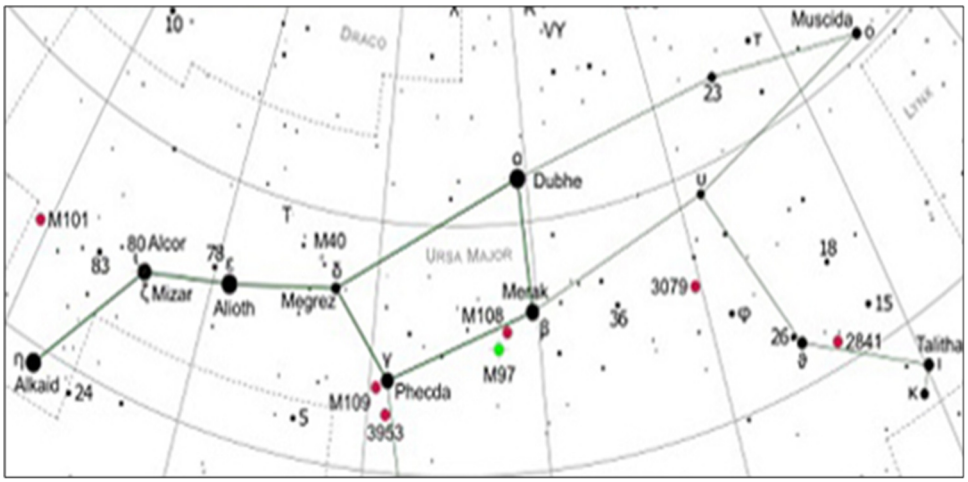
On the evening of March 21, 2022, I sought out NGC 3079 with a 10-inch f/5 reflector. Plugging the galaxy's 2000.0 coordinates (RA 10h 01m 57.8s, Dec. +55° 40' 47") into the AAVSO's online Variable Star Plotter (VSP), I came up with a finder chart that showed a star-hop pathway connecting it to the nearby 4th magnitude star upsilon (υ) Ursae Majoris. Low power eyepiece in place, I followed a path 3 degrees south-southeast from upsilon to a triangle of 8th and 9th magnitude stars which lies just south of NGC 3079. Increasing the magnification to 141X, I spotted a faint, elongated smudge just northwest of the northernmost star in the triangle. The bright central region was barely visibly directly, while averted vision fleshed out the outer extensions, which ran roughly north to south.

NGC 3079 was discovered by William Herschel on April 1, 1790. A recent calculation indicates a distance of 54 million light years.

**The purpose of the Observer's Challenge is to encourage the pursuit of visual observing. It is open to anyone who is interested. If you'd like to contribute notes, drawings, or photographs, we'd be happy to include them in our monthly summary. Submit your observing notes, sketches, and/or images to Roger Ivester (rogerivester@me.com). To find out more about the Observer's Challenge, log on to rogerivester.com/category/observers-challenge-reports-complete.*

"Continued on page 4 "

NGC 3079 Finder Chart A



www.tristateastronomers.org

Chart B

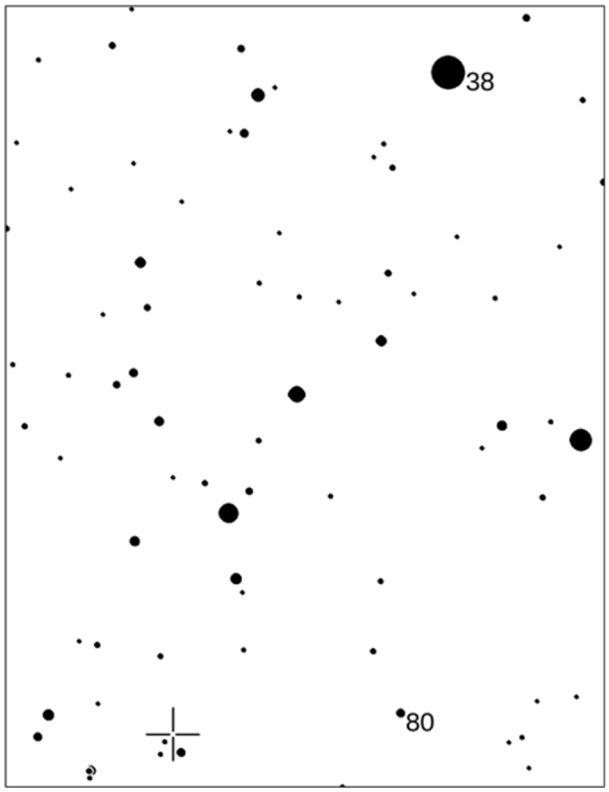
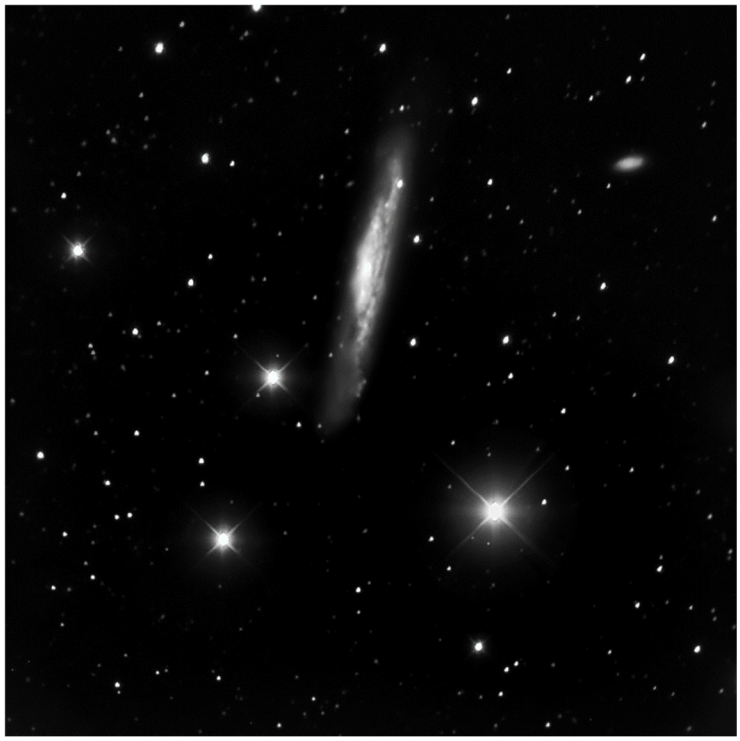


Chart created using AAVSO's Variable Star Plotter (VSP). Numbers indicate stellar magnitudes, decimals omitted. Magnitude 3.8 star is upsilon (υ) Ursae Majoris. Stars plotted down to magnitude 10. North is up in this 3½ by 2½ degree field.

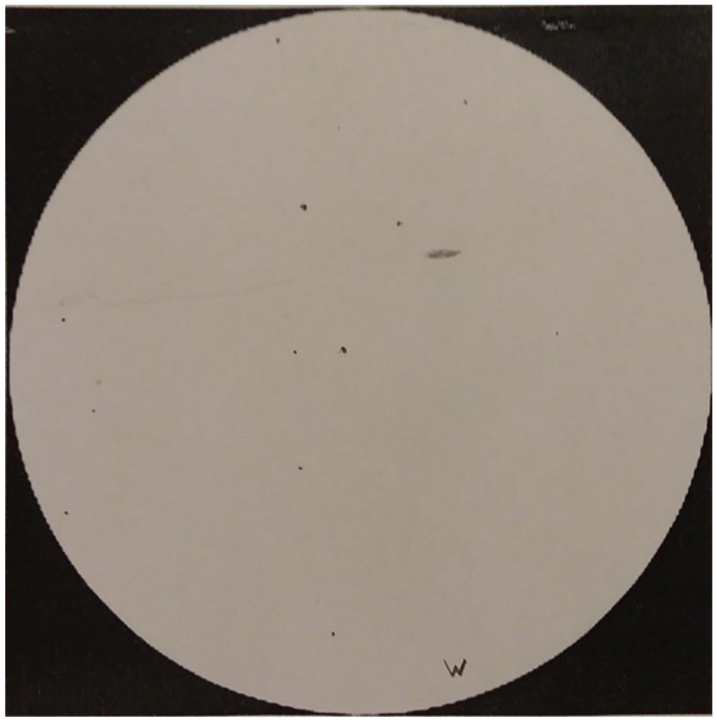
"*Continued on page 5*"

NGC 3079 image

Mario Motta MD (ATMoB) 32-inch f/6 scope with STL 1001E Camera, about 1 hour total integration. North is up. The faint galaxy at upper right is CGCG 265-55, magnitude 14.8.



NGC 3076, as seen with 10-inch f/5 reflector at 141X. Field diameter+0.6 degrees. Sketch by Glenn Chaple (ATMoB)



Principal Meteor Showers in 2022

January 4
Quadrantids

April 22
Lyrids

May 6
Eta Aquarids

July 30
Delta Aquarids

August 12
Perseids

October 9
Draconid

October 21
Orionids

November 9
Taurids

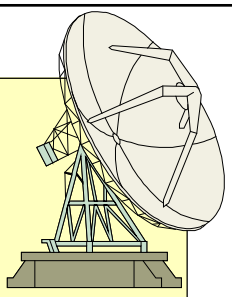
November 18
Leonids

November 26
Andromedids

December 14
Geminids

December 22
Ursids

Note: Dates are for maximum



Got any News?

Skylights Welcomes Your Input.

Here are some suggestions:

Book reviews -- Items for sale -- New equipment -- Ramblings -- Star parties -- Observing -- Photos.

Benefits of Membership

- Attend our monthly meetings and club star parties
- Our Monthly Newsletter: *Skylights*
- Discounts on *Sky & Telescope. and Astronomy magazine subscriptions*
- Automatic subscription to the Astronomical League's quarterly news-letter, *The Reflector*
- With proper training, access to the equipment at ASNNE's Talmage Observatory at Starfield.
- By special arrangement, free admission to the Southworth Planetarium at USM in Portland

Enjoy sharing your interest and have fun learning about Astronomy!

Our Club has Merchandise for Sale at: www.cafepress.com/asnne

All money raised goes to our operating fund.
Any design can be put on any item.

Contact David Bianchi dadsnorlax@yahoo.com for further details.

Measure the Speed of Light from your Backyard

By Paul Kursewicz

Richard Beaulieu, a former member of ASNNE, sent me an email back on Sunday, August 5, 2001. He wrote, "Dear Paul, I would like to invite you to participate in a project with me. It is: to measure the speed of light." Well, Richard definitely caught my interest. He continued, "In 1676, Ole Roemer was able to measure the speed of light. He did it by observing the eclipses of Io, Jupiter's moon. All it takes is arithmetic and measuring times." Now I was hooked. We were going to mimic how the first person measured the speed of light. Richard gives reassurance, "What Ole was able to do with the technology of his time, a good amateur should be able to do easily now. We could write up our results in *Skylights*." Well, I have recently been in contact with Richard and neither of us can remember if we sent anything into *Skylights*. Apparently, we kept it to ourselves. So even though a great amount of time has passed since then (over 20 years), I still have our notes and our memories to draw on, and to share with others.

Here is a very brief explanation as to how Ole Roemer (and now Richard and Paul), calculated the speed of light. Galileo had previously attempted to prove light moved at a particular speed in experiments involving lanterns being flashed back and forth from distant hilltops, but this small-scale investigation was not enough to prove his theory. More distance was needed, so Roemer used a far grander stage for his demonstration. In 1676 he timed the intervals between eclipses of Jupiter's moon Io at different points on the Earth's orbit around the Sun.

The orbital period of Io is now known to be 1.769 Earth days. The satellite is eclipsed by Jupiter once every orbit, as seen from the Earth. By timing these eclipses over many years, Roemer noticed something peculiar. The time interval between successive eclipses became steadily shorter as the Earth in its orbit moved toward Jupiter and became steadily longer as the Earth moved away from Jupiter. These differences accumulated. From his data, Roemer estimated that when the Earth was nearest to Jupiter, eclipses of Io would occur about eleven minutes earlier than predicted based on the average orbital period over many years. And six and a half months later, when the Earth was farthest from Jupiter, the eclipses would occur about eleven minutes later than predicted.

Roemer knew that the true orbital period of Io could have nothing to do with the relative positions of the Earth and Jupiter. In a brilliant insight, he realized that the time difference must be due to the finite speed of light. That is, light from the Jupiter system has to travel farther to reach the Earth when the two planets are on opposite sides of the Sun than when they are closer together. Roemer estimated that light required twenty-two minutes to cross the diameter of the Earth's orbit. The speed of light could then be found by dividing the diameter of the Earth's orbit by the time difference. Before Roemer, no one knew if light was finite or infinite.

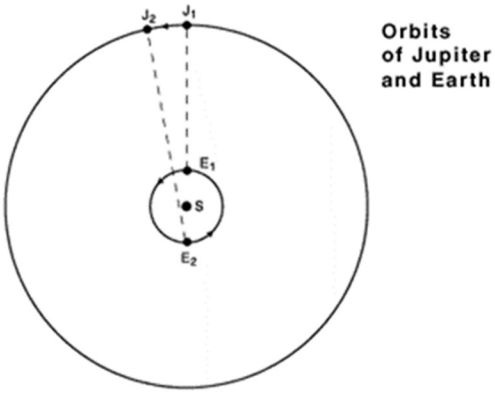
The Dutch scientist Christiaan Huygens, who first did the arithmetic, found a value for the speed of light equivalent to 131,000 miles per second. The correct value is 186,000 miles per second.

"Continued on page 8 "

The difference was due to errors in Roemer's estimate for the maximum time delay (the correct value is 16.7, not 22 minutes), and also to an imprecise knowledge of the Earth's orbital diameter. More important than the exact answer, however, was the fact that Roemer's data provided the first quantitative estimate for the speed of light, and it was in the right ballpark.

For Richard and I to do this project many things had to be planned out in advance. We needed to know when each eclipse occurred during a minimum of a two-month span. We also needed to use a good telescope. Even better, each of us should be looking through a telescope to gain a more precise measurement. So, the backyard that we used for our project was Starfield Observatory (now Talmage Observatory). Our watches not only had to be synchronized, but had to have an accurate time. I don't recall if we used, WWV or time.gov before heading up to the observatory. I had Richard using the 16-inch Meade, while I used the 8-inch Zeiss refractor. We wanted Jupiter to be close so we could get a more precise time when Io goes into Jupiter's shadow. And we needed to take more than one measurement, about one month apart in order to let Jupiter get closer to us. Since it got closer, the time of the eclipse will seem to be earlier to us when we see it. Now it's a matter of simple division. Divide the distance Jupiter moved by the number of seconds the eclipse was earlier, and that is the speed of light. Like Roemer, I did not do the math, Richard did.

We went out many times but not all times were successful. Fortunately, we were both flexible as to when we could go to the observatory. And the time of the eclipses could be in the evenings, or in the early mornings. Ole Roemer's speed of light measurement came up short by about 29% (some websites say differently). Ours came up short by 39%. That's really not that bad for two backyard amateur astronomers. Richard maintains that we needed to do this measurement at least twenty times to get a better result. We just did it twice. It was a fun project nonetheless.



Roemer measured the speed of light by timing eclipses of Jupiter's moon Io. In the figure, S is the Sun, E1 is the Earth when closest to Jupiter (J1) and E2 is the Earth about six months later, farthest from Jupiter (J2). When the Earth is at E2, the light from the Jupiter system has to travel an extra distance represented by the diameter of the Earth's orbit. This causes a delay in the timing of the eclipses. Roemer measured the delay and, knowing roughly the diameter of the Earth's orbit, made the first good estimate of the speed of light.

Go to this video link to learn more: https://www.youtube.com/watch?v=jUHgIYNEzJQ

This article is distributed by NASA Night Sky Network

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.org to find local clubs, events, and more!

Springtime Catspotting: Lynx and Leo Minor

By David Prosper

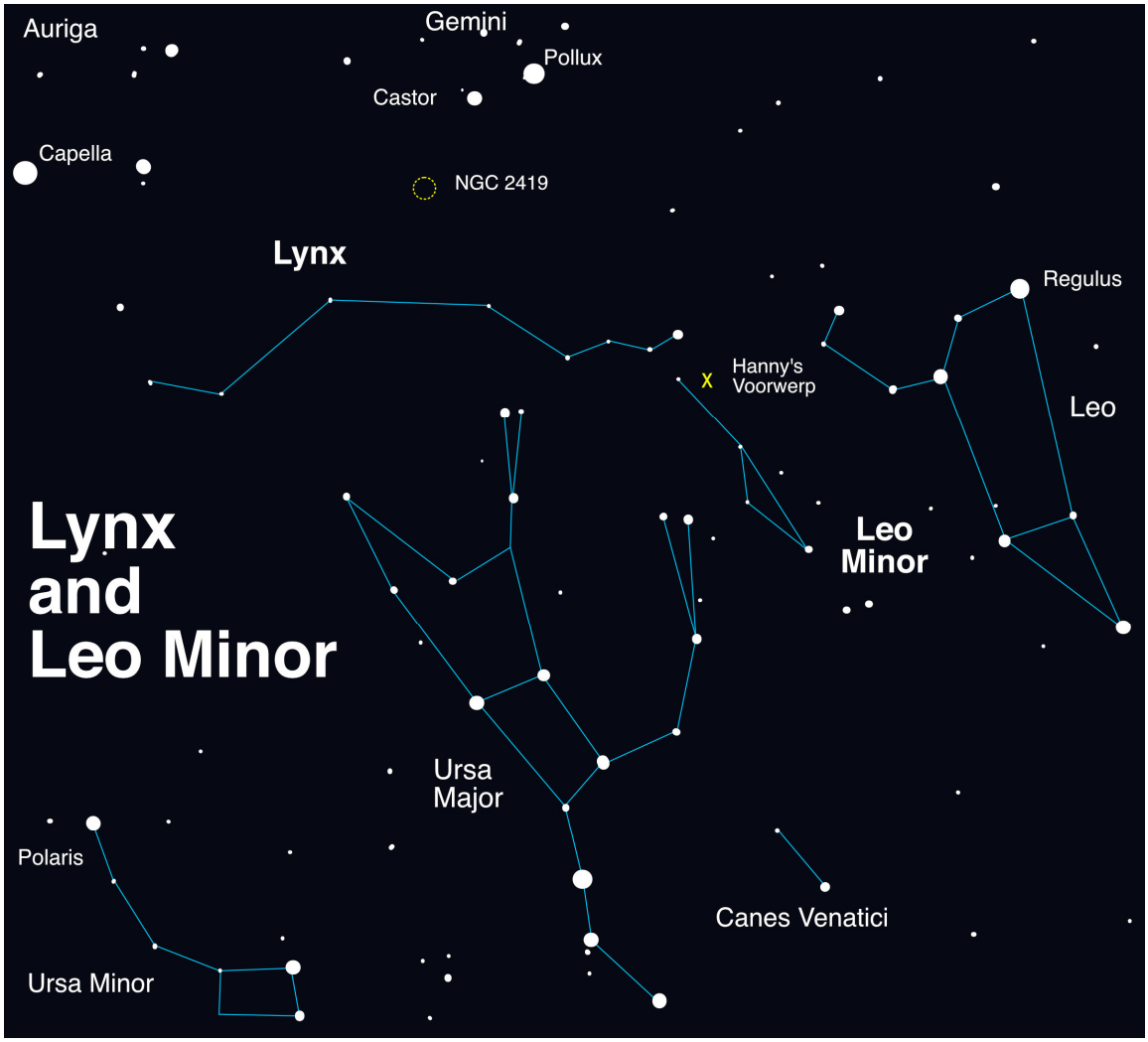
Many constellations are bright, big, and fairly easy to spot. Others can be surprisingly small and faint, but with practice even these challenging star patterns become easier to discern. A couple of fun fainter constellations can be found in between the brighter stars of Ursa Major, Leo, and Gemini: **Lynx** and **Leo Minor**, two wild cats hunting among the menagerie of animal-themed northern star patterns!

Lynx, named for the species of wild cat, is seen as a faint zigzag pattern found between Ursa Major, Gemini, and Auriga. Grab a telescope and try to spot the remote starry orb of globular cluster NGC 2419. As it is so distant compared to other globular clusters - 300,000 light years from both our solar system and the center of the Milky Way - it was thought that this cluster may be the remnants of a dwarf galaxy consumed by our own. Additional studies have muddied the waters concerning its possible origins, revealing two distinct populations of stars residing in NGC 2419, which is unusual for normally-homogenous globular clusters and marks it as a fascinating object for further research.

Leo Minor is a faint and diminutive set of stars. Its "triangle" is most noticeable, tucked in between Leo and Ursa Major. Leo Minor is the cub of Leo the Lion, similar to Ursa Minor being the cub to the Great Bear of Ursa Major. While home to some interesting galaxies that can be observed from large amateur scopes under dark skies, perhaps the most intriguing object found within Leo Minor's borders is Hanny's Voorwerp. This unusual deep-space object is thought to be a possible "light echo" of a quasar in neighboring galaxy IC 2497 that has recently "switched off." It was found by Hanny van Arkel, a Dutch schoolteacher, via her participation in the Galaxy Zoo citizen science project. Since then a few more intriguing objects similar to Hanny's discovery have been found, called "Voorwerpjes."

Lynx and Leo Minor are relatively "new" constellations, as they were both created by the legendarily sharp-eyed European astronomer Johannes Hevelius in the late 1600s. A few other constellations originated by Hevelius are still in official use: Canes Venatici, Lacerta, Scutum, Sextans, and Vulpecula. What if your eyes aren't quite as sharp as Johannes Hevelius – or if your weather and light pollution make searching for fainter stars more difficult than enjoyable? See if you can spot the next Voorwerp by participating in one of the many citizen science programs offered by NASA at science.nasa.gov/citizenscience! And of course, you can find the latest updates and observations of even more dim and distant objects at nasa.gov.

"Continued on page 10"

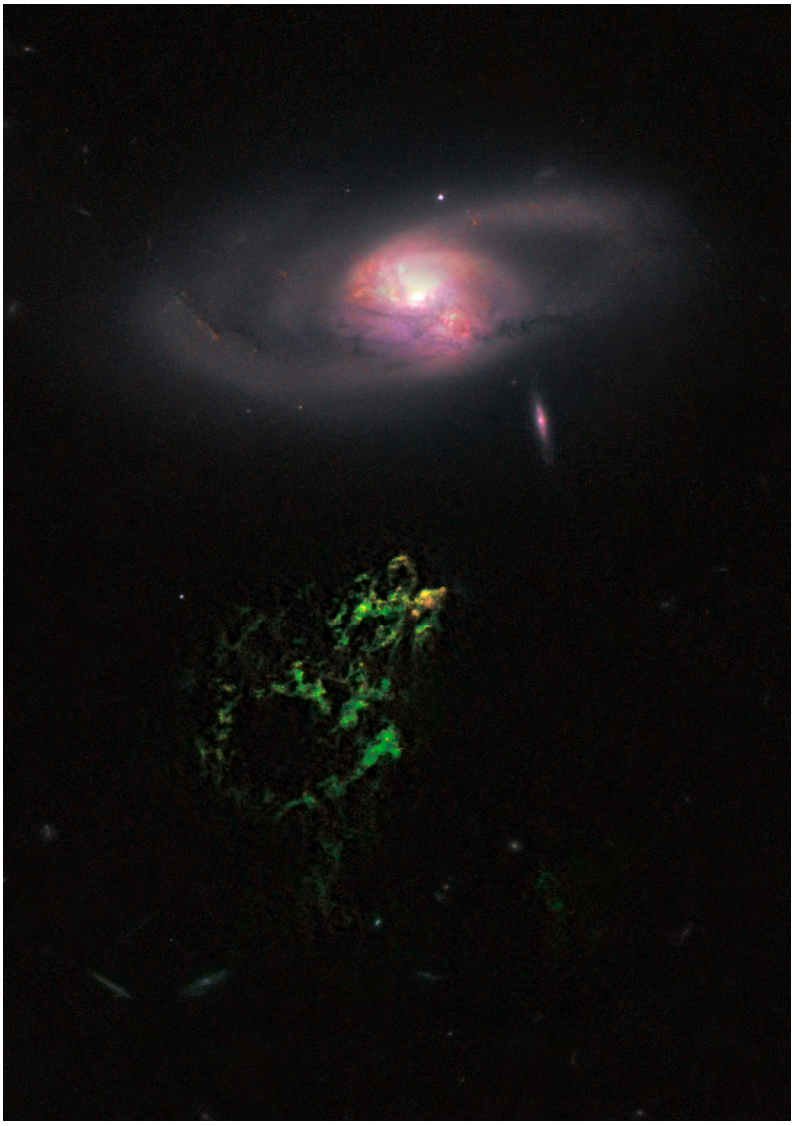


Map of the sky around Lynx and Leo Minor. Notice the prevalence of animal-themed constellations in this area, making it a sort of celestial menagerie. If you are having difficulty locating the fainter stars of Leo Minor and Lynx, don't fret; they are indeed a challenge. Hevelius even named the constellation as reference to the quality of eyesight one needs in order to discern these faint stars, since supposedly one would need eyes as sharp as a Lynx to see it! Darker skies will indeed make your search easier; light pollution, even a relatively bright Moon, will overwhelm the faint stars for both of these celestial wildcats. While you will be able to see NGC 2419 with a backyard telescope, Hanny's Voorwerp is far too faint, but its location is still marked. A few fainter constellation labels and diagrams in this region have been omitted for clarity.

Image created with assistance from Stellarium

"*Continued on page 11*"

Hanny
Zoo T



Hanny's Voorwerp and the neighboring galaxy IC 2497, as imaged by Hubble. Credits: NASA, ESA, W. Keel (University of Alabama), and the Galaxy Zoo Team Source: hubblesite.org/contents/news-releases/2011/news-2011-01.html

Point and Shoot Camera Astroimaging (no telescope)

Canon Powershot SX50 HS

Image & write-up submitted by Paul Kursewicz

Rosette Nebula (slightly cropped)

Specs: RAW Mode, FL 395mm, f/4, ISO 2000, 32 x 1min 30sec, Baader Filter, 1-25-22

The **Rosette Nebula** (NGC 2237) is an emission nebula, a large star forming region located in the constellation Monoceros, the Unicorn. It is closely associated with the open cluster NGC 2244, whose stars were formed from the nebula's matter in the last five million years. It is a stunning Astro-imaging target for your camera. It looks like a rose, thus its name, Rosette. The open cluster can be seen in binoculars, but to observe the nebula, one needs a telescope with a low magnification and good viewing conditions, without light pollution. The cluster and nebula lie at a distance of some 5,000 ly from Earth and measure roughly 130 light years in diameter. The radiation from the young stars excites the atoms in the nebula, causing them to emit radiation themselves producing the emission nebula we see. The Rosette Nebula has an apparent magnitude of 9.0. The nebula's estimated mass is about 10,000 solar masses, which makes the Rosette one of the more massive emission nebulae known.

"Continued on page 13"

From the pages of "Burnham's Celestial Handbook" copyright 1978

Rosette Nebula

I rotated the page counter clockwise in order to match my photo. The 48-inch telescope at Palomar Observatory took this picture. In comparison, a camera lens which is just under 2-inch in diameter took my picture. Burnham's says that there are four bright portions in this nebula and were recorded separately and each given a NGC number; 2237, 2238, 2239, and 2246 though the entire object is often mentioned in astronomical literature simply as NGC 2237. The open cluster NGC 2244 (in the nebula's center) is visible to the naked-eye under good conditions. It's roughly rectangular with a size of about 40'.

Astronomical Society of Northern New England (ASNNE) Membership Meeting Minutes of 4 March 2022

Directors Present: Ian Durham, President *Pro Tem* and Treasurer
Bernie Reim, Vice President
Carl Gurtman, Secretary
Gary Asperschlager, Director
Ron Burk, Director
Bern Valliere, Director

Others Present: There were 19 people, (total), present in person, and 4 people present on Zoom.

There were more people than have been showing up recently, and it appears that Carl's Press Releases announcing the Meetings, and emphasizing that all; all; whatever the level of astronomical knowledge, are welcome, is helping to increase attendance.

Business Meeting:

President *Pro Tem* Ian Durham called the Business Meeting to order at 7:23 pm.

There was no formal Secretary's Report, but Ian, as Treasurer, presented some figures. The cost of our Post Office box has risen to $434 per year. Ian than gave a run-down of ASNNE's (approximate) fixed annual costs.

Insurance:	$ 800	
PO Box	$ 434	
Group io	$ 220	
Web hosting	$ 100	This is estimated, as Ian paid $198 for more than one year.
Signage	$ 60	
ASNNE Fixed costs ~	$ 1,614	

Additionally, there may be Observatory maintenance costs.

Currently, we have 34 paid-up members for 2022. This gives us a shortfall of anywhere from $500 - $800 annually, which we must make up by fund-raising, or "earnings".

"Continued on page 15"

An opportunity to earn funds for ASNNE was presented by Gary. He had been corresponding with, and has met in person, the young woman in charge of the local Huttopia. Huttopia is a chain of family campgrounds that offer camping in comfort, in framed tents. The Southern Maine location is in Sanford. They would like us to present an astronomy night at their campground. This would take place weekly, from the end of June, to the start of September. We discussed this. Usually, we ask for a minimum donation of $200 per event for for-profit organizations. Several Members volunteered to assist. Note: Subsequent to our Meeting, Gary notified them that we agree in principle, and we'll have to work out the details.

Regular Meeting:

President *Pro Tem* Ian Durham called the Regular Meeting to order at 7:40.

Introductions:

Ian had us go around the room, introducing ourselves, with a few words about our backgrounds and interests. Ian included the Zoom participants. Several people had been Members of ASNNE in the past. There was a wide range of astronomical knowledge.

"What's Up?":

Bernie then gave his usual thorough, comprehensive, and complete discussion of what's in store for us in the skies of March, named after the Roman god of war, Mars. March marks the beginning of spring for us in the northern hemisphere. Spring starts at 11:33 A.M. EDT on Sunday, March 20. On this date, the vernal equinox, the sun rises due east and sets due west. Days and nights are of equal duration, and the sun crosses the celestial equator. In March, the spring constellations slowly rotate into view, and the bright winter constellations start to sink below the western horizon.

Jupiter will reappear in our morning sky towards the end of this month. That means that all of the visible planets will be in the morning sky. Keep watching as five of them, in order from Mercury to Saturn, appear in the morning sky. Venus will rise first, Mars shortly thereafter The pair will be less than 4 degrees apart on March 15th, as they drift eastward together in direct motion against the fixed background of stars in Sagittarius and then Capricorn.

"Continued on page 16"

Then Saturn will join the pair. Look for a very close conjunction of Saturn and Mercury low in the southeastern morning sky half an hour before sunrise

during the first week of March. Venus will reach its greatest western elongation

from the sun on March 20. It will be exactly half illuminated by the sun at that time. Keep watching as Jupiter and a slender waning crescent moon join this close planetary triangle on Monday the 28th,

Another important highlight takes place on the last Saturday in March every year; the International Earth Hour. It will occur on March 26 from 8:30 to 9:30 pm local time. The easiest way to participate is to turn off all non-essential lights for that one hour, You could also go outside and look at a darker night sky then.

Our largest asteroid, Ceres, is still tracking between the Pleiades and the Hyades star clusters in Taurus this month. It will reach about 8th magnitude, so you would need at least a pair of binoculars to see it.

You can look for the zodiacal light again this month about an hour after sunset on moonless nights far away from any city or town lights. This light will create a very subtle pyramid-shaped glow stretching up from the horizon into Taurus low in the western sky. It is caused by sunlight reflecting off trillions of tiny pieces of comet and asteroid dust trapped in the ecliptic plane of our solar system.

The best comet this month is still Comet 19P/Borrelly. But it will only reach about 10th magnitude.

Of great interest is that the James Webb Space Telescope (JWST) is right on schedule to become fully operational. The JWST will be 100 times as powerful as the Hubble Space Telescope. The JWST will see in infrared light, so the early Universe's greatly red-shifted light can be examined. Its 18 mirror segments will work together as a single 21-foot mirror..

Bernie then covered "What Happened on this Day. . .", and the names of this month's moon.

Bernie's excellent presentation, in its entirety, can be found, this month, and every month, in Skylights, ASNNE's professional-quality newsletter; editor, Paul Kursewicz. Skylights may be found at: http://www.asnne.org/newsletter.php

Presentation:

Our presenter tonight was our President, Ian Durham. Ian is a member of the Foundational Questions Institute (FQXi), and is the member they turn to to pick the five most important physics stories of the year. Ian talks through his selections in an FQXi podcast series, always including a few runners-up, and sometimes there is a mathematical selection. Tonight, Ian gave us an abbreviated, less technical, run-through of the top five. No runners-up, but as always, explaining his reasons for his selections. An even more abbreviated version follows:

"Continued on page 17"

#5. The Standard Model prediction of the muon magnetic moment, and its experimentally determined value differ. New, very careful, experimental results confirm the discrepancy.

#4. Using The Event Horizon Telescope, a global network of synchronized radio observatories that work in unison to observe radio sources associated with black holes, magnetic field lines of the black hole at the center of galaxy M87 were imaged.

#3. Using an incredibly accurate atomic clock, the way time is warped by gravity, according to the theory of general relativity, across the distance of one millimeter, was measured.

#2. Quantum entanglement between two macroscopic vibrating drumheads has been demonstrated by two independent research groups.

#1. A series of papers proved that the quantum-mechanical world needs imaginary numbers for its proper description.

AstroShorts:

Several Members presented Astroshorts.

The next ASNNE Meeting, will be at 7:30 pm, Friday, 1 April, 2022, at the New School in Kennebunk, Maine. The Regular Meeting will be preceded by a Business Meeting at 7:00 pm. All Members may attend the Business Meeting as they choose. (it's really on 1 April! This is not an April Fool's joke.)

Respectfully submitted,

Carl Gurtman

Club Meeting & Star Party Dates

Date	Subject	Location
Apr 1	**ASNNE Club Meeting:** **Business Meeting** starts at 7:00 PM **Club Meeting 7:30 to 10:00PM** **Guest Speaker / Topic: TBD**. **Bernie Reim** - What's UP **Astro Shorts:** (news, stories, jokes, reports, questions, photos, observations etc.)	The New School, Kennebunk, Me.
Last Month	We had our club meeting at The New School. Our keynote speaker was Ian Durham. Ian presented to us his annual countdown choices for the top physics stories of 2021. Bernie did his "What's-Up" presentation and certain club members contributed to Astroshorts.	
	Club/Public Star Party: TBD	Talmage Observatory at Starfield West Kennebunk, Me.

Directions to ASNNE event locations

Directions to The New School in Kennebunck [38 York Street (Rt1) Kennebunk, ME]

For directions to The New School you can use this link to the ASNNE NSN page and then click on "get directions" from the meeting location. Enter your starting location to generate a road map with complete directions. It works great. http://nightsky.jpl.nasa.gov/club-view.cfm?Club_ID=137

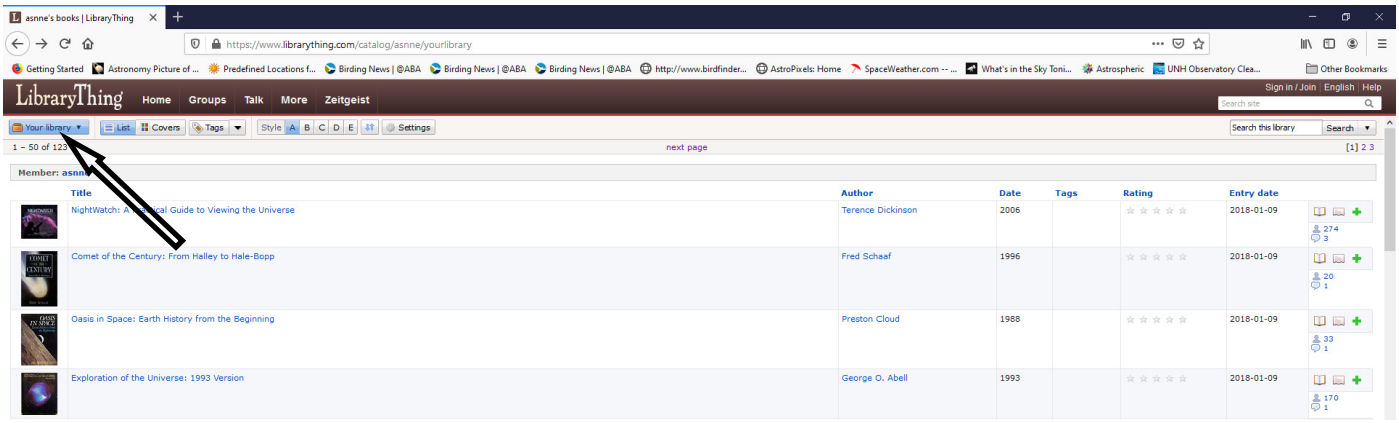
Directions to Talmage Observatory at Starfield [Alewive Road, Kennebunk, ME]

From North:
Get off turnpike at exit 32, (Biddeford) turn right on Rt 111. Go 5 miles and turn left on Rt 35. Go 2 miles on Rt 35 over Kennebunk River to very sharp 90 degree left turn. The entrance to the Starfield Observatory site is at the telephone pole at the beginning of the large field on the left. Look for the ASNNE sign on the pole.

From South:
Get off the turnpike at exit 25 in Kennebunk. After toll both turn right on Rt 35. Go up over the turnpike and immediately turn right on Rt 35. About 4 miles along you will crest a hill and see a large field on your right. Continue until you reach the end of the field. Turn right into the Starfield Observatory site at the last telephone pole along the field. Look for the ASNNE sign on the pole. If you come to a very sharp 90 degree right turn you have just passed the field.

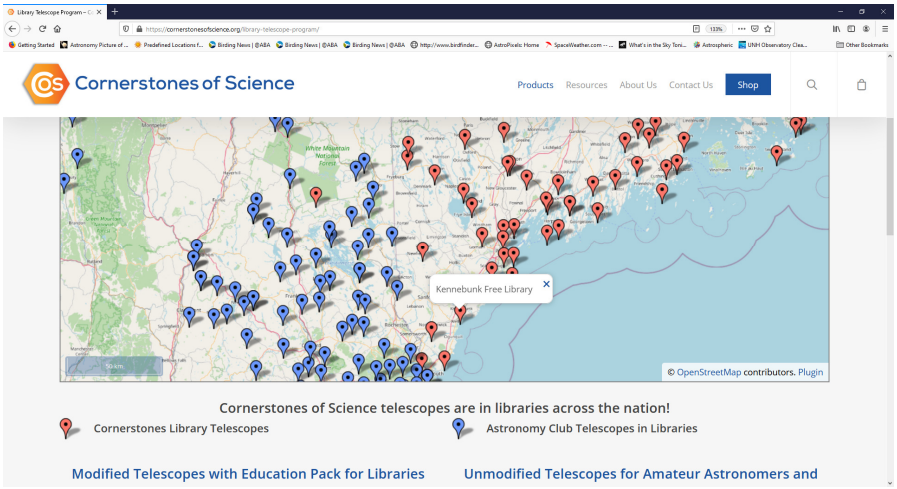
Astronomy Club & Library Resources

Our club has a library of astronomy books which are stored at The New School in Kennebunk, Maine (our monthly club meeting location). To request a book(s), contact one of the club officers. A listing of books is provided here: https://www.librarything.com/profile/asnne . After clicking on the link, a window will open. Click on "Your library" near the upper left corner (as shown by the arrow below). Then scroll down to the end of the page to go to the next page.



Would you like to borrow a telescope? While many astronomy clubs may have a scope to lend out, there are also many libraries which have telescopes for their guests to use. Here are a couple of links.

The following link will bring up an active map (see screen shot below) of the USA showing the libraries which have telescopes to lend out: https://cornerstonesofscience.org/library-telescope-program/



The below link will show a list of known participating library locations for the state of Maine.
https://www.librarytelescope.org/locations/usa/maine

To join **ASNNE**, please fill out the below membership form. *Checks should be made payable to: Astronomical Society of Northern New England (A.S.N.N.E).* For more details, please visit our website: **http://www.asnne.org**

Astronomical Society of Northern New England
P.O. Box 1338
Kennebunk, ME 04043-1338

2022 Membership Registration Form

(Print, fill out and mail to address above)

Name(s for family): _____

Address: _____
City/State: _____ Zip code: _____

Telephone # _____

E-mail: _____

Membership (check one):
Individual $35 _____ Family $ 40 _____ Student under 21 years of age $10 _____ Donation_____

Total Enclosed_____

Tell us about yourself:
1. Experience level: Beginner____ Some Experience ____ Advanced_____

2. Do you own any equipment? (Y/N) And if so, what types?

_____
3. Do you have any special interests in Astronomy?

_____
4. What do you hope to gain by joining ASNNE?

_____
5. How could ASNNE best help you pursue your interest in Astronomy?

_____
6. ASNNE's principal mission is public education. We hold many star parties for schools and the general public for which we need volunteers for a variety of tasks, from operating telescopes to registering guests to parking cars. Would you be interested in helping?
Yes_____ No_____

7. ASNNE maintains a members-only section of its web site for names, addresses and interests of members as a way for members to contact each other. Your information will not be used for any other purpose. Can we add your information to that portion of our web site?

Yes_____ No_____