

Skylights

Newsletter of the Astronomical Society of Northern New England



JULY 2017



Member of NASA's



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 July

By Bernie Reim

The month of July is named for Julius Caesar in 44 B.C. Before that it was named Quintilis, which is Latin for fifth. That was back when March was the first month of the year.

July is the first full month of summer. Even though the days are still long and the nights are short, this is a great month to get outside and enjoy and learn more about the beauty of the night sky. You may have to deal with a few bugs, but there are generally far fewer sacrifices to be made in summer than in winter to enable us to really enjoy the sky and the myriad wonders lying beyond our relatively tiny solar system.

The highlights for this July include Saturn near its best for the year, Jupiter still brighter than usual in our evening sky, Venus in our morning sky passing between two bright clusters in Taurus, similar to what Mars did 2 months ago, an asteroid in Ophiuchus named Hebe, the Delta Aquarid Meteor Shower, and even a bright comet named Johnson in Hydra and Libra.

In summer you are looking into the very center of our amazing Milky Way galaxy when you look low in the southern sky just below Sagittarius and Scorpius. There is an invisible supermassive black hole lurking there at the very heart of our galaxy. We are not special in that regard, since nearly every galaxy, both the spirals and the ellipticals, has supermassive black holes spinning at their centers. Ours weighs in at about 4 million times the mass of our sun. Its event horizon stretches about 30 million miles, the distance from our sun to Mercury. An individual stellar black hole event horizon is only 10 miles across.

We even have a series of about 100 radio telescopes linked together across the entire globe, appropriately called the Event Horizon telescope, to study this black hole, called Sagittarius A, and an even much bigger one at

the center of the monster elliptical galaxy named M87 in the constellation of Virgo. That one is located 50 million light years away and is only one of about 2,000 galaxies in that nearby cluster. The one at the center of M87 is about 7 billion solar masses, or almost 2,000 times more massive than the one we can claim for our own. That one is shooting out an incredibly powerful beam of synchronized radiation at relativistic speeds about 5,000 light years long. Anything and everything in its path would be fried instantly.

All that may sound very dramatic, but our own black hole was 10 million times brighter and more powerful than it is now, only a very short 2 million years ago, which is a mere two seconds in cosmic time. Those are called active galactic nuclei. Ours will probably become active again sometime in the not-to-distant future.

We even think that we have recently found the fossil imprint of that powerful and ancient jet of radiation that used to shoot out of our black hole. It is the stream of lacy gas

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Club Contacts

Officers:

President:
Ron Burk
rdavidburk@yahoo.com

Vice President:
Joan Chamberlin
starladyjoan@yahoo.com

Secretary:
Carl Gurtman
carlgurt@msn.com

Treasurer:
Ian Durham
idurham@anselm.edu

Board of Directors:

Gary Asperschlager
gasperschlager@gmail.com

Larry Burkett
larrybu32@yahoo.com

Star Party Co-ordinator:

TBD

Skylights Editor:

Paul Kursewicz
pkursewicz@myfairpoint.net

Website Manager:

Nan Musgrave
mzgrvz@outlook.com

NASA Night Sky Network

Co-ordinator:

Joan Chamberlin
starladyjoan@yahoo.com

JPL Solar System Ambassador:

Joan Chamberlin
starladyjoan@yahoo.com

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trailing behind the Large and Small Magellanic Clouds, our two closest satellite galaxies.

The Event Horizon telescope is studying these two supermassive black holes and will have much more good data by next year. It is designed to detect the light cast off when objects disappear behind that elusive boundary. It will essentially make the silhouette of this monster black hole become visible to us. It will open new frontiers in our understanding of gravity, and I am sure we have much to learn about this force, which is basically just the curvature or topography of the four-dimensional space-time continuum in which everything in this universe is embedded. The very recent confirmation of the third official gravitational wave detected with LIGO will also add a little more to our ever expanding knowledge of this important and all pervasive, yet still mysterious force.

Saturn can be easily seen in Sagittarius now, just a little above the part of our sky marking the very center of our galaxy about 26,000 light years away. The ringed planet is still in westward or retrograde motion towards Antares, the bright orange giant star marking the heart of Scorpius. Saturn is just under a billion miles away, which is only about an hour and a half at the speed of light.

Jupiter is about twice as close to us than Saturn, and is about 6 times or two magnitudes brighter. Keep in mind that our little man-made mission, Juno has taken many incredible pictures of the king of planets, with countless colorful swirls of clouds near its south pole. Jupiter will already set around midnight. Try to see some or all four of its largest Galilean moons with just a pair of binoculars.

Brilliant Venus rises in our eastern morning sky around 3 a.m. It is another 6 times brighter than Jupiter or fully 36 times brighter than Saturn. Keep watching it as it tracks eastward in direct motion between the famous Pleiades and the less famous Hyades star clusters in Taurus, following a very similar path that Mars took two months ago. Notice that it will be just 3 degrees above the very slender waning crescent moon on the morning of Thursday the 20th, one month into summer.

The Southern Delta Aquarid Meteor Shower will peak during the morning of Sunday the 30th. The moon will be first quarter, which means that it will set at midnight and be out of the way when the shower hits its peak of about 25 meteors per hour. You can expect almost that many meteors each night for the last 5 days of July from this shower. This is also a good warmup to the more famous Perseid Meteor Shower, which unfortunately will be largely washed out by a bright waning gibbous moon this year on August 12.

Comet Johnson should get as bright as 6th or 7th magnitude this month and become easily visible in a good pair of binoculars if not even without any optical aid. Look for it in Virgo just to the left of Spica about the same distance that Jupiter is to the right of Spica. Then it follows an arc through Hydra the Sea Snake just to the west of Libra the Scales.

This is a comet with a hyperbolic orbit, which means it is not on a periodic orbit and it will leave our solar system. It was discovered on November 3 of 2015 by Jess Johnson at only 17th magnitude using the Catalina Sky Survey images. That is 21 magnitudes or 300 million times fainter than Venus.

July 1. The moon passes 3 degrees north of Jupiter this morning.

July 3. Earth is at aphelion, or farthest away from the sun today at 94.5 million miles.

July 6. The moon passes 3 degrees north of Saturn this evening.

July 9. Full moon is at 12:07 A.M. EDT. This is also called the Hay or Thunder Moon.

July 10. Pluto is at opposition at 14.2 magnitude in Sagittarius the Archer tonight. It takes 248 years to make one orbit around the sun and its status was changed to a dwarf planet 11 years ago. Thanks to New Horizons, we now know that Pluto is an incredible and active place that even has a thin atmosphere, but its status is still an icy dwarf or Kuiper Belt object.

July 11. On this day in 1979, or first space station, Skylab, reentered our atmosphere.

July 14. Venus passes near Aldebaran in Taurus this morning.

July 16. Last quarter moon is at 3:26 p.m.

July 18. On this day in 1980 India became the 7th nation to launch its own satellite.

July 20. On this day in 1969, the first humans walked on the moon. They were Armstrong and Aldrin. We would only go there 5 more times and only 12 humans have ever walked on the moon. Viking 1 landed on Mars on this day in 1976. The moon passes near Venus.

July 23. New moon is at 5:46 a.m.

July 25. The moon passes near Regulus this morning. The sun will be in Leo during the total solar eclipse next month.

July 30. The southern Delta Aquarid peak tonight and first quarter moon is at 11:23 a.m.

Moon Phases

July 9
Full

July 16
Last Quarter

July 23
New

July 30
First Quarter

Moon Data

July 1
Jupiter 3° south
of Moon

July 6
Moon at apogee

Saturn 3° south
of Moon

July 13
Neptune 0.9° north
of Moon

July 16
Uranus 4° north
of Moon

July 19
Aldebaran 0.4°
south of Moon

July 20
Venus 3° north
of Moon

July 21
Moon at perigee

July 25
Mercury 0.9° south
of Moon

Submitted by Glenn Chaple



Sky Object of the Month – June 2017 (Courtesy LVAS Observer's Challenge*)

M14 (NGC 6402) – Globular Cluster in Ophiuchus (Mag. 7.6; Size 11')

Ophiuchus is home to seven Messier globulars. One of them, M14, is this month's LVAS Observer's Challenge. It was discovered by Charles Messier on June 1, 1764 and first resolved into individual stars by William Herschel 19 years later. At magnitude 7.6, it's relatively faint, but still bright enough to be viewed binoculars and small-aperture scopes.

I first saw M14 in the summer of 1977 with a 3-inch f/10 reflector and magnifying power of 30X. More recently, I picked it up with a 4.5-inch reflector at 76X. In neither case was there any hint of resolution.

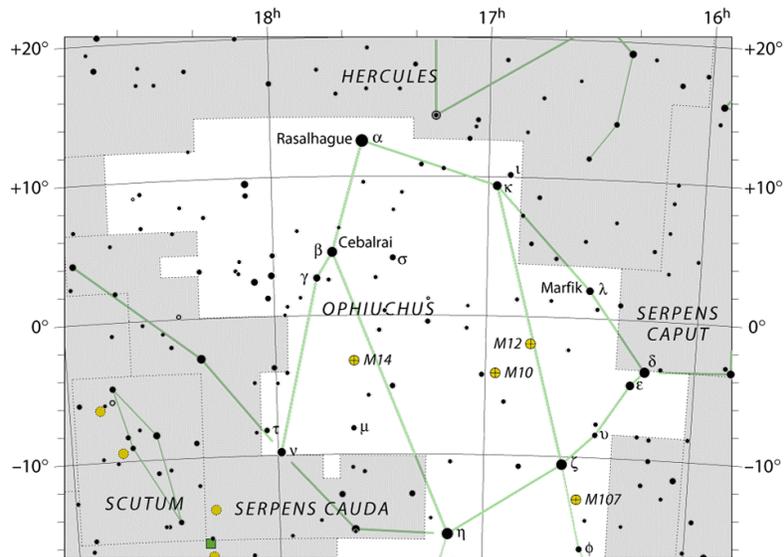
Finding M14 is somewhat of a challenge, as it lies in a rather star-poor region of Ophiuchus. The accompanying finder chart shows its location about 5 degrees north of the magnitude 4.6 star mu (μ) Ophiuchi.

What is the smallest scope that can resolve this cluster? Is it uniformly bright or condensed towards the center? What is its overall shape – round or oval? Find out for yourself and forward your impressions (image, sketch, and/or notes) to the LVAS via the email addresses listed below.

M14 lies some 30,000 light years away. It contains an estimated 150,000 stars and spans a distance of about 100 light years.

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IAU and Sky & Telescope



Mario Motta, MD

*The purpose of the LVAS Observer's Challenge is to encourage the pursuit of visual observing. It is open to everyone that is interested, and if you are able to contribute notes, drawings, or photographs, the LVAS will be happy to include them in our monthly summary. If you would like to contribute material, submit your observing notes, sketches, and/or images to either [Roger Ivester \(rogerivester@me.com\)](mailto:rogerivester@me.com) or [Fred Rayworth \(fred@fredrayworth.com\)](mailto:fred@fredrayworth.com). To find out more about the LVAS Observer's Challenge or access past reports, log on to lvastronomy.com/observing-challenge.

Principal Meteor Showers in 2017

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

RED ALERT – Downward Pointing Lasers

NASA is planning to use (or is already using) downward pointing lasers which are mounted on their spacecrafts. For those of us who look at the night sky through a telescope, or a pair of binoculars, this is a potential hazard. If a laser beam enters our instrument at the very time we are viewing, eye injury or blindness could occur. Contact physicist, Dr. Jennifer Inman, jennifer.a.inman@nasa.gov and tell her your concerns about this perilous issue. Why should we have to live in fear each time we look into a telescope or a pair of binoculars? This is unacceptable!



The latest issue of the Space Place Newsletter: News and Notes for Formal and Informal Educators can be found at: <http://spaceplace.nasa.gov/en/educators>.

Space Place is a NASA website for elementary school-aged kids, their teachers, and their parents.

Check out our great sites for kids:



The Space Place website (<http://spaceplace.nasa.gov>)



The SciJinks Weather Laboratory at <http://scijinks.gov>



NASA Climate Kids at <http://climate.nasa.gov/kids>

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.

Just let our club member, David Bianchi, know.

This article is provided by NASA Space Place.

With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology. Visit spaceplace.nasa.gov to explore space and Earth science!



The Shape of the Solar System

By Marcus Woo

When Stamatios (Tom) Krimigis was selected for the Voyager mission in 1971, he became the team's youngest principal investigator of an instrument, responsible for the Low Energy Charged Particles (LECP) instrument. It would measure the ions coursing around and between the planets, as well as those beyond. Little did he know, though, that more than 40 years later, both Voyager 1 and 2 still would be speeding through space, continuing to literally reshape our view of the solar system.

The solar system is enclosed in a vast bubble, carved out by the solar wind blowing against the gas of the interstellar medium. For more than half a century, scientists thought that as the sun moved through the galaxy, the interstellar medium would push back on the heliosphere, elongating the bubble and giving it a pointy, comet-like tail similar to the magnetospheres—bubbles formed by magnetic fields—surrounding Earth and most of the other planets

"We in the heliophysics community have lived with this picture for 55 years," said Krimigis, of The Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland. "And we did that because we didn't have any data. It was all theory."

But now, he and his colleagues have the data. New measurements from Voyager and the Cassini spacecraft suggest that the bubble isn't pointy after all. It's spherical.

Their analysis relies on measuring high-speed particles from the heliosphere boundary. There, the heated ions from the solar wind can strike neutral atoms coming from the interstellar medium and snatch away an electron. Those ions become neutral atoms, and ricochet back toward the sun and the planets, uninhibited by the interplanetary magnetic field.

Voyager is now at the edge of the heliosphere, where its LECP instrument can detect those solar-wind ions. The researchers found that the number of measured ions rise and fall with increased and decreased solar activity, matching the 11-year solar cycle, showing that the particles are indeed originating from the sun.

Meanwhile, Cassini, which launched 20 years after Voyager in 1997, has been measuring those neutral atoms bouncing back, using another instrument led by Krimigis, the Magnetosphere Imaging Instrument (MIMI). Between 2003 and 2014, the number of measured atoms soared and dropped in the same way as the ions, revealing that the latter begat the former. The neutral atoms must therefore come from the edge of the heliosphere.

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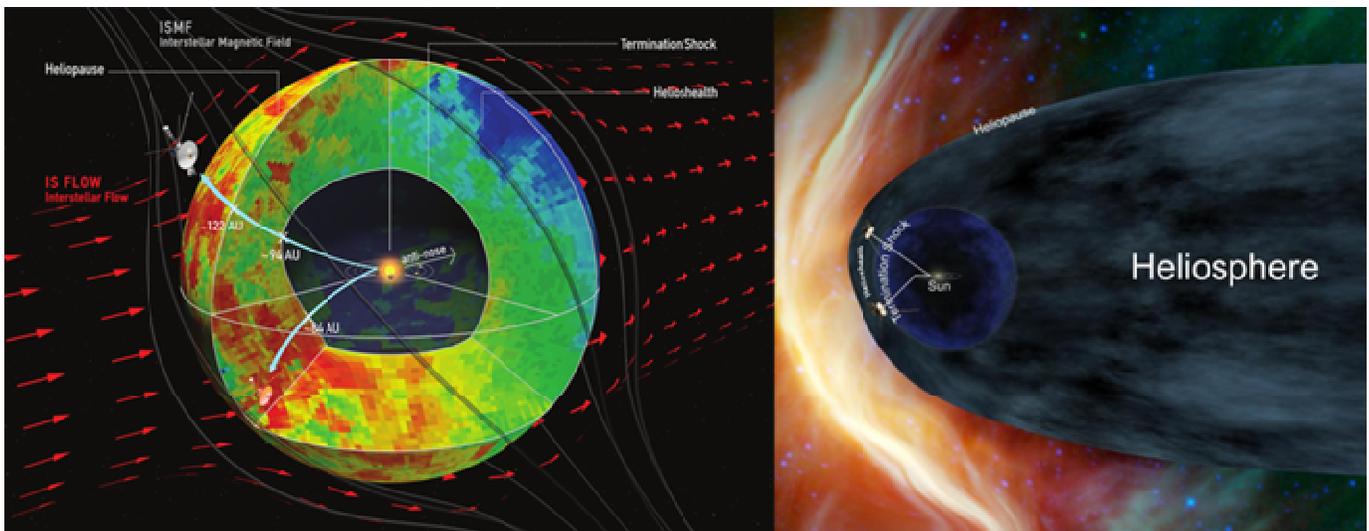
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If the heliosphere were comet-shaped, atoms from the tail would take longer to arrive at MIMI than those from the head. But the measurements from MIMI, which can detect incoming atoms from all directions, were the same everywhere. This suggests the distance to the heliosphere is the same every which way. The heliosphere, then, must be round, upending most scientists' prior assumptions.

It's a discovery more than four decades in the making. As Cassini ends its mission this year, the Voyager spacecraft will continue blazing through interstellar space, their remarkable longevity having been essential for revealing the heliosphere's shape.

"Without them," Krimigis says, "we wouldn't be able to do any of this."

To teach kids about the Voyager mission, visit the NASA Space Place: <https://spaceplace.nasa.gov/voyager-to-planets>



Caption: New data from NASA's Cassini and Voyager show that the heliosphere — the bubble of the sun's magnetic influence that surrounds the solar system — may be much more compact and rounded than previously thought. The image on the left shows a compact model of the heliosphere, supported by this latest data, while the image on the right shows an alternate model with an extended tail. The main difference is the new model's lack of a trailing, comet-like tail on one side of the heliosphere. This tail is shown in the old model in light blue.

Image credits: Dialynas, et al. (left); NASA (right)

Astro Photos

Crescent Moon

Submitted by Eric Harrison

Eric calls this his Frank Sinatra shot. He used a Nikon P900, f/5.6, 125 mm



ISS Solar Transit 6-21-17

Submitted by Paul Kursewicz

I video recorded the 0.61 sec transit, then pulled out 14 individual shots of the Space Station and made this composite image in Photoshop. Used a Canon PowerShot SX50 HS camera with the lens zoomed in at 2400mm. Camera was mounted on a Ioptron SkyGuider Pro Camera Mount.



Cub Scout Pack #355 Visits Starfield Observatory 6-22-17

Photos submitted by Gary Asperschlager

Ron said, "...we had a very good star party with the scouts that Thursday night even having to roll off the roof by hand and using just the Zeiss for the only two objects (Jupiter & Saturn) that we could see in the twilight hours that the scouts and family could be there. Thanks Berne, Gary, Sara and Renee for making it a very informative night for all.



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More Photos

Submitted by Renee DesRoberts

The star party is part of the Cub Scouts "Out of this World" module in the Scout STEM/Nova achievement program.



Club Meeting & Star Party Dates

Date	Subject	Location
July 7	<p style="text-align: center;">ASNNE Club Meeting</p> <p><u>Beginner Class: 6:30PM - 7:15PM</u> Starlady Joan Chamberlin conducts a beginners class in astronomy. All are welcome.</p> <p><u>Club Meeting 7:30PM - 9:30PM</u></p> <p>Guest Speaker: Riwaj Pokhrel.</p> <p>Topic: Star Formation. Riwaj, from Nepal who is working on his doctorate at UMass Amherst And is on a Fellowship at Harvard-Smithsonian Center for Astrophysics, will do a presentation on his research on Star Formation in Local Molecular Clouds.</p> <p>Bernie Reim - What's UP Astro Shorts - (news, stories, jokes, reports, questions, photos, observations etc.)</p>	The New School, Kennebunk, Me.
July 28	Club/Public Star Party (<i>Check List-serve / website for updates or cancellations</i>)	Starfield Observatory, West Kennebunk, Me.

Directions to ASNNE event locations

Directions to The New School in Kennebunk [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 Starfield Observatory [Alewife 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.

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

2017 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 _____

