SkyWAAtch

The Newsletter of Westchester Amateur Astronomers

May 2025

Major Galaxies of the M81 Group by Olivier Prache

Olivier sent his AstroPhysics 130 to the StarFront Remote Observatory in western Texas, which claims Bortle 1 skies, to image over the internet. This image is a 26-hour exposure through Hα-and RGB filters. The field is 2.28 x 1.52 degrees. In addition to M81 and M82, the elliptical galaxy at the top is NGC 3077 (mag 10.14). In the lower left corner are two spiral galaxies, NGC 2959 (mag 12.69) and tiny NGC 2961 (mag 14.7). Another small spiral galaxy along the left side of the image is PGC 28563 (mag 15.22). Olivier even captured Holmberg IX, a fuzzy blotch next to M81 at the one o'clock position (relative to the core), just distinguishable from the background. The magnitude of Holmberg IX is nominally 14.3 but it has extremely low surface brightness, 25.54.

See this month's feature on page 16 for more about galaxies visible this month.

Our club meetings are held at the David Pecker Conference Room, Willcox Hall, Pace University, Pleasantville, NY, or on-line via Zoom (the link is on our web site, www.westchesterastronomers.org).

WAA May Meeting

Friday, May 9 at 7:30 pm

Live or on-line via Zoom

Amateur Telescope Making…It Can Change Your Life!

Andy Poniros
NASA/JPL Solar System Ambassador

Andy Poniros, amateur astronomer, amateur telescope maker, NASA/JPL public outreach volunteer and radio talk show host, will discuss how building telescopes led to his passion for amateur astronomy and public outreach.

He will also discuss the history of telescope making, his mirror-making experiences and his friendship with the MacGyver of telescope making, John Dobson. He'll also touch on sidewalk astronomy, the famed Springfield Telescope Makers, and public outreach through his monthly radio show.

Call: **1-877-456-5778** (toll free) for announcements, weather cancellations, or questions. Also, don't forget to visit the WAA website.

Also In This Issue

SAVE THE DATE:
WAA Club Picnic
Saturday, July 19, 12 noon-4 p.m.

WAA June Meeting

Friday, June 13 at 7:30 pm

Live or on-line via Zoom

MOXIE—The Oxygen Generator on Mars

Piyush Khopkar
Software Engineer & NASA Solar System Ambassador

Starway to Heaven

Ward Pound Ridge Reservation, Cross River, NY

Date	Sunset	Moon	Illumination
5/17	8:08 pm	Rises 12:55 am	75% waning
5/24	8:19 pm	Rises 4:01 am	4% waning
5/31	8:25 pm	Sets 12:47 am	29% waxing

New Members

Victoria Assumma	Armonk
Michael Faucher	Croton on Hudson
Holly Hanlon	Chappaqua
Courtney-Lynn Mellina	Spring Valley
Scott Mitchell	Ridgefield
James Russin	Tarrytown
Amy Saland	Somers
Anne Swaim	Chappaqua

Renewing Members

Steven Bellavia	Smithfield, VA
David Brady	Ridgefield
Rick Bria	Greenwich
Harry S. Butcher, Jr.	Mahopac
Michael DiLorenzo	Yonkers
Cabiria Jacobsen Dougherty	Pleasantville
Matthew Dugan	White Plains
Jeffrey Jacobs	Rye
John Lanzetta	Tarrytown
Milagros Lecuona	White Plains
Mark Lewis	Pine Bush
Arthur Linker	Scarsdale
David Parmet	Mt. Kisco
Paul Renken	Yorktown
Daniel Rosenthal	New York
Neil Roth	Somers
Richard Rubin	Somers
Michael Sheridan	Mt. Kisco
Peter Spenser	New Rochelle
Lori Wood	Harrison

ALMANAC for May 2025

Bob Kelly, WAA VP of Field Events


Bob Kelly


1Q May 4


Full May 12

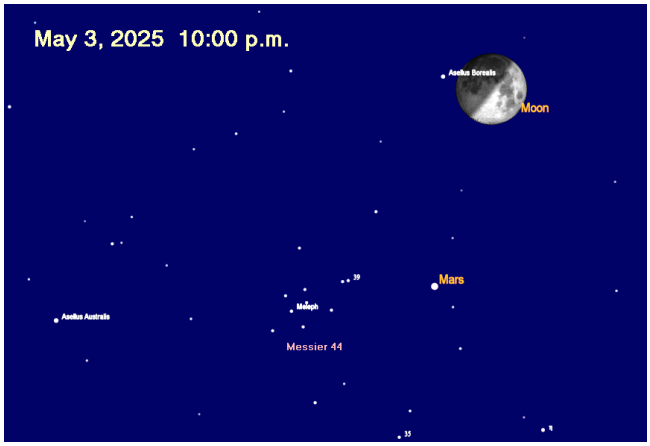

3Q May 20


New May 26

Western Evenings

The action in the evening shifts to the western sky. When we view Mars and Jupiter, we're looking far across the solar system. The two planets are heading behind the Sun from Earth's perspective. Mars is tiny, just six arcseconds wide, not showing much detail. Its gibbous shape and hint of a white north polar cap might be worth viewing at high power if seeing is extremely good.

Mars Moseys on Over to the Beehive



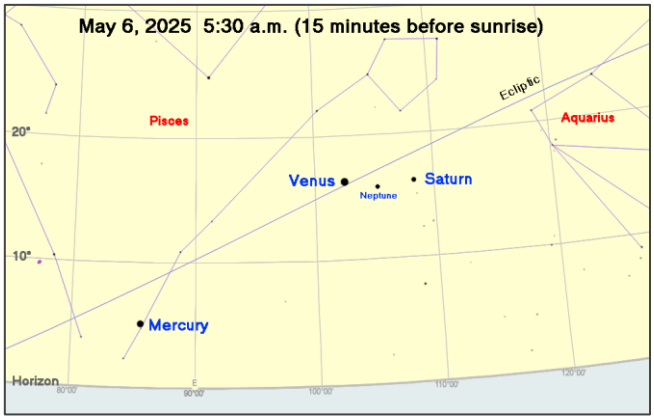
According to Webster's, "mosey" means "to hurry away." I've been using the alternative definition of "to move in a leisurely manner" all my life. I guess that says something about me, or about the way we can define and use words in contradictory ways. So, Mars heads over from his time with the Twins toward Cancer, skirting the northern edge of the Beehive Cluster, a pretty sight in binoculars. The Moon comes by on the 3rd. Mars will be between the Moon and the Beehive, providing directions to everyone who wants to see all the members of this celestial meet-up. About 10:52 p.m. EDT, a 4.7 magnitude star, Gamma Cancri (Asellus Borealis), will be covered by Moon's dark limb. It's always awesome to watch when a star instantaneously disappears behind the Moon's dark edge. Check it out with binoculars or a telescope as soon as the sky gets dark. It would be interesting to get a photo all these characters together, but its quite an imaging challenge due to their wide range of brightness.

Jupiter Sliding Down

Jupiter is heading down toward the Sun this month. May is the last full month for us to view it in the evening sky. By the end of May, Jupiter sets just before astronomical twilight ends. Jupiter's moons are getting harder to separate from the planet in binoculars, but wonderful views in the telescope are still available before Jupiter sets.

Morning Lowjinks

Low in the eastern sky before sunrise, Venus is the bright marker at magnitude -4.6 pointing the way to lesser lights. From May 5th through 7th, Saturn is at magnitude +1.2 to the right of Venus. Neptune is also in the area, but hard to find at magnitude +7.9, low in the morning twilight. Saturn's rings are edge-on to the Sun on the 6th, after which they will be lit from their underside, possibly visible late in the month at high magnification but extremely difficult because they are so thin (30 feet thick) and so distant (795 million miles). Use a telescope on Venus too, but in twilight, to see it as it goes from crescent to nearly half-lit, while decreasing in size by one-third during the month. Another Saturn sight that needs high power is seeing the shadow of Titan on Saturn's disk near sunrise on the 15th and 31st.



The Moon comes by the morning planets later in the month. On the 22nd, the Moon is to the upper right of Venus and Saturn and flops over to the lower left of them on the 23rd. You might be able to catch the thin Moon well left of Venus on the 24th.

The Flip Side

The young Moon flies up into the evening sky in the last week of May. It flips from below Jupiter on the 27th to above it on the 28th. It goes to the heart of Gemini on the 29th. Mars and the Moon have another encounter on the 31st.

A May Shower

For a few days on either side of May 6th the Eta Aquariids can put on a decent show of 10 to 30 meteors per hour. The first quarter Moon will get out of the way around 3 a.m. The American Meteor Society notes they are fast movers in our atmosphere and some leave nice trails when they streak across the sky.

Station Sightings

From May 8th through May 11th, the International Space Station is visible every 96 minutes through the night. The night of the 9th/10th has the most passes, with six visible from our area. To see all six means staying up all night or setting an alarm for every 90 minutes or so. Not easy!

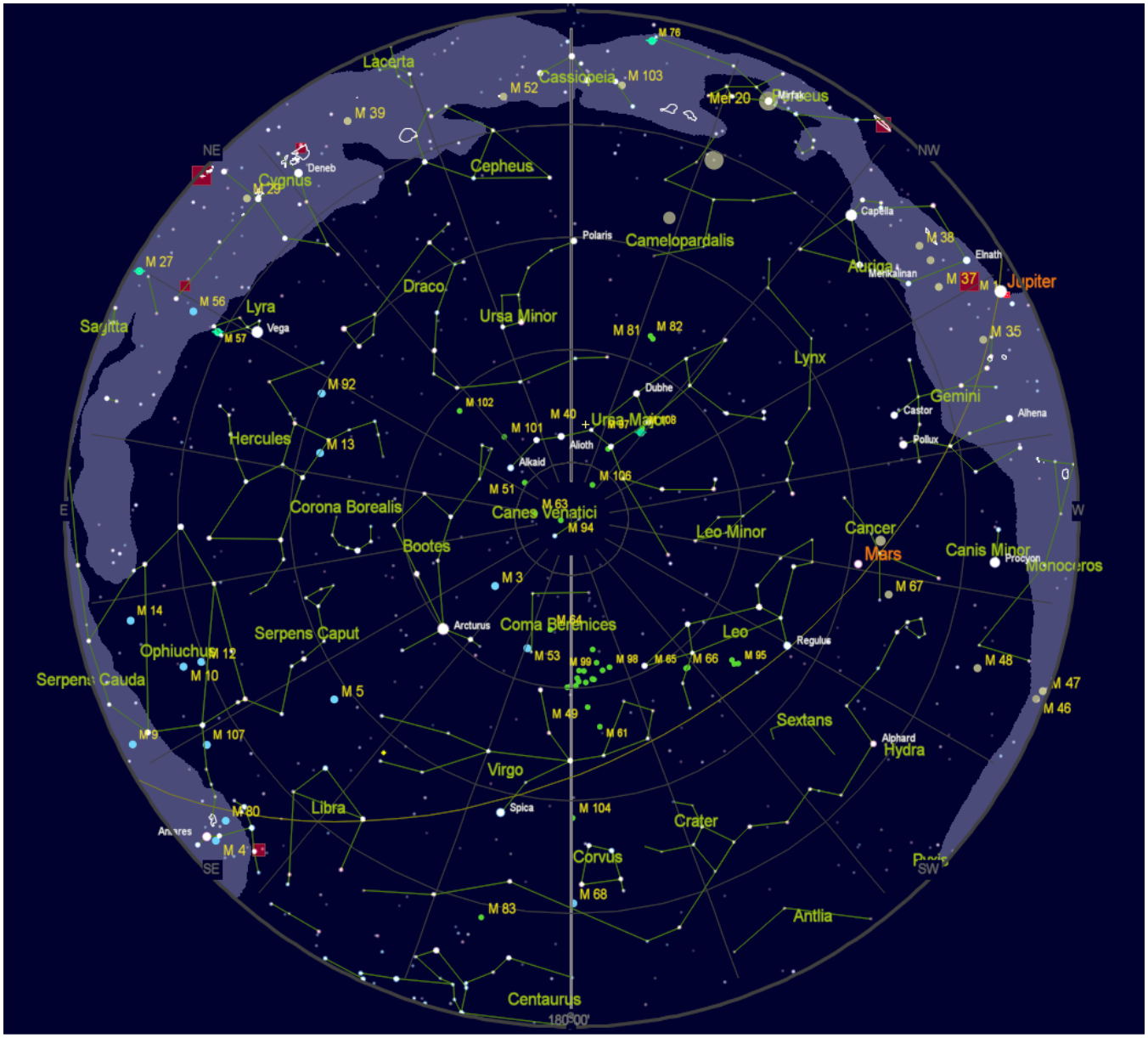
China's Tiangong space station is visible in the mornings from the 11th through the 25th, and then in the evenings for the rest of the month.

Whole Sky Delights

Leo and the Great Bear stand out this month, heading west in the late evening sky. Arcturus comes over us and may be the first star visible during twilight, which ends around 10 p.m. this month. The Milky Way is low in the east then. We get to look out through the roof of the galaxy, including sights like the realm of galaxies in Virgo, telescopic objects 54 million light years away. See page 16 for more on this month's galaxies. ■

Bob Kelly caught the rising partially eclipsed Sun on March 29th from Rye Park over Long Island Sound. Tripod-mounted Canon XS with 250-mm zoom lens at f/7.1, 1/80 second at ISO 200. No filter. No processing.

May Sky Map



The map above shows the night sky from Westchester at 10 p.m. on May 15. Solar system objects will be in simi lar positions, except for the location of the Moon, around 11 p.m. on May 1 and 9 p.m. on May 31.

Join the WAA Discord Server

Discord is an app (iOS, Android, Windows) that will vastly enhance communication within the club and increase the value of your membership. It's free.

Join the "Office Hours" Discord chat hosted by WAA President Jordan Webber every other Wednesday at 7:00 p.m. For more information and to join, go to https://is.gd/WAADisc

Elyse Faltz (1949-2025)

We are heartbroken to share the sad news of the passing on April 5 of Elyse Faltz, wife of SkyWAAtch Editor and former WAA President Larry Faltz. Elyse and Larry were married for over 41 years.

In the primary mirror cage at the 200-inch Hale Telescope, 2016

Elyse was born in Brooklyn, raised in Illinois, and graduated from Syracuse University with a journalism degree. She had a lifelong passion for all the arts, especially dance, and became involved with many organizations, including the Rye Arts Center, for which she served as a Board member and President. Elyse arranged WAA's participation at the opening of the Art Center's exhibition of the Hubble Space Telescope images in 2009. She was a person of enormous dignity, decency, strength and judgment. Curious, knowledgeable and open, her regular presence always added sparkle to WAA events and the many other social and professional gatherings she enthusiastically attended with Larry. She was a wonderful conversationalist and made everyone she met feel at ease. She and Larry did everything together, taking joy in many familiar activities, particularly ballet and classical music performances, skiing and museum visits, and sharing the wonder of each new travel adventure. She was an incredible optimist, even in the face of a long and difficult illness, which she confronted valiantly and with enormous grace. We will miss her.

ASU Meteorite Museum, 2016

Subaru telescope, Mauna Kea, 2012

Chile, 2017

Caffé Florian, Venice, 1985

As an ugly sister In *Cinderella* Scarsdale JCC 2012

Elyse and Tomba 1999

Whipple Observatory, 2011

Deep Sky Object of the Month: Cor Caroli

Cor Caroli	
Constellation	Canes Venatici
Object type	Double Star
Right Ascension J2000	12h 56m 01.67s
Declination J2000	+38° 19’ 06.15’
Magnitude	2.84/5.6
Class	A0/F2
Separation	19.6 arcseconds
Distance	100 light years
Other Name	α Canum Venaticorum

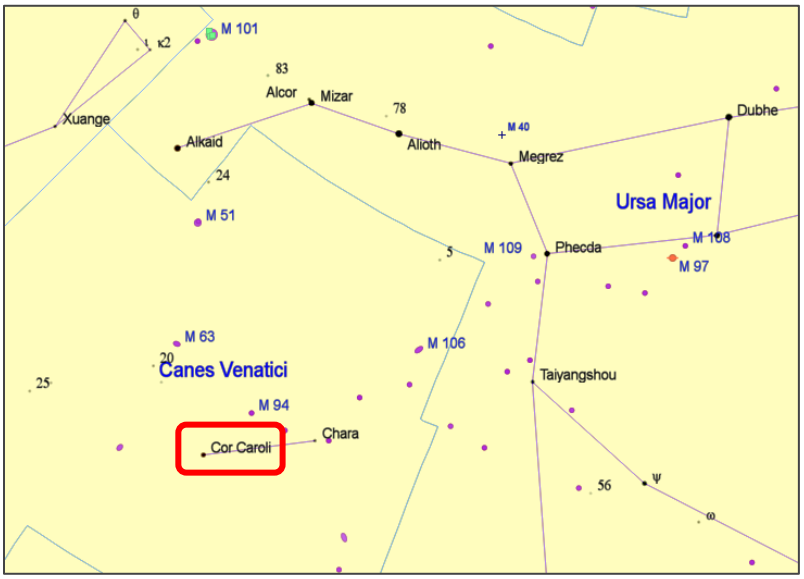
Visibility for Cor Caroli			
10 p.m. EDT	5/1	5/15	5/31
Altitude	76° 16’	85° 52’	80° 09’
Azimuth	97° 14’	136° 50’	255° 48’

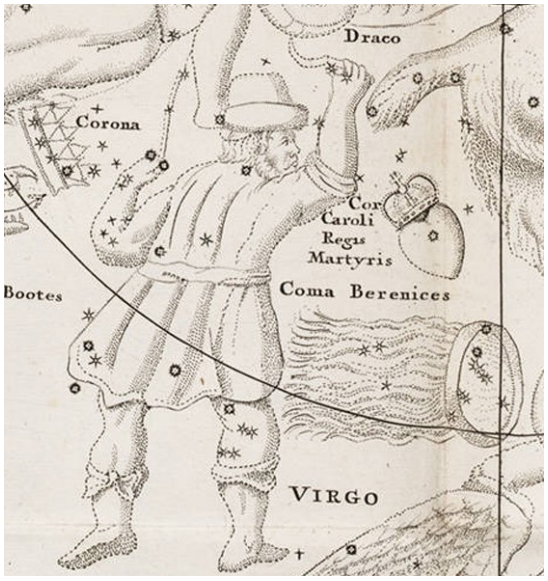
Since galaxies are the subject of this month’s feature article, we’re presenting a double star for your consideration as the deep sky object of the month. Maybe not as deep as a galaxy, but deep enough: if you were to drive to Cor Caroli in your car at 60 mph, it would take you 1.2 billion years to get there.

In Bayer’s *Uranometria* (1603) the star appears on the plate showing Ursa Major, but it isn’t labeled.

Cor Caroli is one of the rare stars with a Latin name. It was possibly coined in 1660 by Sir Charles Scarborough in honor of Charles II, who returned to England on May 29, 1660 after Oliver Cromwell’s death and the end of the Commonwealth, in a comment that may have been made to Edmund Halley. In Francis Lamb’s 1673 star chart (image below), the star was labelled Cor Caroli Regis Martyris (The Heart of Charles, the Martyred King), referring to Charles I, who was beheaded in 1649. The constellation Canes Venatici (“Hunting Dogs”) was created by Johannes Hevelius in his *Firmamentum Sobiescianum sive Uranographia*, which was published in 1690. The dogs, Asterion and Chara, are held on a leash by the hunter Boötes.

The brighter of the two stars making up the Cor Caroli binary is paradoxically labeled α2. It is variable, with a period of 5.47 days. It has a strong magnetic field that produces large starspots.





Another Movie Telescope: *His Majesty O'Keefe*

In this 1954 adventure film, Burt Lancaster plays an ambitious, self-confident sailor who is shipwrecked on Yap Island in the Marianas. He learns the copra trade from an honorable German plantation manager, coming to understand the native culture and religious beliefs. Copra is the dried flesh of coconuts, the source of coconut oil.

Striking out on his own, he returns to Shanghai to get a ship and make his fortune. A toothache brings him to a Chinese dentist, played by Benson Fong. Fong happens to own a boat that is moored in the harbor, and he shows it to Lancaster with a telescope that just happens to be on hand in his dental office. [WAA Treasurer Paul Alimena, also a dentist, does not keep a telescope in his office.]

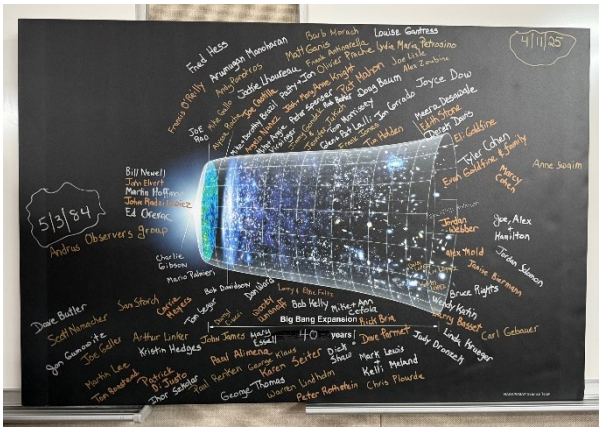
The film was based on the exploits of an actual person, David O'Keefe, who was shipwrecked on Yap in 1871.

The film was shot on Fiji, not Yap. Lancaster noted at the time, "It was so tough working in the humidity that one day I actually watched fungus grow on my clothes. Every day blazing sun or tropical rain beat down upon us and at night there were always mosquitoes." The film, however, gives the impression that the island was a tropical paradise. In addition, O'Keefe's strategy for motivating the otherwise lazy natives is to find a clever way of mining the red stones that serves as their currency. But the stones' value ultimately collapses, creating problems for Lancaster. This seemed to your Editor a warning of what might happen with cryptocurrency.

WAA 40th Anniversary Gala

On April 11th, WAA celebrated its 40th anniversary with a dinner and gala at Pace University. The program was organized by Eva Andersen, WAA's VP for Membership, with the assistance of Jordan Webber, Liv Andersen-Lopez, Janise Biermann, Eli Goldfine and Karen Seiter. Original WAA member Bill Newell contributed a vast amount of material dating back to the initial organization of the club, and even earlier material about local amateur astronomy that he had collected and stored over the years. Much of it was on display.

Eva related the history of WAA with a slide show recalling fascinating events and personalities. Several friends of WAA, including astronomers and legislators, offered video greetings. Many previous club presidents and officers were present. Awards and certificates were presented to honor club members for outstanding contributions to WAA. The club's 20-inch Obsession telescope was formally named the "Bob Davidson Telescope" in honor of the club's first president. A plaque with the dedication will be affixed to the scope. Many door prizes were awarded. Sharon and Steve Gould won the grand prize, a ZWO SeeStar S50 telescope.

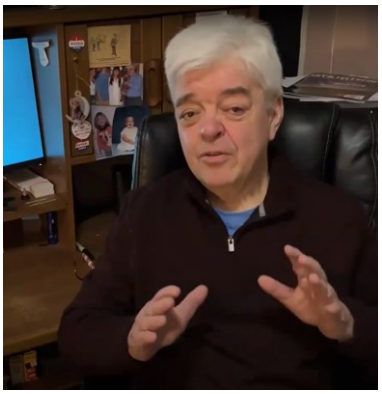


Westchester
Amateur Astronomers

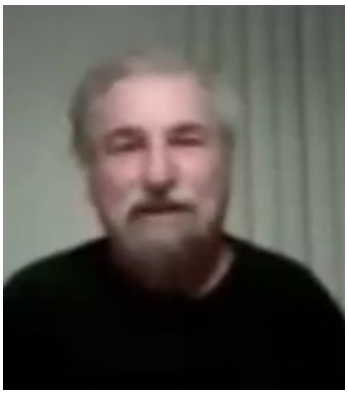
The Bob Davidson Telescope

In honor of Robert J. Davidson
First President of Westchester Amateur Astronomers

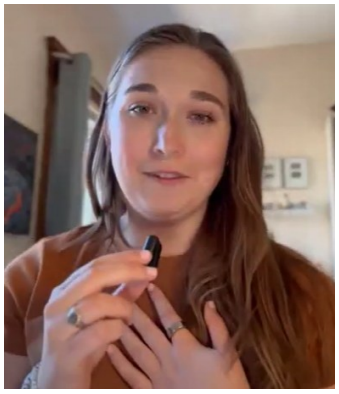
We received video congratulations from friends of WAA, among them

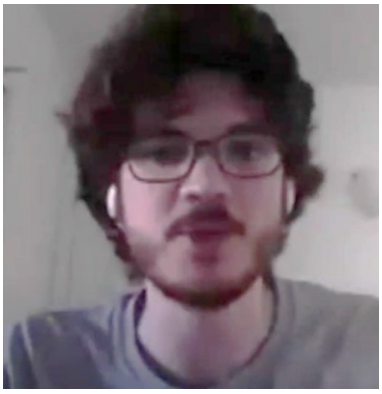

Joe Rao


Will Grundy (Lowell)


Sam Storch

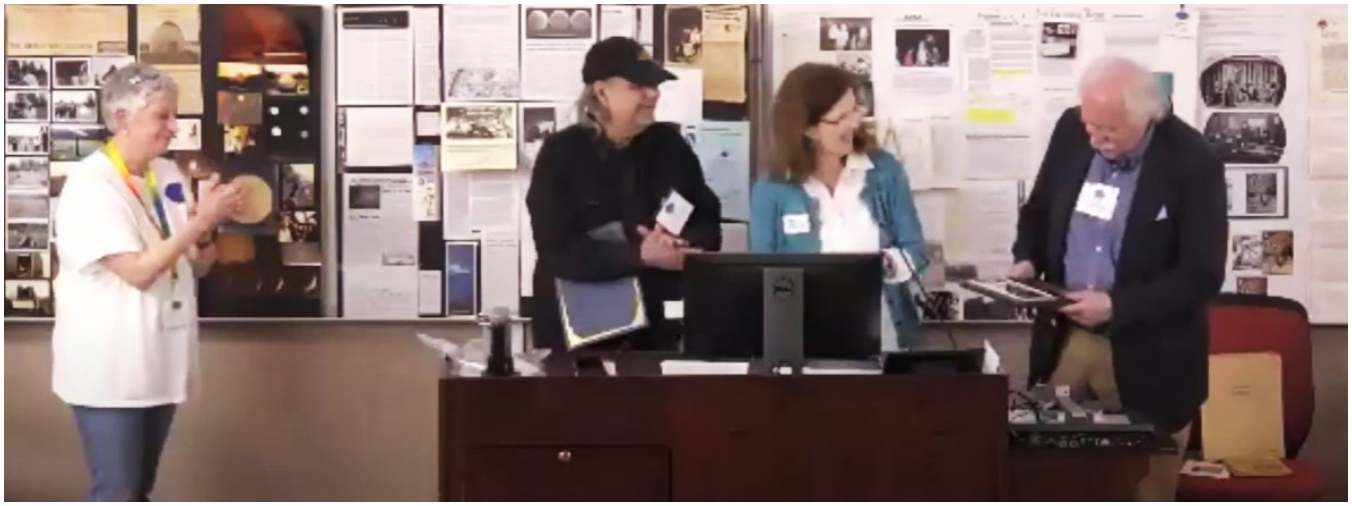

Neil deGrasse Tyson


Emma Loudon (Yale)

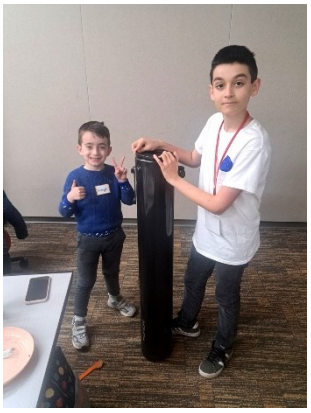

Tyle Cohen (VLA)


NY State Senator Andrea Stewart-Cousins

More pictures from the gala:

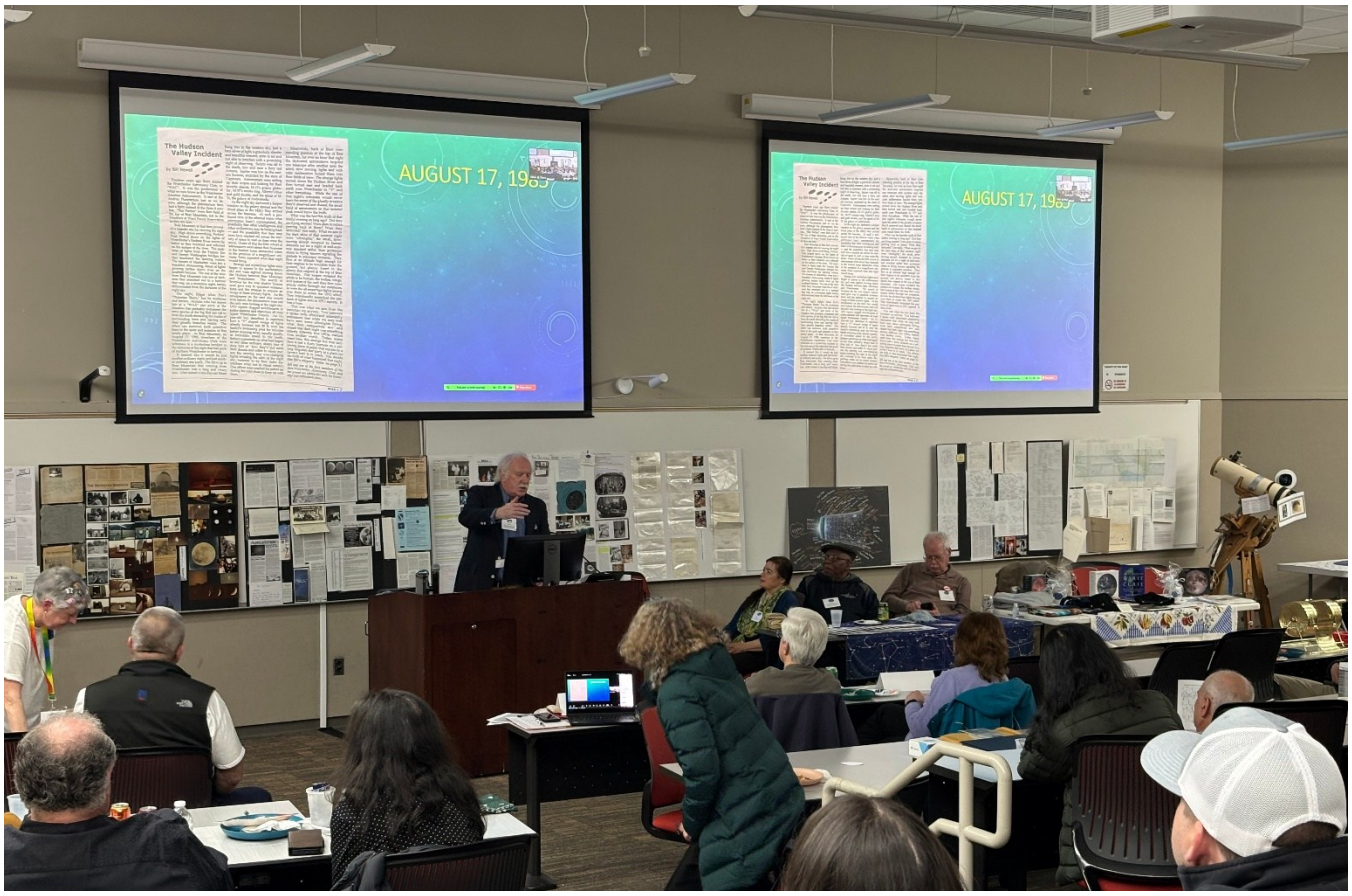

Eva Andersen and Mike and Ann Cefola present an award to Bill Newell





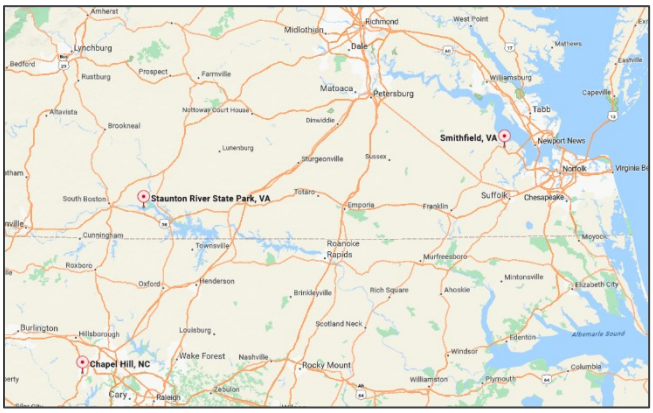

FIREBALL
XL5





The Hudson Valley Incident
AUGUST 17, 1953
The Hudson Valley Incident
AUGUST 17, 1953

Observing Report: Staunton River Star Party — Steve Bellavia

I attended the Staunton River Star Party, hosted by Chapel Hill Astronomy Observing Society (CHAOS), from Monday, March 24th to Friday, March 28th

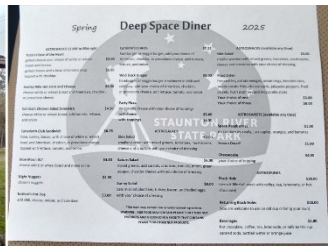


I left my house in Smithfield, Virginia at 8:30 a.m. Monday and got there at 11:30 a.m., with a stop for gas and breakfast at McDonald's.

I was the second person to arrive. I waited for the rain to stop and then set up, having the choice of anywhere I wanted. I picked a spot at the north end of the field, as I always set up my hunter's blind (my "office" for imaging), so that it opens away from other attendees. In case of an accident (for example if I forget to cover the laptop) I don't want to have any stray light shining towards anyone else.

This star party is a five-star, A-1, class act. It's the model to follow if you ever want to run a star party. One reason for this is that the park is fully involved. It's not just an astronomy club "showing up" at some rural park. Staunton River State Park is an IDA-certified Dark Sky Park, and it park has an astronomy-trained staff and even a bunch of table-top Dobs to loan out.

And the park, not the club, runs the "Deep Space Diner," open from 8 a.m. to midnight, with a substantial menu of excellent food, including fresh salads. On one night, I was sitting in the heated diner, under red lights, having a cheesecake and coffee with friends!



The men's bathroom has four shower stalls with hot water, four changing areas, four sinks and a heater you can turn on, if needed. They even have tennis courts and a pool, but the pool needs repair and may not open for a while, or ever again, which would be sad.

Monday night had poor conditions, with only a few stars visible. I used that time to polar align, focus and do some flats and dark-flats in preparation for serious imaging for the next night. I did get up every so often to check if it had cleared and was surprised in the wee hours to see Scorpius high up through the clouds. I knew I was five degrees further south than at Cherry Springs, where I had gone so many times when I lived in Mattituck.

This park, in southern Virginia, is also slightly *west* of Cherry Springs State Park, in Pennsylvania. On the back of our ID badges, they list the latitude and longitude, a nice touch. When I saw 78 degrees 39 minutes 52 seconds longitude, I was surprised.

Tuesday was beautiful, and I took hikes on some of the park's many trails. I saw deer and many birds along the Roanoke River. And there was a killdeer momma bird nesting on part of the observing field, so the park rangers roped that section off.

I showed people the daytime crescent moon and Venus most of the days I was there. Venus was a magnificent crescent, a "safe" 15 degrees from the Sun.

Here's a short video: https://is.gd/6V6CL9.

It got cloudy and started raining around 6:00 p.m., lasting until 9:30 p.m. It started clearing an hour later, and there was some beautiful cloud motion, which you can see at https://www.astro-bin.com/oq4286/.

I was lucky to have my nearest neighbor imaging with an 11-inch SCT and observing with a 12-inch Dob. I asked if I could "drive" the Dob for a while, and with it I ended up doing a visual marathon of deep sky objects:

- Galaxies: M81-M82, M51, M101, M108, M109, Cocoon, Whale-Hockey-Stick, The Needle (NGC 4565), the Splinter (NC 5907), the Sombrero (M104), Leo triplet, the Southern Pinwheel (M83), and NGC 2903. We stumbled on NGC 4536-4527 in Virgo which I have never deliberately hunted down, but will again, and maybe image too.
- Globular clusters: M3, M4, M10, M12, M13, M92.
- Nebulas: M42, M57, M97, the Cat's Eye.
- Open Clusters: M35, M37, M38, NGC 457 (ET)
- Double stars: Mintaka, Polaris, Albireo, Kuma, Algieba, Castor.
- Occasional meteors.
- Too many satellites.
- And a bunch more stuff I forgot.

I went to sleep at 4:00 a.m. and had a great breakfast at 8:00 a.m. sharp, when the Deep Space Diner opened.

Wednesday was another gorgeous day. More Venus, more walks, and a comfortable nap. That is one

advantage of a March star party. It's normally much too hot to sleep in a tent in the daytime during a summer event.

Wednesday night started and stayed clear most of the night. More observing and imaging. I got to look through a fellow Richmond Astronomical Society member's 24-inch New Moon Telescope:

I also saw a glow-worm in the grass, but you had to be dark-adapted to see it. Another attendee also saw one.

The sky is pretty dark at Staunton River State Park. When the Coma cluster was near the zenith, it was prominent. But it didn't knock you over like it did the first time I saw it at Cherry Springs in early May some years back, when I asked myself, "what the heck is *that*?" If Cherry Springs is Bortle 2, I would say Staunton River is Bortle 3. My raw image data confirms this, showing a sky flux of 21.45 mag/sq arc-second.

It got cold that night, and there was ice and frost on the car. I believe it went below 32° F. Thank goodness for my cold-weather REI sleeping bag.

Thursday was another beautiful day. Chilly in the shade, comfortable in the sun. I got to see an incredible solar prominence through another neighbor's Hα scope. In the afternoon, I gave an informal talk to a dozen or so people on some radio astronomy projects I've worked on at Brookhaven National Labs. The audience seemed genuinely interested and asked great questions.

Thursday night was only clear until 10:30 p.m., as predicted, so I captured whatever data I could, and went to bed early. On all four nights, I spent whatever clear time there was imaging two objects: the Eskimo Nebula, NGC 2392, in the first half of the night (see image on page 25) and the Hamburger Galaxy, NGC 3628, until dawn (see image on page 26). This was first light for my new 6-inch Classical Cassegrain telescope.

Although the star party continued until Sunday, I left for home Friday. It was an easy drive. Often, there were no other cars on the road. I got home in 2 hours and 55 minutes. It is nice to be able to get to a dark sky in under 3 hours, with no traffic.

I attended another star party after I got home, but just during the day on Saturday, to say hello to my other Virginia Astronomy club members at Chippokes State Park, a Bortle 4-5 site seven miles from home. It was mostly cloudy Saturday and Sunday nights, at both parks, so I didn't miss much.

A full photo summary of the trip is on Flickr, in more-or-less chronological order, at https://is.gd/KxoL4l. ■

May is Galaxy Time!

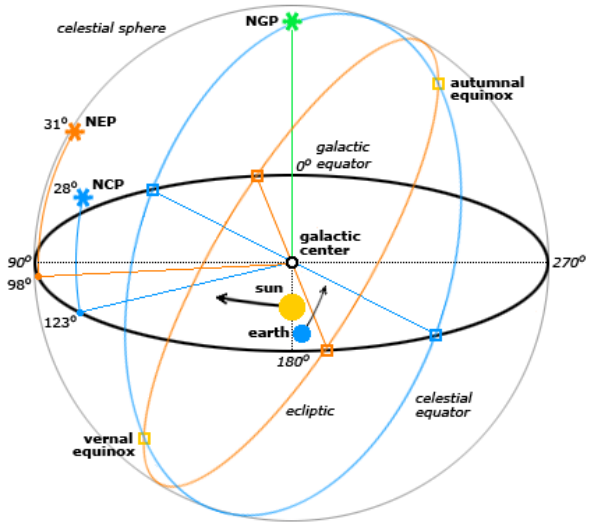
Larry Faltz

The Sun is an ordinary type G star situated just above the plane of the Milky Way galaxy some 27,000 light years from the galaxy's center and about halfway to its edge. It is on the inner aspect of a band of stars known as the Orion Arm (or Spur). It rotates around the Milky Way once every 250 million years. The solar system, however, is not oriented in the plane of the galaxy, but is tilted at an angle of about 60 degrees. This fortuitous angulation allows us to view neighboring galaxies overhead on clear spring and fall nights. During those seasons, the Milky Way is positioned along the horizon in the evening. Its many wonderful sights, whether summer or winter, must wait for the next change of season.

In the fall, our view is dominated by two galaxies in the Local Group, Messier 31 in Andromeda and Messier 33 in Triangulum. But in the spring, we look beyond the Local Group to clusters of galaxies in Virgo, Coma Berenices, Cates Venatici, Leo, Ursa Major and Draco. These galaxies are in groups that make up the Virgo Supercluster, of which the Local Group is a minor and rather peripheral member. The Virgo Supercluster is a collection of over 100 subgroups more than 110 million light years in diameter. As galaxy groups go, it is fairly ordinary. There are many superclusters in the observable universe. Within 1.3 billion light years of the solar system, a relatively small portion of the whole universe, there are at least 130 of them. The Virgo Supercluster is special only because we're in it. We covered clusters and superclusters in the January 2024 SkyWAAtch and February 2024 SkyWAAtch.

Group	Distance (LY)
M81 Group (Ursa Major)	11 million
M101 Group (Ursa Major)	24 million
M51 Group (Canes Venatici)	31 million
Leo Group	35-38 million
Draco Group	40 million
Ursa Major Group	55 million
Virgo Cluster	65 million

As we discussed in the March 2025 SkyWAAtch, the galactic coordinate system has an axis orthogonal to the plane of the Milky Way. The north galactic pole is in Coma Berenices, 6° north of Messier 64.



The ecliptic (yellow) is angled 60° from the galactic plane (black) and 23.4° from the celestial equator.

In the constellations Ursa Major, Canes Venatici, Coma Berenices, Virgo and Leo there are 53 galaxies magnitude 10.0 or brighter.[1] They are in reach of moderate aperture (8-10 inches) telescopes on clear nights with good transparency (low humidity, few particulates). Of course, the darker the sky, the easier they are to see. The photographic images in this article[2] are not what you'd see in your telescope: you'll have to be satisfied observing typical "faint fuzzies," often requiring averted vision to see anything at all, unless you can get a hold of a really big scope (>16 inches). Nevertheless, it's exciting to see these objects visually, their photons directly exciting the protein rhodopsin in the rods of your retina. Astrophotographers are getting increasingly detailed views with modern imaging equipment and techniques, although small galaxies may need longer focal lengths than many imagers employ in the current era of small, highly corrected, short focal-length refractors intended to capture nebulas in the Milky Way.

[1] There are another 107 galaxies between magnitude 10.1 and 11,0 and 199 between 11.1 and 12.0 in this region, targets for visual observers with larger instruments.

[2] Except where noted with an asterisk in the caption, all of the images were made by WAA members.

A galaxy does not look as bright as its given magnitude suggests. Its light is spread out over a large area, and the listed magnitude is the integrated light intensity over its entire extent. So each point within the galaxy is dimmer than a star (a point source) of the same magnitude. For extended objects we rely on the eye's ability to detect contrast, the difference between the object and the background. The meaningful parameter is the galaxy's *surface brightness*, which is expressed as magnitudes per square arcsecond. The darkest night sky has an integrated brightness of 22.0 magnitudes per square arc second. The night sky at Ward Pound Ridge Reservation on a clear moonless night is about 19.9,[3] typical for a "good suburban sky." It's probably possible to see galaxies with surface brightnesses two units fainter than the sky brightness, because, like magnitude, the surface brightness figure is an average over the whole extent of the galaxy, but the galaxy's core may be quite a bit brighter. As an example, Messier 31, the Andromeda Galaxy, at magnitude 3.4, can be a naked eye object at WPRR on a great fall night, but its nominal surface brightness is 22.2 and so it ought to be barely visible even in a large telescope. But we've all seen it, and that's because its core central has a surface brightness of 16.6, the 22.2 figure being due to the enormous (3°) extent of the galaxy over which its light is spread. We might not see the whole galaxy but the core will stand out from the background. A table of magnitudes, central surface brightness and average surface brightness for the objects presented in this article is given on page 24.[4]

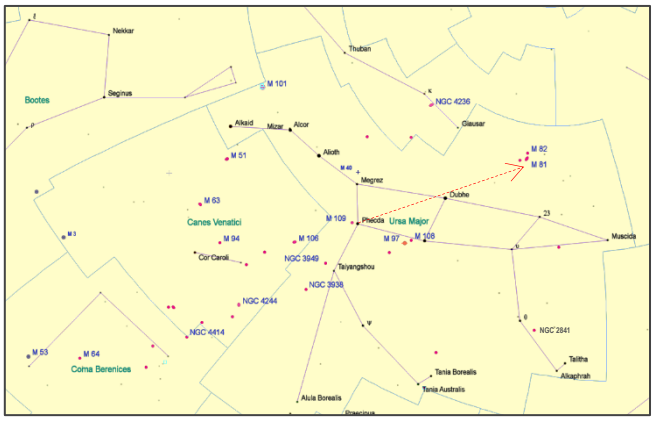
Visual light pollution filters are no longer as useful as they once were because they are designed to eliminate specific wavelengths generated by sodium and mercury vapor lamps, nearly all of which have been replaced by blue-rich panchromatic LEDs. These bulbs scatter across the entire visual spectrum. Dark skies and dark adaptation, and of course aperture, are key to visual galaxy observing.

A go-to scope makes finding galaxies (or any other astronomical object) a simple matter. A decent star map or planetarium software will help orient you. Connecting your computerized scope to a laptop or hand-held device is not difficult. New mounts with internal wi-fi hubs make it almost automatic. If you have an older go-to mount or telescope like a Celestron CPC or AVX or Meade LX-90 or LX200, you can still make the connection between mount and computer with an old RS-232 serial interface (some newer hand controls have USB connectors), either wired or wireless with an aftermarket device like the SkyFi III or Celestron SkyPortal.

If you just concentrated on the Messier galaxies in this region, you'd have 31 to examine. The rest of the galaxies that might break through the visibility barrier are in the NGC catalog. There are many other catalogues of even fainter galaxies, such as the IC, UGC, MCG, PGC/LEDA, 2MASS and SDSS catalogues, and there are catalogues of galaxy groups (Abell, Hickson, Zwicky) but these are not for the visual observer except for those privileged few with gigantic scopes.

Galaxies in Ursa Major

Ursa Major is high overhead in May. It's a good place to start hunting galaxies.



Map of Ursa Major and Canes Venatici. The arrow shows the author's method for finding M81 & M82.

Messier 81 (M81), also known as Bode's Nebula, at magnitude 6.9, is the brightest galaxy in this part of the sky. Its total extent is almost half a degree, but its outer portions have low surface brightness and are harder to visualize compared with the intense core. It was discovered on December 31, 1774 by Johan Elert Bode, working at the Berlin Observatory (he was obviously not attending a New Year's Eve party), which he later directed. Bode is responsible for the *Uranographia*, the last great illustrated sky atlas, which

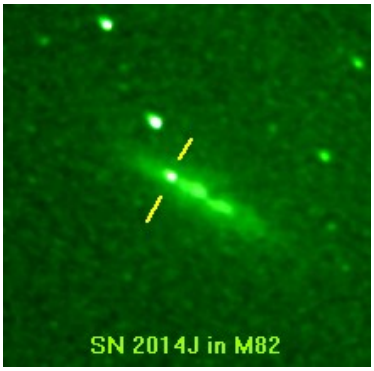
[3] Fifteen years ago, a good night at WPRR was 20.45. Don't get me start ranting about light pollution.

[4] See Tony Flanders' discussion of surface brightness at https://tony-flanders.com/surface-brightness/.

was published in 1801. He also gave the name "Uranus" to the new planet discovered by William Herschel in 1781.

About the same diameter as the Milky Way, M81 harbors a larger supermassive black hole, estimated to be 70 million solar masses. The galaxy is some 12 million light-years away, and is moving towards us at a rate of 46.99 km/sec. The Milky Way will have merged with the Andromeda Galaxy long before M81 gets here. As big in the sky as the full Moon, its spiral arms and dust lanes are prominent in images but hard to make out without a large telescope, so we usually see only its core. M81 is considered a "grand design" galaxy, with prominent spiral arms that clearly extend around the galaxy. Only about 10% of spiral galaxies are classified as "grand design." Most are termed "multi-armed" and few are "flocculent." Other grand design galaxies visible in this area of the sky are M51 and M101.

Its companion, the Cigar Galaxy, M82 (magnitude 8.4), is a starburst galaxy with a central dust lane and hydrogen gas spewing from it. Its tidal interaction with M81 has stimulated star formation in multiple bursts over the past 200 million years. At the current time, all the star formation occurs within the central 500 parsecs (1,630 light years). Stars are forming in that area at a rate ten times higher than the entire Milky Way. In 2014, a type Ia supernova, SN 2014J, was seen by many amateurs. It peaked at magnitude 10.5. WAA member John Paladini captured it with a home-made image intensifier. Type II core collapse supernovas have also been detected in M82.



With a small scope and color CMOS camera, it's not difficult to capture the central dust band and the red glow of hydrogen spewing from the center of the galaxy. Through the eyepiece M82 appears homogenous. Only half a degree apart, M81 and M82 can fit in the same low power visual field. It's an exquisite sight, often visible with a 4-inch scope in even moderately dark skies.

You can find M81 and M82 visually by extending a line between the Big Dipper stars Phecda and Dubhe diagonally across the Dipper's scoop. Go twice their separation to the northeast to find the two galaxies (see the dotted red line in the map on page 17). This is a good technique to use if you are viewing with binoculars.

Messier 81 & 82 (Gary Miller)
[also see Olivier Prache's image on this month's cover]

About 15 degrees southeast of M81/M82 and less than two degrees west of the magnitude 3.1 class F7 star Theta Ursae Majoris is the pretty spiral NGC 2841 (10.0). This object is the prototype of a "flocculent" galaxy because of its patchy, discontinuous spiral arms. Messier 63 is also a member of this small class of galaxies.

NGC 2841 (*Digital Sky Survey)

Messier 97 and Messier 108 (Steve Bellavia)

There are many faint galaxies floating in the Big Dipper's bowl (or if you are in Great Britain, being dug up by the blade of the Plough). The brightest of these are just outside the bowl. The Surfboard Galaxy M108 (10.0) is a degree and a half southeast of the star Merak (the lower "pointer star") along the bottom of the bowl. Go one degree further southeast to find the first-rate planetary nebula M97, the Owl Nebula, large and sufficiently bright at magnitude 9.9.[5] Not a galaxy, but don't miss it.

You can find M109 (9.8), a classic barred spiral, near the 2.3-mag A star Phecda. M109 is the most distant object in the Messier catalog, estimated to be 67 million light years away. It bears the nickname "Vacuum Cleaner Galaxy" because it's supposed to resemble that home appliance, but we don't see the similarity.

Messier 109 (Rick Bria)

Just above the handle of the Dipper, forming an equilateral triangle with Alkaid, the end star of the handle, and the famous double star Alcor/Mizar, is the very large (half a degree) Pinwheel Galaxy, M101. Even though it is listed at magnitude 7.9, its low surface brightness makes it somewhat challenging.

Messier 101 (Olivier Prache)

Messier 101 graced us with a lovely core collapse (type II) supernova in May 2023. Can you find it in the image below?

M101 with supernova SN 2023ixf (Larry Faltz)

That some "nebulas" were distant and composed of individual stars was still debated in the late 19th century and only established in the 20th. However, the

[5] A light pollution filter may help M97 because so much of its light is in the blue, from OIII. The filter would at least provide some increase in contrast of this object against the sky background.

great observer and classifier of the heavens William Herschel wrote in 1784 that he saw in M101 "a mottled kind of nebulosity…. I expect my present telescope will, perhaps, render the stars visible of which I suppose them to be composed." (It didn't, but he was right that it was made of stars.) It is estimated that there are at least one trillion stars in M101.

M101 is twice the diameter of the Milky Way. It has 1,264 catalogued HII regions in which star formation is occurring.

Galaxies of Canes Venatici

Four wonderful Messier galaxies lie between magnitude 1.85 Alkaid and magnitude 2,89 Cor Caroli, the brightest star in Canes Venatici. One third of the way down from Alkaid is the glorious M51, the Whirlpool Galaxy, actually a pair of interacting galaxies (NGC 5194 and 5195). The Whirlpool's spiral arms can be seen with larger scopes or in very dark skies. I've seen them with a 6" f/5 reflector in Bortle 2 skies at 9,200' altitude in Colorado. They're easily captured with a fairly short exposure in a small refractor with a CMOS camera. Only a little harder to catch photographically are the streams of stars being flung into space by the tidal interaction of the two galaxies. I never tire of looking at this galaxy. We profiled it in detail in the June 2016 SkyWAAtch.

Messier 51 (Robin Stuart)

Two-thirds of the way to Cor Caroli is the Sunflower Galaxy, M63, an 8.6 magnitude flocculent spiral with complex outer arms. The distance to this galaxy is uncertain. Measurements using different techniques range from 15.2 million to 34 million light years.[6]

Messier 63 (Arthur Miller)

Closer to Cor Caroli is the peculiar galaxy Messier 94, sometimes called the Cat's Eye or Crocodile's Eye. The galaxy has a tight inner ring and a more diffuse outer ring. Star formation is occurring in the inner ring. The outer ring, long thought to be a homogeneous structure, is actually composed of diffuse but recognizable spiral arms. The outer ring holds a quarter of the galaxy's mass and 10% of its new star formation. The genesis of this peculiar structure is still debated. Although merger with a satellite galaxy is a possibility, more recent studies suggest the oval shape of the inner ring created resonances which generated the outer ring.

Messier 94 (Steve Bellavia)

[6] See "Determining Galactic Distances" in the March 2021 SkyWAAtch.

Almost on the border between Canes Venatici and Ursa Major is Messier 106, a galaxy 23 million light years away. It is about the same size and mass as the Andromeda Galaxy. Its central black hole has a mass of 3.9 x 10^7 M⊙.

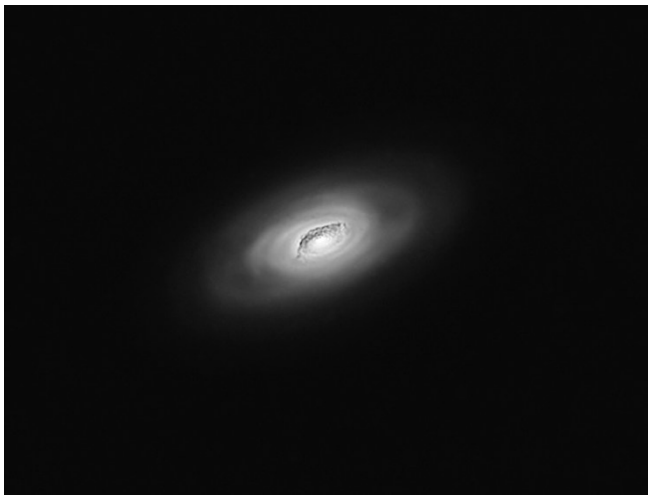
Messier 106 (Steve Bellavia)

In the southern region of Canes Venatici is the Whale, NGC 4631, an irregular magnitude 9.3 edge-on spiral galaxy that has undergone some gravitational disruption. Cradled next to the Whale is the Pup, NGC 4627, a smaller elliptical galaxy that's rather faint at magnitude 12.4. It takes very dark skies to see it visually. Half a degree away is another oddly shaped galaxy, the magnitude 10.4 NGC 4656, often called the Hockey Stick or Crowbar Galaxy, for evident reasons.

Hockey Stick (NGC 4656/7), Whale (NGC 4631) and Pup (NGC 4627) (Jordan Solomon)

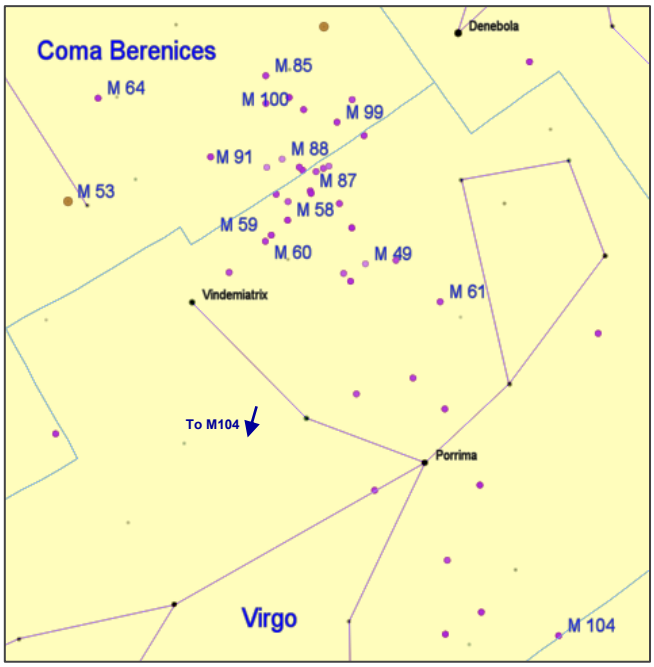
Galaxies of Coma Berenices and Virgo

Heading further away from the celestial pole, we come to Coma Berenices. The Black Eye Galaxy, M64, has a large band of dust that obscures some of the nucleus of this 8.5 magnitude object. The contrast between the dust and the galaxy's stars is usually detectable visually.



Messier 64 (Rick Bria)

The border of Coma Berenices and Virgo is Galaxy Central, the vast riches of the Virgo cluster. The cluster crosses the meridian around 11 p.m. early in May, at an elevation of 55 to 60 degrees.



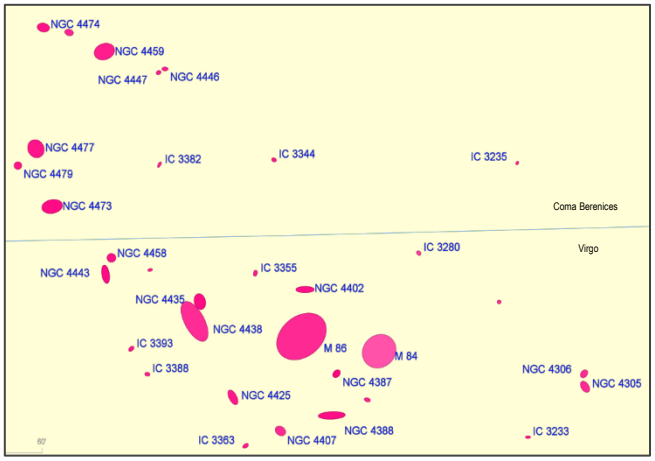
There are two dozen galaxies magnitude 10.0 or brighter within a square 14 degrees on a side, located between the stars Vindemiatrix (Epsilon Virginis) and Denebola (Beta Leonis).

The brightest galaxy in the cluster is the elliptical galaxy M87 (mag 8.6). The magnetic field thrown out by the galaxy's rapidly rotating supermassive black hole, estimated to have a mass of 6.6 billion suns, powers a jet of a high energy plasma moving near the speed of light that copiously radiates throughout the electromagnetic spectrum. It takes a very large telescope and optimal sky conditions to see the jet visually, but it can be imaged, as Arthur Miller did in the February 2024 SkyWAAtch. There are also two small galaxies near M87 that can be confused with the jet. They are at a 90 degree angle to it and 6 times farther away from us than M87. If you blow up the image below, you can see the jet close to the galaxy's core at the 5 o'clock position.

Messier 87 (Arthur Miller)

The Virgo cluster also contains Markarian's Chain, a group of galaxies with common proper motion. The main members of this group are M84, M86, NGC 4477, NGC 4473, NGC 4461, NGC 4458, NGC 4438 and NGC 4435.

Markarian's Chain (Olivier Prache)



Map of Olivier Prache's image (Cartes du Ciel)

M86, the brightest member of the chain, is a lenticular galaxy that is blue-shifted, which means it's actually approaching us at 244 km/s. It's falling towards M87 at the center of the Virgo cluster from the opposite side. We're not in danger, and anyway M31 (Andromeda) will get to us first.

Just out of the upper border of Olivier's image is Messier 88. Located on the outer edge of the Virgo Cluster, it too is heading towards the center of the cluster, which it will reach in about 300 million years. Neutral hydrogen is being stripped away from the periphery of the galaxy by ram pressure

Messier 88 (Arthur Miller)

Elliptical galaxies M59 (9.6) and M60 (8.8) form a nice pair, with spiral galaxy NGC 4647 (12.5) right on the edge of M60. M60 and NGC 4647 are interacting, with disturbances in the spiral's outer arms giving it a flocculent appearance on deep images. This pairing is catalogued as Arp 116 in Halton Arp's *Catalogue of Peculiar Galaxies* (1955).

M60 and M59 (*Franz Klauzer, Puchenstuben, Austria)

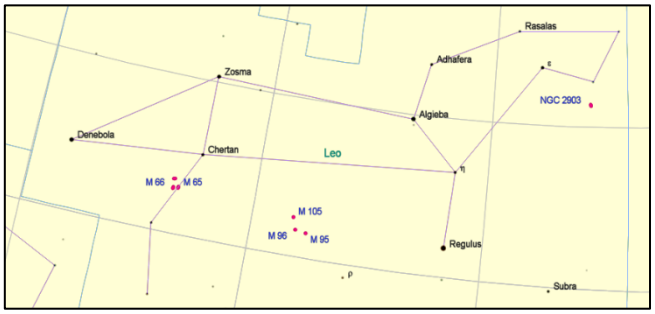
Messier 100 is a grand design spiral on the northern edge of the Virgo cluster. It exhibits active star formation in a ring surrounding the core. M100 is almost as large as M101. It's fairly distant at 55 million light years.

M100 (*Mykola Neumann, Konstanz, Germany)

The famous Sombrero Galaxy, M104, is the brightest galaxy in Virgo, at magnitude 8.0. It's actually just barely in Virgo, far away from the concentration of galaxies near Markarian's Chain and just 3 arcminutes from the boundary of Virgo and Corvus. A few references erroneously place it in Corvus. It's noted for its central bulge and sharp dust lane. The supermassive black hole at its center is at least one billion solar masses. It's a member of the Virgo II Group, which forms the southern edge of the Virgo Supercluster. With a central surface brightness of 18.3 compared to an average surface brightness of 21.0, it can be seen in smaller scopes under good sky conditions.

Messier 104 (Arthur Miller)

Galaxies in Leo



Leo is one of the easier constellations to identify, since it really does resemble a feline in a sphinx-like pose. Near Leo's back legs is the magnificent Leo Triplet, three bright spiral galaxies within half a degree of each other fitting within a circle 45 arcminutes in diameter. M66 (9.0), M65 (9.3) and NGC 3628 (9.5) are breathtaking in a large telescope.

Leo Triplet. L→R, M65, M66, NGC 3628. (Larry Faltz)

M66's gravitational encounter with NGC 3628 generated its peculiar spiral arm, which can be seen trailing to the south (up in the image). See page 26 for more on NGC 3628.

Another triplet of galaxies is closer to Regulus. M95 (mag 9.3), M96 (mag 9.7) and M105 (mag 9.3) form a group around 1¼ degree across. M105, an elliptical galaxy, forms a mini-triplet with two fainter spiral galaxies, NGC 3384 (mag 11.4) and NGC 3389 (mag 13.0).

M105 (with NGC 3384 and NGC 3389), M95 and M96 (*SDSS)

On the western side of Leo is a very nice 9.0 magnitude spiral galaxy, NGC 2903. It is considered a "field galaxy" and not part of a galaxy group, but it's still within the Virgo Supercluster. There is active star formation around the core at a rate of about 0.7 M☉ per year. It is about the size of the Milky Way and is 30.4 light years distant.

NGC 2903 (Olivier Prache)

This is just a sampling of the brighter galaxies overhead in May and into early June. If we get very clear skies at the May and June Ward Pound star parties, they will make fine, if challenging, visual targets. Give them a try.

If you have a larger telescope or access to one, perhaps a large Dobsonian or an 11-inch SCT, try for the galaxies between magnitude 10 and 11, which we didn't list in this article. Use a planning or planetarium program, or just meander through the body of the Virgo cluster around the border of Coma Berenices and Virgo. That's a fine way to spend a couple of hours on a dark, clear night. ■

The Brighter Galaxies of May (& Early June)

Object	Constellation	Mag	Size min)	Central surface brightness	Average surface brightness
M64	Com	8.5	10x5.4	18.9	21.5
M88	Com	9.6	6.9x3.7	19.6	21.7
M100	Com	9.4	7.4x6.3	20.0	22.2
M51	CVn	8.4	11x6.9	19.3	21.7
M63	CVn	8.6	13x7.2	19.3	22.2
M106	CVn	8.4	19x7.2	19.2	22.4
M94	CVn	8.2	11x9.1	17.7	21.8
NGC 4631	CVn	9.3	14.4x2.2	N/A	22.4
NGC 4656	CVn	10.9	6.5x0.7	N/A	20.6
M65	Leo	9.3	9.8x2.9	19.3	21.6
M66	Leo	8.9	9.1x4.2	19.0	21.5
M95	Leo	9.7	7.4x5	19.7	22.2
M105	Leo	9.3	5.4x4.8	18.9	21.5
M96	Leo	9.3	7.6x5.3	19.2	21.9
NGC 2903	Leo	9.7	11.9x5.3	N/A	23.0
M81	Uma	6.9	27x14	17.8	22.0
M82	Uma	8.4	11x4.3	18.8	21.2
M101	UMa	7.9	29x27	20.3	23.8
M108	UMa	10.0	8.7x2.2	19.8	21.8
M109	UMa	9.8	7.6x4.7	20.4	22.3
NGC 2841	UMa	10.0	8.1x3.5	N/A	22.5
M59	Vir	9.6	5.4x3.7	19.4	21.5
M60	Vir	8.8	7.4x6.0	18.8	21.5
M84	Vir	9.1	6.5x5.6	19.0	21.6
M86	Vir	8.9	8.9x5.8	19.2	21.8
M87	Vir	8.6	8.3x6.6	18.9	21.6
M104	Vir	8.0	8.7x6.3	18.3	21.0

Images by Members

NGC 2392, the Eskimo Nebula by Steve Bellavia

Steve writes,

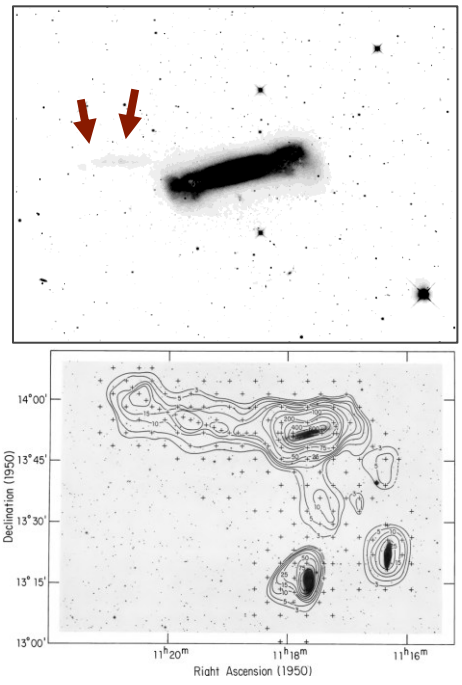
> I have spent much time contemplating how to obtain images of tiny, dim objects like small, distant galaxies and planetary nebulae. One method is to get a really big telescope, and build an observatory at high altitude, with good seeing. But I have my own rule of "no imaging telescopes beyond 6-inch aperture," and I don't plan on moving (again) or building an observatory any time soon. So after much deliberation, I decided on a 6-inch Classic Cassegrain. combined with a Baader Alan-Gee reducer (designed by Roland Christen of AstroPhysics), and my ZWO ASI294MM pro camera. In this configuration, it is *f*/7.1, 1,085-mm focal length. With the camera in BIN2, this yields 0.88 arc-seconds per pixel. A 6-inch scope has a theoretical resolution of approximately 0.80 arc-seconds. It is still under 20 lbs. and the two counterweights that came with my EQ6R-Pro mount are less than mid-way on the bar.

The Eskimo, in Gemini, also known as the Clown-Face or Lion Nebula. is catalogued as Caldwell 39 in Patrick Moore's extension of the Messier catalog. It is a "bipolar double-shell planetary nebula," magnitude 10.0, 48 arcseconds in diameter (about the maximum telescopic size of Jupiter). It was the first object imaged by the Hubble Space Telescope after the 1999 repair mission. If you're not familiar with the Caldwell catalogue, which includes southern hemisphere objects, see https://is.gd/waacaldwell.

The bright star is HD 59087 (mag 8.5, class A5). The field of view is 13.2 x 8.79 arcminutes.

NGC 3628, the Hamburger Galaxy by Steve Bellavia

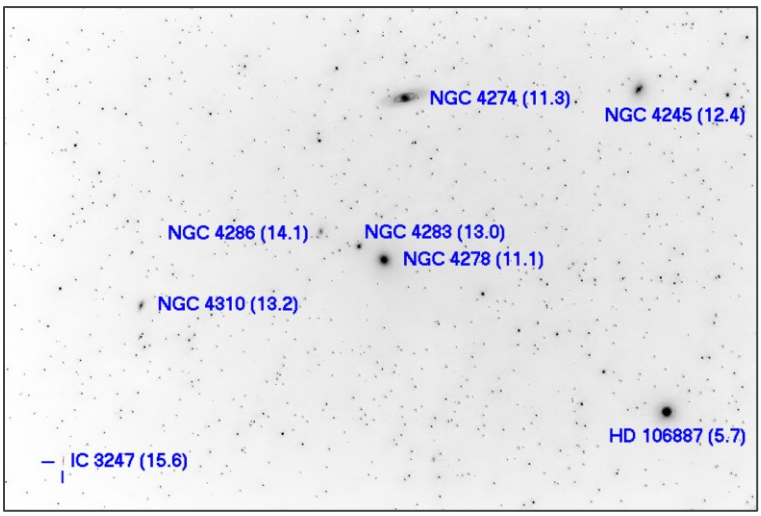
NGC 3628 has a 300,000 light year-long tidal tail (dare we call it ketchup dripping from the hamburger?) that is visible to the left of the galaxy. To show the part of the tail closest to the galaxy, we enhanced Steve's 41.2x31.2 arcminute image by inverting it, converting to monochrome and drastically enhancing the contrast.

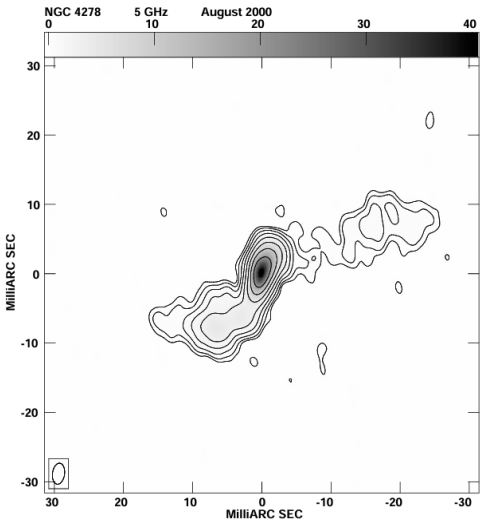


The distribution of neutral hydrogen demonstrates the interactions between NGC 3628, M65 and M66, which form the Leo Triplet (see page 23). Haynes, et al. used the Arecibo radio telescope to map out the 21-cm emission from neutral hydrogen. They observed emission not only in the tail, but also in two appendages directed towards the two Messier galaxies. Perhaps 20% of the total mass of neutral hydrogen in the galaxy resides in the tail and appendages. Haynes, M.P., Giovanelli, R., Roberts, M.S., A detailed examination of the neutral hydrogen distribution in the Leo triplet, *The Astrophysical Journal*, 229: 83-90 (1979) (https://articles.adsabs.harvard.edu/pdf/1979ApJ...229...83H)

Galaxies in Coma by Arthur Miller

We highlighted the brightest Coma galaxies and those bordering Virgo on page 21. These fainter galaxies are in the northern part of the constellation, near its border with Canes Venatici. The elliptical galaxy NGC 4278 (center) has a central black hole of mass 3.1 x 10^8 Mʘ. It also has two relativistic radio jets that extend 20 milliarcseconds on either side of the galaxy, a distance of 1.4 parsecs at the galaxy's 55 million light year distance. The jets are actually aligned between 2° and 4° to our line of sight. (Giroletti, M., et al., The Two-sided Parsec-Scale Structure of the Low-Luminosity Active Galactic Nucleus in NGC 4278. *The Astrophysical Journal* 622: 178–186 (2005). https://arxiv.org/abs/astro-ph/0412563). Arthur's image is 1.56 x 1.04 degrees.



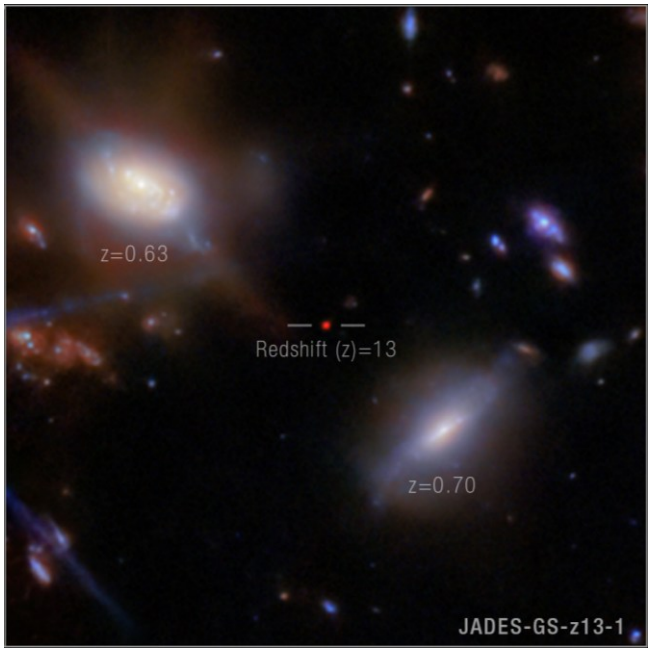


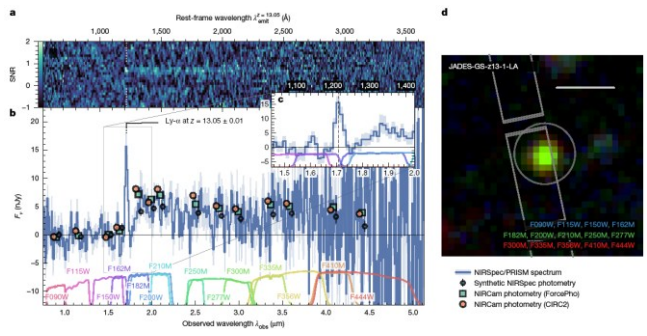
Research Highlight of the Month

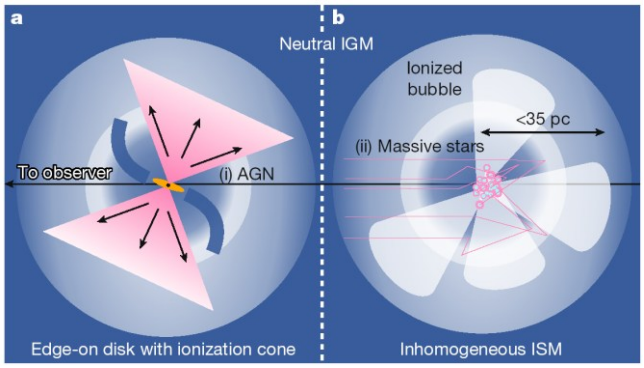
Witstok, J., et al. (37 authors) Witnessing the onset of reionization through Lyman-α emission at redshift 13, *Nature* 639: 697-700 (2025)

Until 380,000 years after the Big Bang, the universe was a plasma of hydrogen and helium nuclei (protons and alpha particles) and free electrons. These charged particles scattered photons, making the universe at best a rather foggy, if not completely dark, place. Once it cooled by expansion to about 3000 K, neutral atoms could form, with electrons bound to nuclei. The photons were free to travel through the universe, which we perceive today as the cosmic microwave background. After a period of several hundred million years, local mass concentrations collapsed under gravity to form the first stars and galaxies. The photons generated by nuclear reactions in stars were energetic enough to reionize the surrounding space. With continued expansion of the universe, ionized protons and electrons were no longer dense enough to intercept and scatter every photon, so light from these distant stars and galaxies could reach us, redshifted because of the expansion.

Using two instruments on the James Webb Space Telescope, an internation team observed JADES-GS+53.06475-27.89024, called JADES-GS-z13-1 for short). Spectroscopy revealed a redshift of 13.0, meaning that the galaxy was visualized just 330 million years after the Big Bang. A very sharp Lyman-alpha line (the radiation emitted when an electron in a neutral hydrogen atom drops from the second energy level to the ground state) was unexpected. It was redshifted into the infrared, perfect for JWST's vision. From the characteristics of the spectrum, the team developed two physical explanations for the radiation's intensity, both involving a partially reionized bubble of gas around the galaxy.







Above: Schematic of production, escape and absorption of Ly-α in JADESGS- z13-1-LA (Fig 3 from the paper). Ly-α emission is indicated in pink, dark blue is neutral H gas. (a) An extended disk of neutral gas seen in edge-on orientation may cause absorption of radiation, whereas an ionization cone perpendicular to the disk plane allows Ly-α photons to escape. The source of the Ly-α emission may be an AGN or a nuclear starburst. (b) Alternatively, if neutral gas in is inhomogeneously distributed, resonant scattering could allow Ly-α to diffuse outwards while the central source remains obscured by H gas, as seen in local, compact, star-forming galaxies

Left: top: JWST NIRCam image of the galaxy. Bottom: the spectrum and NIRCam field shutters and filter locations.

Member & Club Equipment for Sale

Item	Description	Asking Price	Name/Email
NEW LISTING Celestron 8-inch f/5 reflector OTA	Newtonian OTA with tube rings and Vixen style dove plate. Can take 1 1/4 or 2" eyepieces. Image here. Donated to WAA.	$100	WAA via David Parmet david@parmet.net
NEW LISTING Steel tripod	From a Celestron Advanced GT scope. Standard tripod with post for azimuth adjustment during polar alignment. Complete with spreader bar. Image here. Donated to WAA.	$25	WAA via David Parmet david@parmet.net
Orion 6-inch f/5 reflector on EQ mount	Little used, if at all. Solid EQ4-type non-go-to equatorial mount with an electric RA drive as well as slow-motion stalks. The setting circles are large and very readable, unlike most EQ mounts for scopes of this size. An image of the mount head is here. 9 and 25 mm Plössl eyepieces, polar alignment scope with reticle, Orion flashlight, finder, counterweights, gold-colored aluminum tripod (missing tripod tray, but you can make one easily enough). Good intro scope for a bright young person. A 6" f/5 OTA alone costs at least $300. Donated to WAA.	$100	WAA ads@westchesterastronomers.org
Stellarvue 80-mm finder	Stellarvue 80mm f/3.75 finder scope with rings and illuminator, 23mm, 50 degree crosshair eyepiece. Barely used, excellent condition. Small blemish on attachment foot (an unavoidable indentation when screwed tight in the finder shoe). Optically and otherwise cosmetically perfect. https://is.gd/Nn30UI.	$200	Manish Jadhav manish.jadhav@gmail.com
ADM R100 Tube Rings	Pair of 100 mm adjustable rings with large Delrin-tipped thumb screws. Fits tubes 70-90 mm. You supply dovetail bar. Like new condition, no scratches. See them on the ADS site at https://tinyurl.com/ADM-R100. List $89.	$30	Larry Faltz lfaltzmd@gmail.com
1.25" Filters	Thousand Oaks LP-3 Oxygen III (2 available)	$50	Eugene Lewis genelew1@gmail.com
	Astronomic UHC (2 available)	$75	
	High Point Neutral Density (2 available)	$10	

Want to list something for sale in the next issue of the WAA newsletter? Send the description and asking price to ads@westchesterastronomers.org. Member submissions only. Please offer only serious and useful astronomy equipment. WAA reserves the right not to list items we think are not of value to our members. All receipts for items owned by WAA goes to support club activities.

Buying or selling items is at your own risk. WAA is not responsible for the satisfaction of the buyer or seller. Commercial listings are not accepted. Items must be the property of the member or WAA. WAA takes no responsibility for the condition or value of the item, or for the accuracy of any description. We expect but cannot guarantee that descriptions are accurate. Items are subject to prior sale. WAA is not a party to any sale unless the equipment belongs to WAA (and will be so identified). ***Prices are negotiable*** unless otherwise stated. Sales of WAA equipment are final. *Caveat emptor!*

WAA Members: Contribute to the Newsletter!
Send articles, photos, or observations to
waa-newsletter@westchesterastronomers.org

Editor: Larry Faltz
Proofreader: Eric Baumgartner
Almanac Editor: Bob Kelly
Editorial Consultant: Scott Levine
Editor Emeritus: Tom Boustead

SAVE THE DATE: WAA CLUB PICNIC

Saturday, July 19, 2025, 12 noon- 4 p.m.
More information in next month's SkyWAAtch