SkyWAAtch

The Newsletter of Westchester Amateur Astronomers

March 2024

Comet 12P/Pons–Brooks and a Geminid Meteor by Steve Bellavia

Comet 12P/Pons-Brooks has an orbital period of 71 years. It was recovered in June 2023 at magnitude 23. It brightened and had several outbursts, including one just the day before Steve made this image on December 15, 2023 from Long Island with a 51mm William Optics WhiteCat and ASI183MC Pro camera. The field of view is 1.99 x 1.33 degrees.

The comet will be 25 degrees from the Sun at the time of the April 8, 2024 solar eclipse. It is expected to be at magnitude 4.5 at that time, but if there are more outbursts it's possible that it could be visible to the naked eye during the eclipse. Perihelion will be on April 21, 2024, when it will be at 0.781 AU from the Sun. The closest approach to Earth will be 42 days later on June 2, 2024, 1.55 AU from Earth, but only visible from the southern hemisphere.

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 March Meeting

Friday, March 8 at 7:30 pm

Galactic Archeology

Allyson Sheffield, Ph.D.
Professor of Physics,
LaGuardia Community College & American Museum of Natural History

Dr. Sheffield's research is focused on the structure and formation of the Milky Way. She studies the motions and chemical abundances of old stars in stellar streams in the halo of the Milky Way Galaxy.

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

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

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

Also In This Issue

WAA April Meeting

Friday, April 12 at 7:30 pm

The History of the Universe, from 1919 to Today

Jeremy Tinker, Ph.D.
Assistant Professor, Center for Cosmology and Particle Physics, New York University

Starway to Heaven

Ward Pound Ridge Reservation, Cross River, NY

Saturday, March 9 (sunset at 5:55 p.m. EST)
Saturday, March 30 (sunset at 7:18 p.m. EDT)

New Members

Karen Barnstable	White Plains
Asad Husain	Croton on Hudson
Suzanne Kavic	Ossining
Jessica O'Mary	Rye

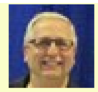
Renewing Members

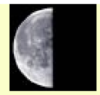
Rob & Melissa Baker	West Harrison
David Brady	Ridgefield
Kevin Bynum	Irvington
Giuseppe Colombo	Mamaroneck
John DeCola	Mt Kisco
Matthew Dugan	White Plains
Edgar S Edelmann	Tarrytown
Louise Gantress	Mt. Kisco
Eli Goldfine and Family	Larchmont
Ellen Grogan	Pound Ridge
Drexel Harris	Jamaica
Curtis Jones	North Salem
Penny Kelly	Wappingers Falls
Anthony Mancini	Pleasantville
Kevin Mathisson	Millwood
Hans Minnich	Mahopac
David Mullen	Yorktown Heights
Neil Roth	Somers
Joseph Trerotola	Bethany
Lori Wood	Harrison

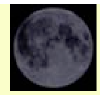
NEAF April 20-21, 2024. Members: help staff the WAA booth. Check your email for more information.

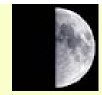
ALMANAC For March 2024

Bob Kelly, WAA VP of Field Events


Bob Kelly


3Q 3/3


New 3/10

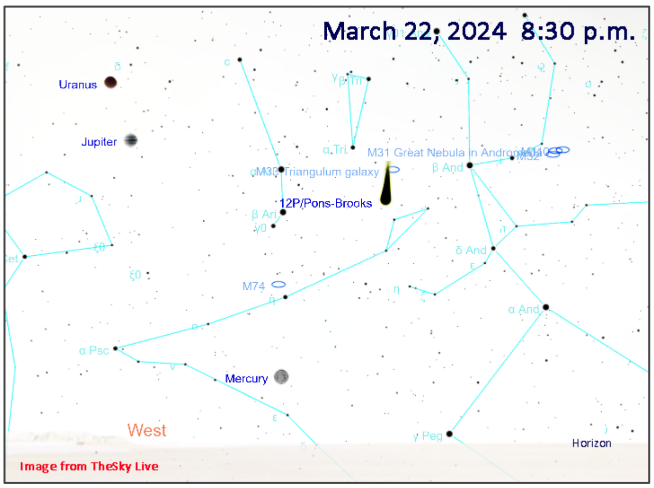

1Q 3/17


Full 3/25

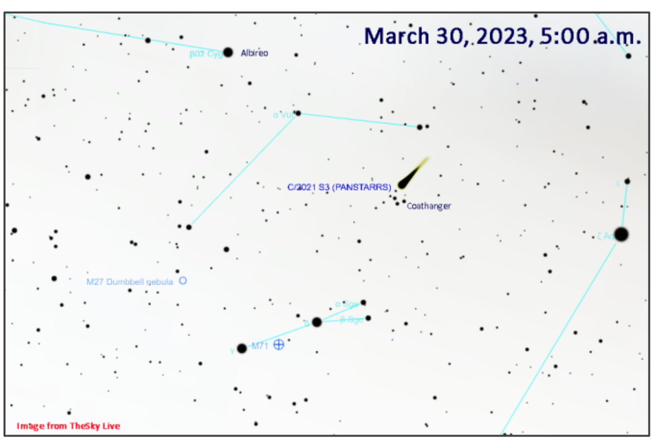
Comets!

We have a morning and an evening comet in March that are bright enough to see in a dark sky with some optical aid. They may be high enough in the sky to get them out above the shrubbery.

12P/Pons-Brooks is low in the northwestern sky after sunset, passing through Andromeda as if heading toward Jupiter, with which it will cross paths in April.



C/2021 S3 (PanSTARRS) is in the morning sky, about 8th or 9th magnitude. On March 30th, the Coathanger asterism (Brocci's Cluster, Cr 399) sets a trap for the comet to make it easier for us to find. It also makes a pass by 3rd magnitude Zeta Aquilae, on the northern wing-tip of the Eagle, on the 22nd.



Faint penumbral eclipse of the Moon

A very faint shading on the Moon will show up in the predawn hours of Sunday the 25th. From the Moon's point of view, the Sun is only partially blocked by the Earth for this eclipse. This would look like a brilliant "diamond ring" partial eclipse as seen from the Moon. The eclipse begins 12:51 a.m.; maximum at 3:13 a.m.; ends 5:25 a.m.

Venus

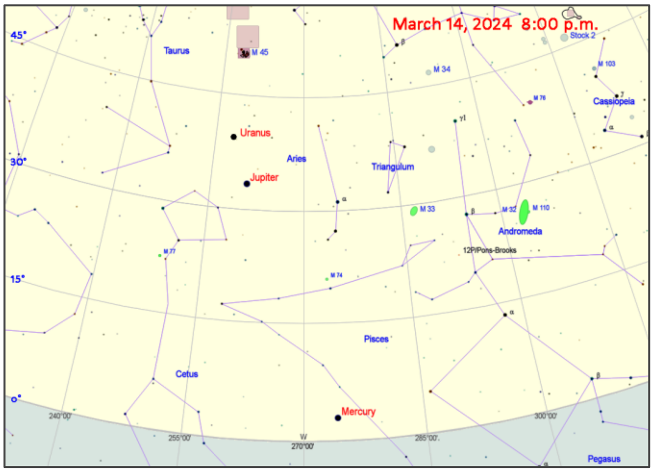
When was the last time anyone saw Venus in the morning sky? It's so bright, but so low. As Venus approaches solar conjunction in early June, it introduces other planets to the morning sky as they come out of their conjunctions with the Sun. This month's inductee into the pre-breakfast club is **Saturn**. Did you see Mars glide by Venus in late February? Me neither. At magnitude +1.9, it's not an easy find, being so low in the sky, even with magnitude -3.9 Venus serving as a pointer. So, we get to try again as Saturn passes by. It'll be magnitude +0.9 as it glides by our sister planet on the 22nd. In a telescope, Saturn will appear four times larger than Mars did, but that also spreads out the brightness over a larger area. Venus appears slightly smaller than Saturn. By the numbers: Venus rises an hour before sunrise at the start of the month, decreasing to half-an-hour by month's end.

Mars

Mars gets some separation from Venus (and even more from the Sun) this month. But it doesn't get much altitude, only four degrees higher than Venus.

Jupiter

Jupiter stars as the mainstay of the evening sky, unless you count all those fantastic winter constellations. Hard to miss at magnitude -2.1, but it's getting lower in the southwestern sky this month. Any telescope will let you watch the dance of Jupiter's four brightest moons. There will be shadow transits visible in the evening on 3/3, 3/10, 3/16, 3/23 and 3/25. Check a Jupiter Moons app or a planetarium program for exact times.



Uranus

Check out Uranus, as it trails a few degrees behind Jupiter, at magnitude +5.8.

Mercury

Jupiter invites Mercury to hoist itself up and share Jupiter's viewpoint. Of course, Mercury never gets high enough to join Jupiter for a post-dinner party, but we'll get a wonderful view of the innermost planet from the northern hemisphere. Mercury reaches 19 degrees of elongation from the Sun on the 24th, setting 90 minutes after Sunset. Start trying to see it a week or so before greatest elongation as Mercury will be brightest, at magnitude -0.9, on the 17th.

Moon

Speaking of our good buddy, the Moon, it's at perigee two hours before New Moon on the 10th. Not a visual event, but watch for the larger-than-normal tidal extremes for the next few days. Hope for no nor'easters to pump up the tide levels even further.

Next month, the bright planets vie for opportunities for photobombing the total solar eclipse in the afternoon sky on April 8th.

Later Sunsets!

Also on the 10th, **Daylight Time** begins for much of the United States. Love those later sunsets making it easier for drivers to see on the way home in the evening! But hate them for having to start dark-sky observing an hour later.

Space Station Sightings

The **International Space Station**, with seven souls aboard, can be seen in the morning sky through the 9th, and in the evening starting on the 11th.

China's **Tiangong** space station, with three aboard, is visible in the evening sky through the 10th and in the morning starting on the 27th. ■

New Leadership at Ward Pound Ridge Reservation

After a long tenure as the superintendent of Ward Pound Ridge Reservation, Jeff Main has stepped down. Under his leadership, WPRR shined as Westchester County's flagship park, preserving the natural environment for everyone's use and enjoyment. Jeff was particular helpful and hospitable to WAA and was instrumental in formalizing our special use agreement that permits WAA members to view and image in the park on any clear night, with advance notice to the park office. Jeff has a graduate degree in Ecology, Evolution, Systematics, and Population Biology from Fordham University and is Senior Adjunct Professor of Environmental Science at Westchester Community College.

We didn't have Jeff's formal picture, but we found something better: a video of him singing "The Leatherman's Song," a ballad he wrote about the mysterious 19th century vagabond who roamed the county. See it at http://tinyurl.com/jmleatherman.

We wish Jeff the best and thank him for all he's done for the park and Westchester Amateur Astronomers.

The new park superintendent is Taro Ietaka, who has already been helpful to WAA in planning for 2024. We look forward to working with Taro. ■

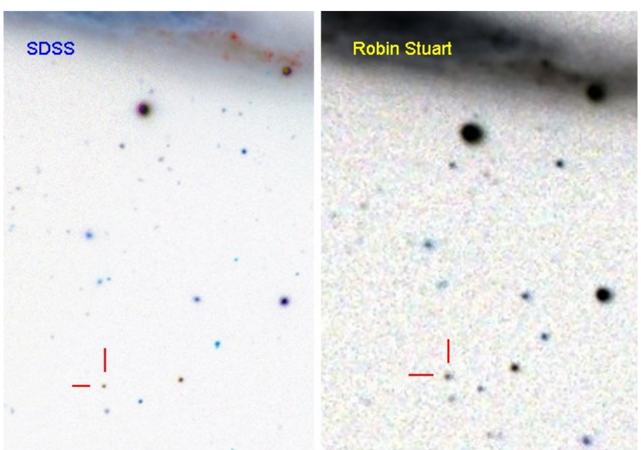
Correction? The Most Distant Quasar Imaged by a WAA Member

In the caption of Bill Caspe's wonderful image of Messier 106 on page 20 of last month's SkyWAAtch, I commented that it showed "SDSS J121933.77+472956.6, a quasar with red shift z=2.0754, giving a look-back time of 10.522 billion light years. This is the largest red shift of any object identified to date in a WAA member image in SkyWAAtch." Shortly after I sent out the newsletter, I was reminded by WAA member Robin Stuart that he had identified a more distant quasar in his image of the Twin Quasar (itself a mere z=1.414) in the July 2023 SkyWAAtch, p. 18. Robin's quasar is at redshift 2.96. I had simply forgotten that Robin had found this object, whose light was emitted 11.5 billion years ago. As a surgeon would say, "oops!"

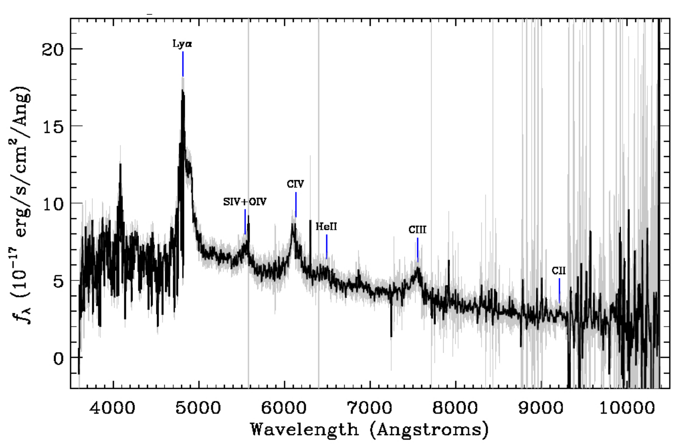
Robin labeled the quasar (or more precisely, PixInsight had labeled it for him) "SDSS J10015+5441," but its actual name is SDSS J100132.00+554106.2. PixInsight truncates the SDSS nomenclature, noting in its documentation that "The SDSS designations for quasars are constructed from their right ascension and declination to arcsecond accuracy and are too long to be practical as labels in images. For that reason, the shorter naming convention adopted in the earlier catalog of Quasars and Active Nuclei by Véron-Cetty and Véron was used in the image." The 12th edition of Véron's catalog was published in 2006, containing 108,080 quasars. The most recent Véron catalog is the 13th edition from 2010 with 168,940 quasars. None of Véron's catalogues contain this object.

The most recent quasar catalogs are the 16th SDSS catalog from 2020 with 750,414 quasars and the Million Quasar catalog from 2023, with 1,021,800 quasars. The 18th SDSS data release (2023) has 814,963 quasars but the table does not yet appear on the Virtual Observatory listing for download to planetarium programs. PixInsight must be using the 16th SDSS catalog because it's the first one in which this quasar appears. The proper naming convention for SDSS objects is "SDSS JHHMMSS.ss+/-DDMMSS.s" with the RA given to hundredths of an arcsecond and the declination to tenths. PixInsight appears to have rounded up the "32" to "5" since it only wants to display 5 digits for the RA component. Rounding down the declination four digits didn't change anything because the fifth was zero.

Using the Sloan Digital Sky Survey SkyServer application I was able to download the quasar's spectrum. Note the position of the hydrogen Lyman-alpha line. It has been redshifted to about 4800 Å from its initial wavelength of 1215.67 Å. The formula for redshift is $z=(\lambda_{observed}-\lambda_{emitted})/\lambda_{emitted}$. Doing the arithmetic, (4800-1215)/1215=2.95, essentially equal to the formal value of 2.96 given the pixel resolution of the gif spectrum image!



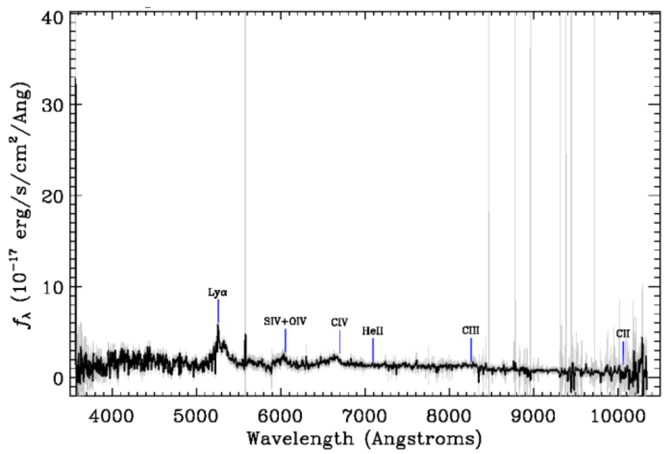
Images of Robin's quasar, SDSS J100132.00+554106.2



Spectrum of Robin's quasar, z=2.96

Now, I felt bad for Bill Caspe, having bestowed an honor upon him that I would seemingly have to quickly take away. So I decided to scrutinize his image again. I found a more efficient way to identify quasars using Cartes du Ciel. I downloaded the 16th SDSS catalog and displayed its contents for a small region of the sky (lest CdC be asked to load three quarters of a million records, which would paralyze the program). The field of Bill's M106 image revealed about 90 quasars. In CDC, you get full catalog information by right clicking on an object's symbol. Fairly quickly I found SDSS 121956.17+472900.1, 14½ arcminutes northeast of the center of M106 and just 42 arcseconds southwest of the galaxy PGC 2299193, which is in the lower right quadrant of his original image (the inverted, labeled version can be seen at http://tinyurl.com/5e68kcdy). The Lyman-alpha line of its spectrum is shifted to about 5250 Å, which calculates to a red shift of z=3.32.

Detail from Bill's M106 image. South is up.

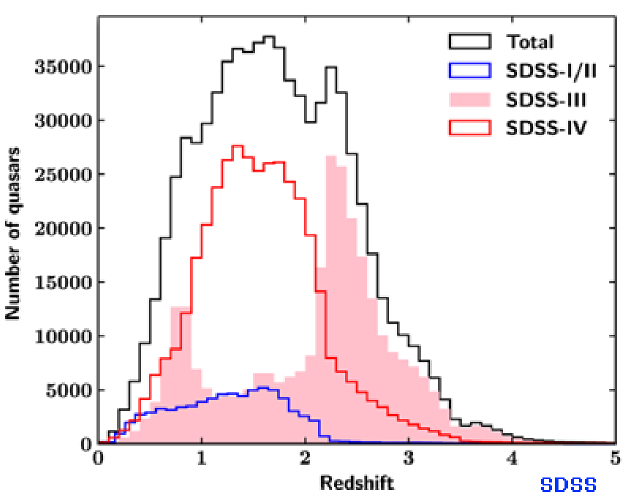


Spectrum of Bill's (new) quasar, z=3.32

So now the honor for the most distant quasar imaged by a WAA member goes back to Bill Caspe. The challenge for Robin Stuart is to go deeper, which he should be able to do from his home in rural Eustis, Maine.

Hunting distant quasars needs very dark skies: these can be magnitude 19-21 objects. Bill made his image of M106 with a remote telescope in New Mexico. This year, seeking skies darker than his home in Scarsdale, he went to the Winter Star Party in the Florida Keys. He packed his astro gear in his car and drove down to Lorton, VA where he took the AutoTrain to Sanford, FL and then drove down to the event, held under Bortle 3 skies. Robin can just go outside where the sky is Bortle 2. (On the other hand, in Eustis the low temperature at night during the second week of February was 5° F, while in Scout Key it was 63° F.) Robin is installing a Nextdome observatory and has the luxury of staying indoors while he images. Light pollution for Robin usually means the aurora. He's trying to get the town of Eustis to adopt a lighting ordinance to protect the dark night sky. See his excellent new web site, http://eustis-sky.com/ for more information and more of his fine images.

The challenge of finding a more distant quasar is amplified by the fact that there are a relatively small number of catalogued quasars with red shifts above 3. Some of this deficiency may relate to the brightness of the most distant quasars, limiting the ability to get a decent spectrum to calculate the redshift, but it also is a feature of the evolution of the cosmos. That is, the conditions needed to activate the nucleus of a host galaxy may only occur sometime after it forms, or some galaxies hosting quasars only form later in cosmic history. Also, many of the objects visible on SDSS images have simply not been catalogued or investigated. See the April 2019 SkyWAAtch, p. 5 for more on quasars and active galactic nuclei.



We're excited when anyone is able to image a quasar, but it's a special treat to see quasars with redshifts greater than 2.0. Their light has been traveling to us for more than 10 billion years. Apologies and thanks all around. Great work, Robin and Bill.

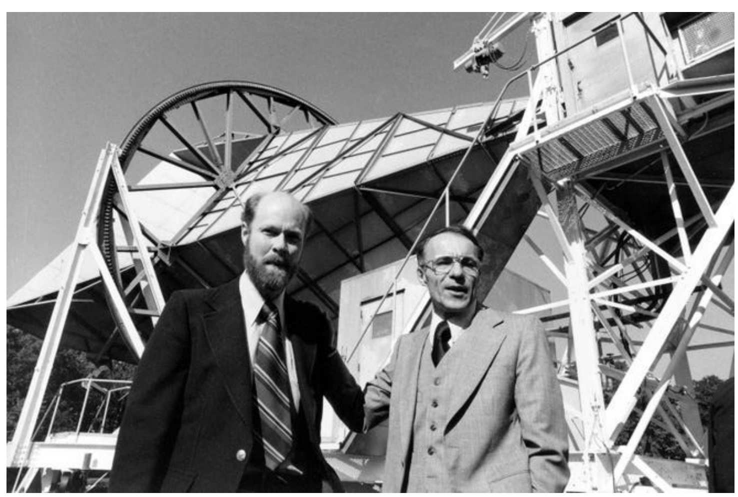
The Editor

Holmdel Horn Saved!

On Tuesday, January 23rd, Holmdel, NJ Mayor Rocco Impreveduto announced that Holmdel Township has officially acquired the upper 35 acres of Crawford Hill and now owns the historic horn antenna. The Township Committee is introducing an ordinance to formally establish "Dr. Robert Wilson Park," which will be developed into a recreational and educational center. Bell Labs, the original owner of the site, was acquired by Alcatel-Lucent, who sold the property to Nokia, who sold it to developer Rakesh Antala. The town paid Antala $5.5 million; he donated $750,000 back to the township for improvements to the park. Antala will develop the now-empty office building at the base of Crawford Hill, but the top of the hill will be a public space.

Arno Penzias and Robert Wilson detected the cosmic microwave background radiation with this instrument, publishing their findings in the *Astrophysical Journal* in July 1965. In the same issue, Princeton physicists R.H. Dicke and P.J.E. Peebles proposed that the radiation was generated by an expanding primal fireball. Penzias and Wilson shared the 1978 Nobel Prize. Sadly, Penzias died at age 90 on the day before the town's announcement was made.

For more information on the Holmdel Horn, read "Two Monuments to Discovery" in the September 2013 SkyWAAtch.



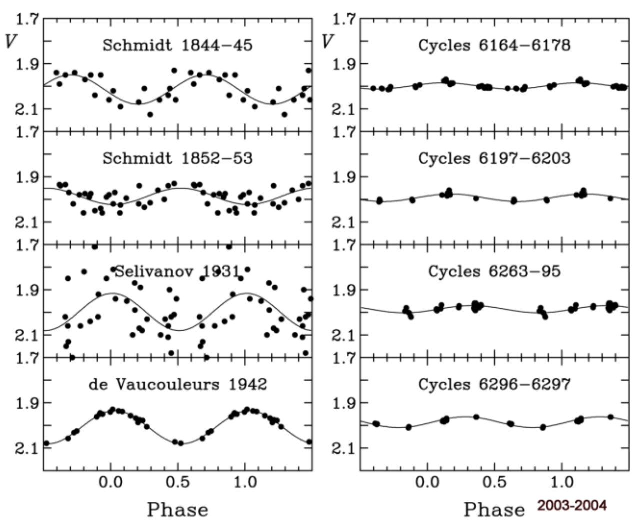
Wilson (L) and Penzias in 1978

Deep Sky Object of the Month: Polaris

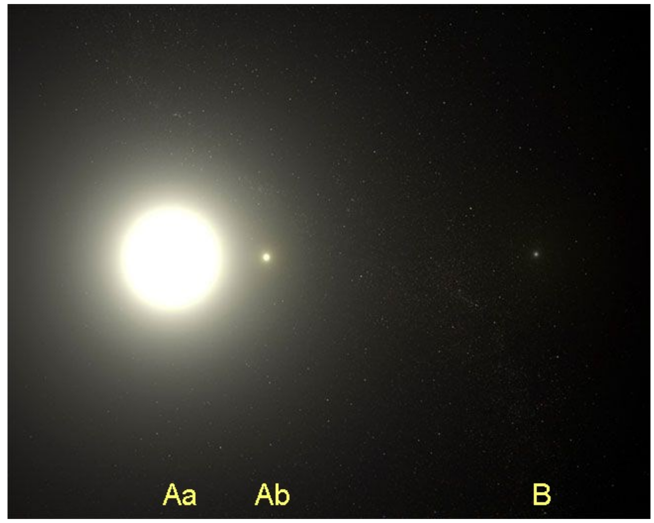
Polaris	
Constellation	Ursa Minor
Object type	Multiple star system Cepheid variable
Right Ascension J2000	02h 31m 54.682s
Declination J2000	+89° 15' 50.51"
Magnitude	Aa+Ab 1.98, B 8.7
Mass ($M_\odot$)	Aa 5.4, Ab 1.26, B 1.39
Spectral type	A F7Ib, Ab F6, B F3b
Distance	432.6 LY
Discovery	B: W. Herschel 1779

Every amateur astronomer should be able to find Polaris and many of us use it for telescope alignment. Fewer have examined it at high power. It's a triple star system, the main component (Aa) being a Cepheid variable. The Ab component is too close (< 0.2 arcseconds) to bright Aa to be resolvable in most amateur telescopes, but the B component is about 18 arcseconds away and can easily be seen away from the glare of Aa even in smaller instruments.

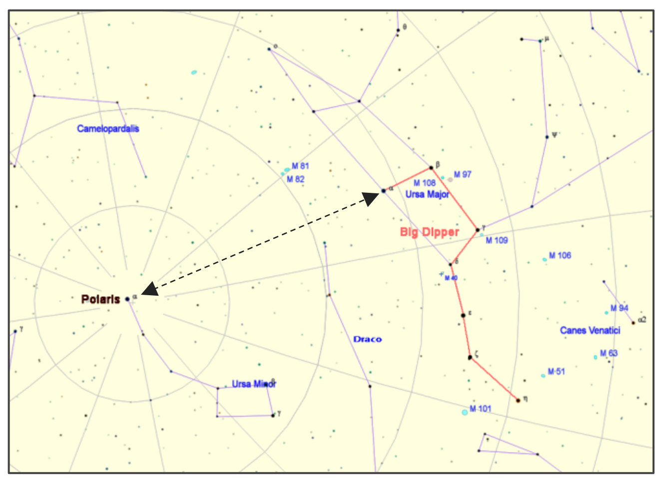
α-Uma Aa is the closest Cepheid variable to the Sun. It has over the years demonstrated some unusual behavior. Both the amplitude of its variation and its period have been changing over time, sometimes erratically. In addition, it has been suggested that it may have brightened over 2.5 times since Ptolemy's time.



Light curves of Polaris. Left column: historic; right column: 2003-2004. Turner, DG, et. al. The Period Changes of Polaris, *PASP* 117: 207-220 (2005)



Since Polaris is always visible 41 degrees above the northern horizon, there is no need for the usual visibility table that we publish for DSOs of the Month. Simply use the Big Dipper to find it, moving about 5 times the distance between the "pointer stars" α and β Ursa Majoris (Dubhe and Merak). The coordinates shown on the map are equatorial.



Polaris is a good star for aligning alt-azimuth go-to mounts. The best stars for two-star alignments with these mounts (Celestron Nexstar, SkyWatcher AZ-GTI, iOptron Minitower) will be between 30 and 60 degrees elevation and on opposite sides of the sky.

Find out more about Polaris and variable stars in the <u>November 2012 SkyWAAtch</u>, page 3.

Another Movie Telescope

This one might be the acme of movie telescope scenes! It was sent in by Bart Fried of the Amateur Astronomy Association, the NYC club, via WAA member Joe Geller. Bart is a nationally recognized expert on old telescopes and we suspect he's also an aficionado of old movies.

It's from the 1937 musical film *On the Avenue*, starring Dick Powell, Madeleine Carroll, Alice Faye, George Barbier, and The Ritz Brothers. The thin Broadway-love story plot surrounds music and lyrics written by Irving Berlin. The most well-known among the songs is "I've Got my Love to Keep Me Warm."

These frames are from the movie's opening number, "He Ain't Got Rhythm." The song opens with college coeds singing about a professor who is lonely, but then moves to the observatory and morphs into a spectacular high-energy production number featuring amusing lyrics and terrific comic tap dancing by the Ritz Brothers, whose work is little known today.

The lyrics include these pearls:

I know every planet up in the sky
I've measured them all with my naked eye
I've seen everything up in Mars
I know all about falling stars
But still I'm a very unhappy guy, I wonder why

and

Heaven, I see Heaven
Through my telescope while gazing from Mount Wilson's highest peak
I'll explain it all in Latin or in Greek
[These lines sung to the melody of Berlin's "Cheek to Cheek" from the 1935 Astaire/Rogers film *Top Hat*]

The entire movie is available on YouTube, and even if you're not a fan of 1930's musicals, you will enjoy this scene. https://youtu.be/YRYM-lOpV68M.

Art & Astronomy: The First Pictures of Telescopes Larry Faltz

Who invented the telescope? Who first made a picture of one?

There is evidence that people were experimenting with lenses earlier than the early 17th century. The English scholar Roger Bacon wrote about devices that would "make the Sun, Moon and stars…descend hither in appearance." Thomas Digges, in the preface of the second edition of *Pantometria* (1591), a book about geometry, claims that,

> …to learne these celestiall causes and things done of antiquitie long agoe, my Father [Leonard Digges] by his continuall painfull practices, assisted with Demonstrations Mathematicall, was able, and sundrie times hath by proportionall Glasses duely situate in convenient Angles, not onely discovered things farre off, read letters, numbred peeces of money with the verye coyne and superscription thereof, cast by some of his freends of purpose upon Downes in open Fields, but also seven Myles off declared what hath beene doone at that instant in private places.[1]

It isn't clear whether "proportionall Glasses" refers to lenses, mirrors or a combination of the two, as in the peculiar "Digges-Bourne" telescope of the mid-16th century. This instrument used a convex lens as an objective and a convex mirror as the eyepiece. Objects had to be behind the viewer, which made it not very practical as a military instrument. There is a claim that the Spanish Armada was sighted through one of these devices. See John Paladini's article "A Telescope in Tudor Times" in the July 2021 SkyWAAtch.

Most often, credit for the two-lens refracting telescope is given to Hans Lipperhey, a Dutch spectacle maker in the town of Middelburg, for crafting such an instrument in 1608. Some stories say Lipperhey came upon the construction by accident; others say some children were playing with his lenses and found the right combination, which he then placed in a tube. Dutch records preserved in The Hague show that Lipperhey petitioned the States General on October 2, 1608 claiming that he invented an instrument for "seeing at a distance." It had obvious military value, the Dutch being embroiled at the time in the Eighty Years' war with Spain. Although a truce was declared in 1609 that lasted 12 years, hostilities started up again as a component of the larger Thirty Years War, a pan-European religious and imperial conflict. The hostilities were settled in 1648 with the Treaty of Münster, a component of the larger and more well-known Treaty of Westphalia.

In response to Lipperhey's petition, a committee was formed and the telescope was tested two days later from the turret of Prince Maurice of Orange's mansion. On October 6th, Lipperhey was asked to make a device that would allow the user to see with both eyes, in other words, a binocular. The lenses were to be made of rock crystal, a substance clearer than the glass of the day although harder to work (nevertheless, many museums have intricate carved rock crystal pieces, some dating back to antiquity). He was given 900 florins and told not to divulge the invention to anyone else, but he was not given an exclusive patent. Perhaps it was common knowledge that other makers had been crafting telescopes around that time, and maybe the device could be improved, which exclusivity might retard. The States General, it appears, wanted to reward Lipperhey's manufacturing skill but was not willing to acknowledge him as the inventor. According to the records, Lipperhey's binocular instrument was approved on December 16, 1608. No actual device has survived.

On October 17, 1608, another petition arrived at the States General, this one from Jacob Adriaanzoon. The petition claimed his instrument was better than "the one which had been lately offered to the States by a citizen and spectacle maker of Middleburg," meaning Lipperhey. Rene Descartes, writing in 1637, credits Jacob Metius, brother of the Dutch astronomer Adriaan Metius, with the invention, and suggests that Adriaanzoon and Jacob Metius are the same person. Many histories of the telescope cite the name Metius and don't mention Adriaanzoon. Henry King, in his *History of the Telescope*, is quite certain that these are one and the same person.[2] Later testimony claims that Sacharias Janssen, another optician in Middelburg, made a telescope even before Lipperhey, perhaps as early as 1604, but the support for this

[1] Digges, Thomas, *A Geometrical Practical Treatize Named Pantometria*, London, 1591, online at http://tinyurl.com/pantometria.

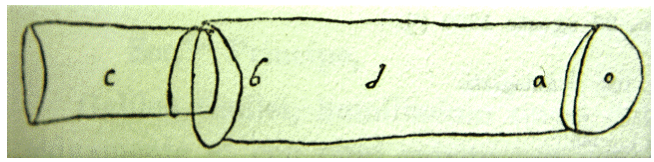
[2] King, Henry, *The History of the Telescope*, London: Charles Griffin & Company Ltd, 1955, p. 31.

assertion comes in recollections published half a century later, and thus of dubious validity.

The early telescopes were not very good, lens-making being adequate for reading glasses and magnifiers but aberrations were too great for very clear sight when combined into a compound device. Only the central part of lenses had a correct figure, and singlet lenses suffered from serious chromatic aberration.

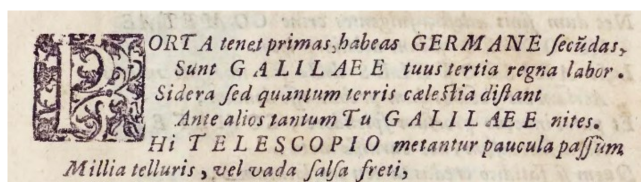
Nevertheless, within a few months, telescopes were being offered for sale in several European cities. While in Venice in May 1609, Galileo heard about the device from his friend, the renegade prelate, lawyer, republican, anti-Jesuit and all-around colorful figure Paolo Sarpi, although he apparently did not actually see one. He headed back to Padua (the two cities are only 24 miles apart) and, being a skilled instrument maker, crafted one the next day according to Grant, [3] although in the *Starry Messenger* he says he got confirmation of the design in a letter from Paris and made the telescope "shortly thereafter." Galileo's 3X telescope presented a correct image with a field of view of about 15-arcminutes. The lenses in Galileo's two surviving telescopes, which were of higher magnification, were tested in 1992. Although they had the expected chromatic aberration, the telescopes were considered "diffraction limited."[4]

The *Starry Messenger*, published in March 1610, contains Galileo's drawings of what he saw through the telescope. He describes his instrument but the pamphlet does not contain a picture of a telescope. The Neapolitan playwright, cryptographer and polymath Giambattista della Porta, who had an interest in optics and perfected the camera obscura, is credited on the "Galileo Project" web site (Rice University)[5] with making the first drawing of a telescope. This was sketched in a letter in August 1609 to Federico Cesi, founder of the Accademia dei Lincei (Society of Lynxes), the world's first scientific society. Cesi had written to della Porta describing Galileo's demonstration of his telescope to the Venetian nobility. The senators climbed church towers to view the ships in the Venetian lagoon through Galileo's telescope. Della Porta tells Cesi, "Concerning the secret of the telescope, I have seen it, and it is nonsense and it is taken from my *Book 9 De Refractione*, and I shall write it down." Although the book describes lenses, there's nothing specific in it about telescopes. Della Porta's 1561 book *Magia Naturalis* apparently says that objects would appear enlarged when seen through a combination of concave and convex lenses, but Grant comments that the description is "so obscure as to defy interpretation."[6] In another letter, Della Porta says that Galileo "accomidato mia invention."[7] Della Porta died in 1615 at the age of 80 before completing his promised book on the telescope.



Della Porta's drawing of a telescope

Galileo, who joined the Lincei shortly after Della Porta, seems to have acknowledged Della Porta's claim of priority. The preface to his *Il Saggiatore* (The Assayer, 1623) by fellow Lynx Johann Faber (and no doubt approved by Galileo), opens with these lines:


PORTA tenet primas, habeas GERMANE ſecũdas,
Sunt GALILAEE tuus tertia regna labor.
Sidera ſed quantum terris cæleſtia diſtant
Ante alios tantum Tu GALILAEE nites.
Hi TELESCOPIO metantur paucula paſſum
Millia telluris, vel vada ſalſa freti,

> Porta possesses the first claim; you German [probably meaning Dutchman, although possibly meaning Christoph Scheiner], may have the second. The third claim, Galileo, rests on your labor. But you, Galileo, surpass the others by as great a distance as the celestial stars are separated from the Earth. With the telescope they may measure a few miles of the Earth and venture at sea; you surpass them by an infinite distance….[8]

The first analytical explanation of telescope optics was given by Johannes Kepler in his *Dioptrice* (1611).

[3] Grant, Robert: *The History of Physical Astronomy from Earliest Ages to the Middle of The Nineteenth Century*, London: Robert Baldwin, 1852, Chapter XX (p. 514 *et. seq*.). Online at http://tinyurl.com/GrantPhysAstro.

[4] Greco, V, Molesini, G, Quercioli, Optical Tests of Galileo's Lenses, *Nature* 358: 101 (1992) Online at http://tinyurl.com/GalileoLenses.

[5] http://galileo.rice.edu/sci/instruments/telescope.html.

[6] Grant, *op. cit.*, p. 516.

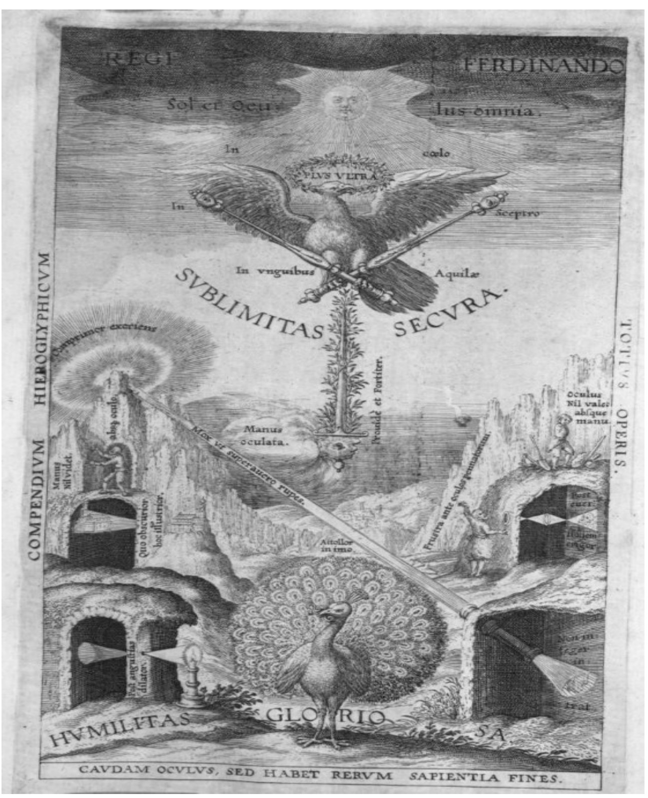
[7] Clubb, Louise, *Giambattista Della Porta, Dramatist*, Princeton University Press, 1965.

[8] Translation by Stillman Drake in *The Controversy on the Comets of 1618*, University of Pennsylvania Press, 1960.

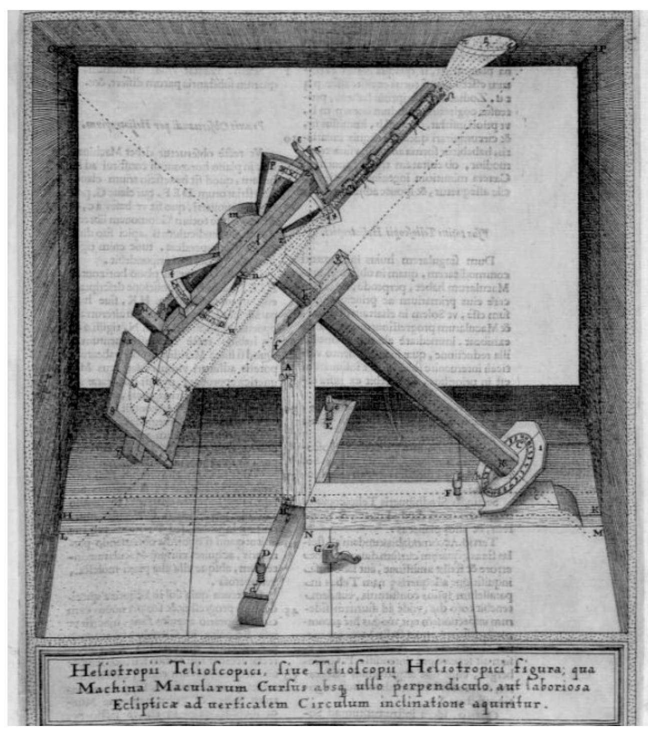
It doesn't contain a picture of a telescope, but it does have diagrams including basic ray tracings of convex/convex and convex/concave lens combinations.

We do find images of telescopes in books by Christoph Scheiner, the Jesuit astronomer with whom Galileo tangled over sunspots. In Scheiner's *Disquisitiones Mathematicae*, published in 1614, the elaborate frontispiece shows a telescope projecting an image. Scheiner's *Refractiones Coelestis* (Celestial Refractions, 1617) shows what appears to be a projection telescope on some kind of table, but this appears to be in a section about manufacturing the instrument, not using it. His magnum opus *Rosa Ursina* (1630), which collects Scheiner's extensive investigations of sunspots, shows telescopes in its frontispiece and has a detailed description and image of his projection helioscope. In a wonderful engraving in the middle of the book, two observers are looking directly through telescopes. Below that is a detailed picture of a projection helioscope in action. Although Galileo and Scheiner both used projection, solar astronomers sometimes looked directly at the Sun through colored filters or through atmospheric haze. It is alleged that Galileo's blindness may have been a consequence of this dangerous practice.

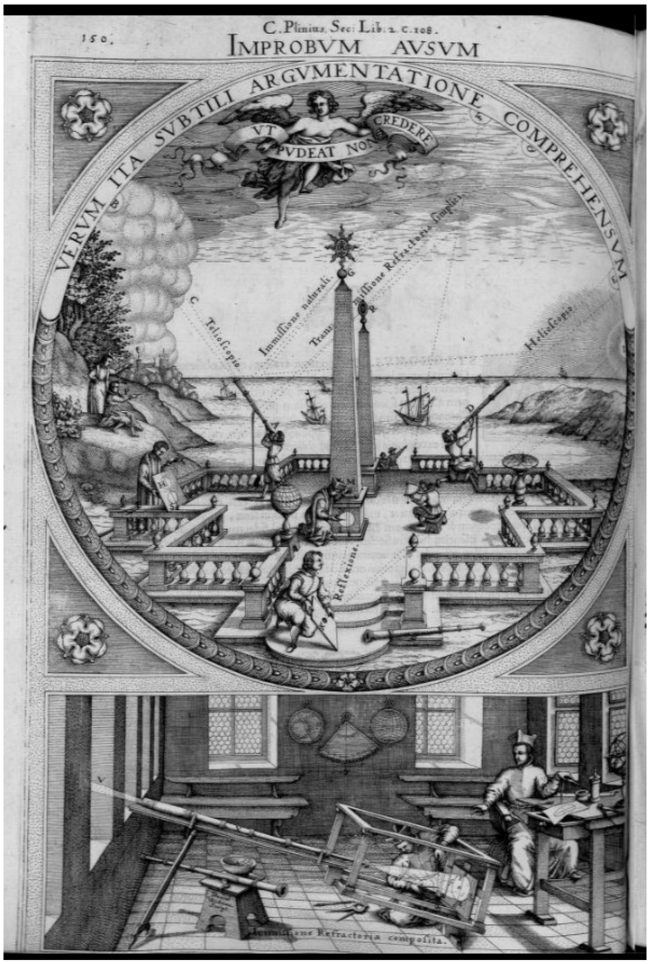
Rosa Ursina, frontispiece



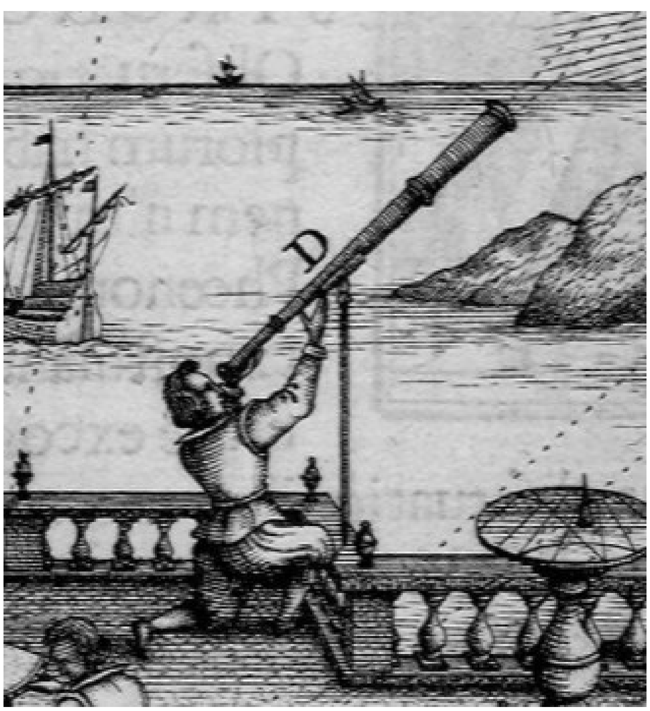
Disquisitiones Mathematicae frontispiece



Rosa Ursina: Projection helioscope on an equatorial-type mount



Rosa Ursina, p. 150



Detail from above image

Jan Brueghel the Elder, Extensive Landscape with View of the Castle of Mariemont

What about the appearance of telescopes in paintings? That would be evidence that knowledge of the instrument had penetrated the wider realm of society, even if telescopes were undoubtedly high-cost luxury items.

It was quite soon after its invention that a telescope appeared in a painting by Jan Brueghel the Elder, *Extensive Landscape with View of the Castle of Mariemont*. This mid-sized (33 3/8 × 51 1/2 inches) oil on canvas, held by the Virginia Museum of Fine Arts, is dated between 1609 and 1611. The grand Chateau de Mariemont was located in Morlanwelz, Belgium, 27 miles south of Brussels. It was constructed by the Habsburgs, who controlled the low countries beginning in the 15th century. Later enlarged from its appearance in Breughel's painting, Mariemont was one of the largest chateaux of the region until the French army destroyed it in 1794.

The figure in the lower left holding a spyglass is said to be Archduke Albrecht VII, who ruled the Habsburg Netherlands (which included Belgium) between 1598 and 1621. Brueghel worked in Brussels at the time and executed several paintings for the Archduke, including more landscapes with the Chateau de Mariemont in the background.

Brueghel was a close friend of Peter Paul Rubens, and as was the custom of the day they often collaborated on larger paintings, more than one artist to a canvas, so to speak. The chateau formed the backdrop of a portrait of Albrecht's wife Isabella that the two artists executed together. It is now displayed at the Prado in Madrid.

Italian astronomers Paulo Molinaro and Pierluigi Selvelli identified *Extensive Landscape with View of the Castle of Mariemont* as the first representation of the telescope in art. If so, the telescope apparently appeared pictorially in a painting before any illustrations in astronomy books! Molinaro and Selvelli provide interesting information about the critical period in the fall of 1608.[9] They report that in a letter dated April 2, 1609, Guido Bentivoglio, the Papal nuncio in Albrecht VII's court, wrote that the Italian nobleman Ambrogio Spinola, commander of the Spanish army in Flanders, witnessed a public demonstration of the telescope in the Hague on September 25, 1608. He does not say who made this instrument, but being just a week before Lipperhey's petition we might conclude it was his, although Janssen has also been suggested as the maker. Spinola and Albrecht were able to obtain a telescope shortly thereafter, although Bentivoglio says that it was "not of such perfection as the one owned by Count (*sic*) Maurice" (*i.e.* made by Lipperhey, possibly the one tested at Prince Maurice's mansion on October 4, 1608). Molinaro and Selvelli suggest that the telescope in Brueghel's painting is the one obtained by Albrecht directly from the "inventor."

Jan Brueghel the Elder & Peter Paul Rubens, The Allegory of Sight

The telescope in *The Allegory of Sight*

Brueghel and Rubens collaborated on *The Five Senses*, a quintet of moderate-sized oil-on-wood paintings made in Antwerp in 1617-1618 for Albrecht VII and Isabella. All are now in the Prado. In each of the paintings, a naked female figure and a cherub, most likely Venus and Cupid (connecting the senses with the erotic?), are seen among objects that illustrate the range of each sense. In the foreground of *The Allegory of Sight* we see a small telescope on a stand.

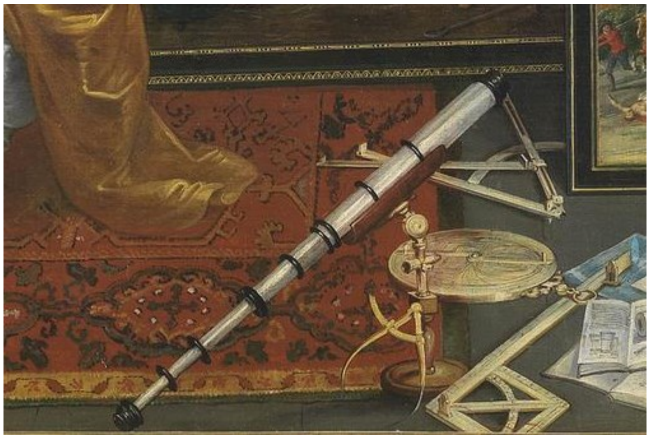
In 1620, Brueghel collaborated with his son Jan (Brueghel the Younger), Hendrick van Balen, and perhaps other artists including Rubens, on *The Allegory of Sight and Smell* (also in the Prado), a large (5½ x 8 feet) oil on canvas, that shows a small refractor in the foreground. It's similar, but not identical, to the telescope in *The Allegory of Sight*.

The Allegory of Sight and Smell

The telescopes in both allegorical paintings are multi-segment spyglasses. Given the long focal length of early lenses (Galileo's two surviving telescopes were f/51 and f/61) the tubes had to be very long. Exactly who invented the "telescoping telescope tube" isn't

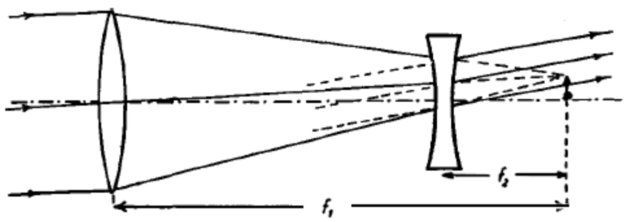
[9] Molaro, P, Selvelli, P, The mystery of the telescopes in Jan Brueghel the Elder's paintings, *Memorie della Società Astronomica Italiana* 75:282 (2008) https://arxiv.org/pdf/0908.2696.pdf. I am indebted to John Paladini for sending me this article.

in the historical record, but it would have been a logical step to take for any practical instrument maker.

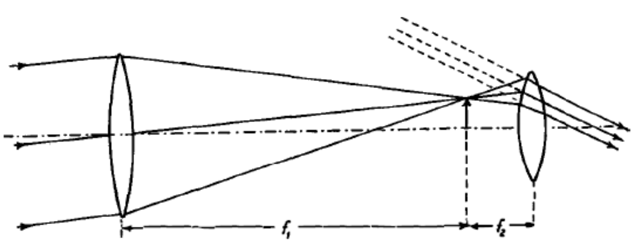


The telescope in *The Allegory of Sight and Smell*

The earliest telescopes used a convex objective lens and concave eyepiece lens, giving an upright image at the expense of little eye relief and small field of view. This combination is generally referred to as a “Galilean” telescope. In *Dioptrice*, Kepler showed a diagram of a concave/concave telescope, which offered a wider field of view and better eye relief at the expense of an inverted image, which could be compensated for by a third lens.



Galilean telescope.



Keplerian telescope. Drawings from King.

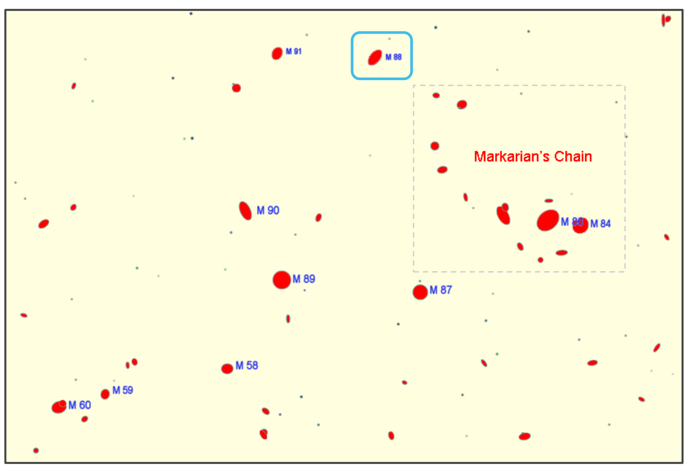
The first Keplerian telescopes were probably made in the mid-1610s. Molaro and Selvelli (reference 9) report that the Neapolitan lawyer and telescope maker Francesco Fontana claimed in his *Novae Celestium Terrestriumque rerum Observationis* (New Observations of Celestial and Terrestrial Things, 1646) to have built a telescope with two convex lenses in 1608, but there is no other confirmation of that date. Fontana’s telescopes were in use by others after 1614. Archduke Maximilian III, brother of Albrecht VII, received a Keplerian telescope around 1615. Fontana was the first observer to study the planets with a Keplerian telescope and the first to see surface markings on Mars. He made the first accurate lunar maps.

Molaro and Selvelli point out that in Brueghel and Rubens’ *The Allegory of Sight* there is a second telescope, a small spyglass being held by a monkey. Another monkey holds a pair of glasses. On the floor is a purse that is spilling out gold and silver coins. In the art of the time, monkeys were symbols of foolishness. Molaro and Selvelli comment “Here it may underline the brain-storming implications of the new discoveries, or more simply, the serendipitous way in which the telescope was conceived.” But I rather think it might be a subtle dig on what, just a decade after its invention, was already a practice among some of the aristocracy to have a telescope collection. That’s a compulsion that has continued to this day for more than a few amateur astronomers! ■

Detail from *The Allegory of Sight*

Images by Members

Messier 88 by Arthur Miller



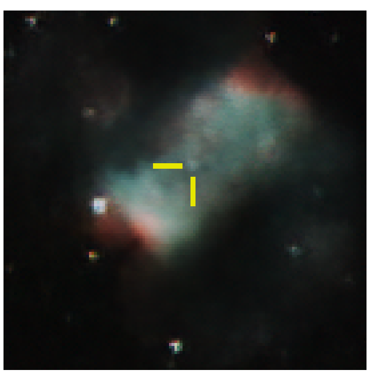
Messier 88 (NGC 4501) in Coma Berenices is a magnitude 9.6 Sbc spiral galaxy inclined to our line of sight by 64°. A member of the Virgo cluster, it is about 50 million light years distant, *z*=0.0076. As Arthur's image shows, the spiral arms can be followed right to the core of the galaxy. Narrow emission lines from the core show that it is a Seyfert type 2 galaxy with an 80 million solar-mass black hole at its center, moving at high velocity towards the massive M87 elliptical galaxy at the core of the Virgo cluster. M88 lies just beyond the tail of Markarian's Chain. The small spiral galaxy on the right is LEDA 169494, g-mag 16.079, *z*=0.0017. It is closer to us than M88 if the red shift is to be believed, but that seems unlikely; perhaps proper motion is involved. The tiny fuzzy beige dot below M88 is the galaxy LEDA 169501, g-mag 18.71. A redshift for this galaxy is not in the literature.

Horsehead Nebula by Steve Bellavia

Steve oriented his shot to show σ-Orionis, the bright star at the top that energizes the nebula IC 434, part of which the Horsehead obscures. NGC 2023 is the nebula on the lower left. Technical information on this image at https://www.astrobin.com/guhisq/B/. The color choices were: Red = H-alpha, Green = 50% H-alpha + 50% OIII, Blue = OIII, giving the golden hue of the image. More on discovery and naming of the Horsehead in the April 2023 SkyWAAtch p. 6.

More Quick Larchmont Driveway Imaging: Messier 76 by Larry Faltz

Messier 76, the "Little Dumbbell" or "Cork Nebula" is a magnitude 10.1 planetary nebula in Perseus, 2,500 light years away from us. It gets two entries in the New General Catalog, NGC 650 and NGC 651, because visual inspection with mid-19th century telescopes resolved what were thought to be two emission nebulas. It was formally proposed as a planetary nebula by Lick Observatory's Heber Curtis in 1918. The central star (properly referred to as a planetary nebula nucleus, or PNN) is magnitude 15.9 and is just visible in this image, as shown in the frame on the lower left. The bright red star near the top is HD 10498, a 8.27 magnitude K5 red giant, located one-third of the distance to M76. The brightest star below the nebula (a little more than halfway to the lower edge) is HD 10243, class F5, magnitude 9.49, 935 light years distant. The field is 35.2x29.8 arcminutes. East is up.

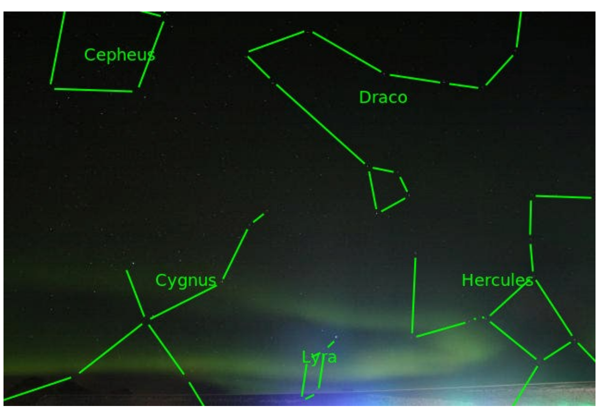


November 11, 2023, Stellarvue SVR105 f/7 triplet, ASI533, ZWO AM5 mount, ASIAir Plus, 30 x 60-second subs, flats, lights and bias frames, stacked with ASI Studio and processed with Siril and Topaz Denoise AI. SQM 18.3, LED streetlight 105 feet away at azimuth 97 degrees, fixture elevation about 15 degrees. M76 was at azimuth 55°, altitude 56° at the start of the imaging run.

Aurora Borealis in Iceland by Bob Kelly

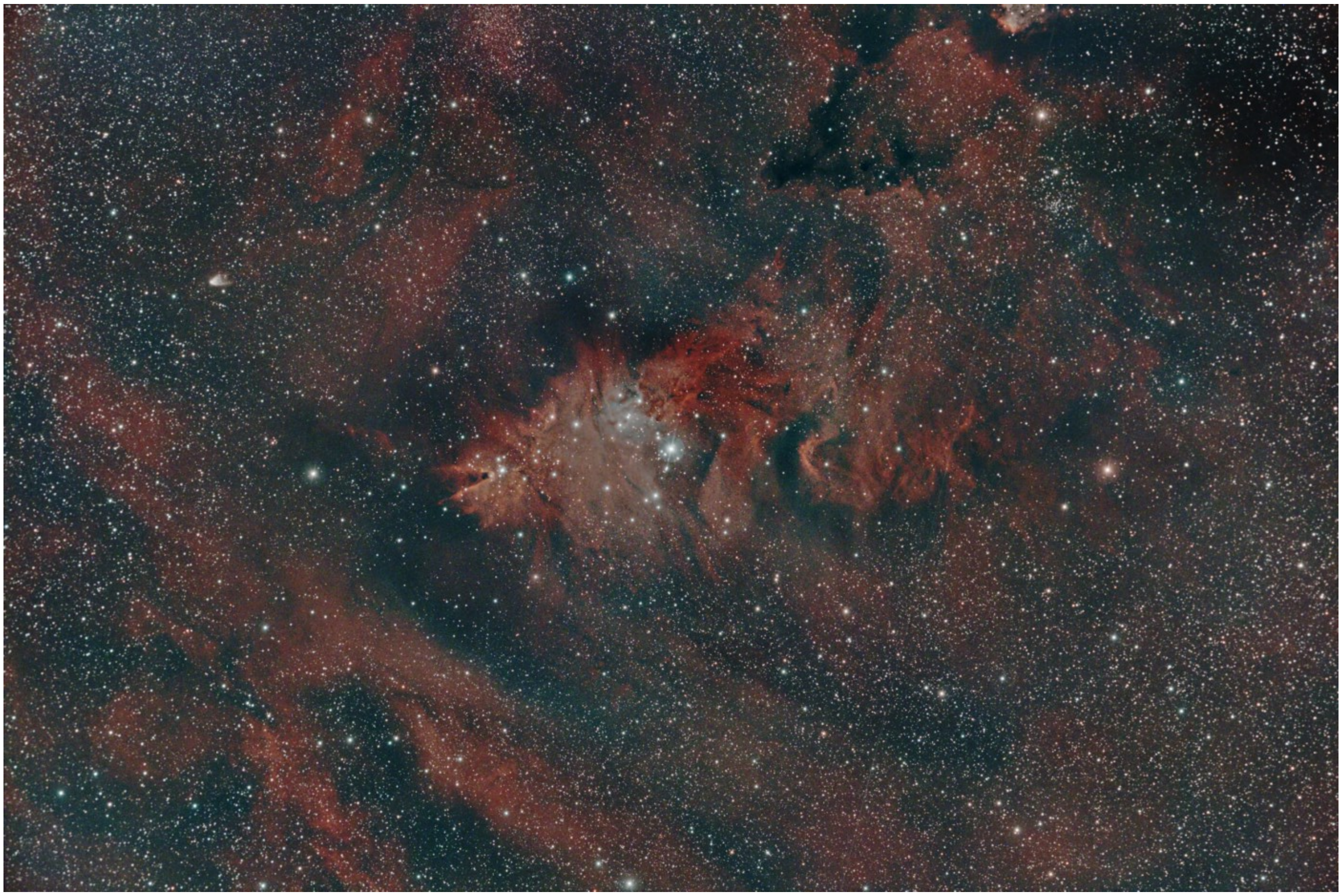
Bob Kelly went to Iceland in February and had some fine views of the aurora borealis. These images were made in the tiny town of Vik (formally Vík í Mýrdal, population 750), the southernmost point of the island.

Alas, even in remote Vik outdoor lighting is still an intrusion, but not enough to block the aurora.



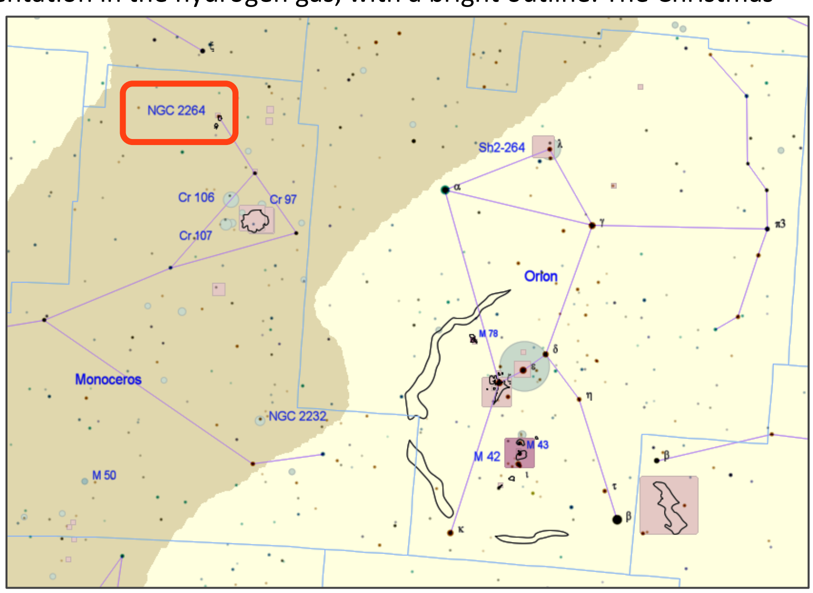
We processed the top image through the plate solving site astrometry.net, which told us that the field of view is 67.1x44.8 degrees, and even gave us a map of the constellations in the image.

NGC 2264 in Monoceros by Olivier Prache



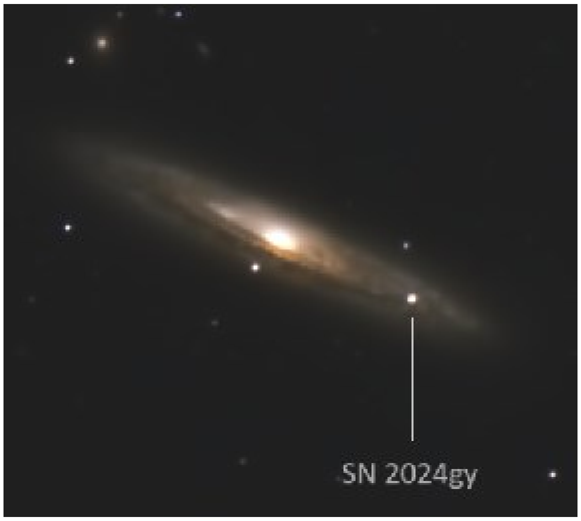
Olivier made this image with an 8” Celestron RASA astrograph and an IDAS NBZ filter, which is designed to have better performance for ultrafast optical systems like the f/2.2 RASA than “regular” narrowband filters. The total exposure time was 130 minutes. The field of view is 3.39 x 2.25 degrees.

The Cone Nebula, which many astrophotographers choose as the main focus of their images of this nebula, is seen just left of center as a small conical indentation in the hydrogen gas, with a bright outline. The Christmas Tree cluster is almost lost in the bright central emission region.

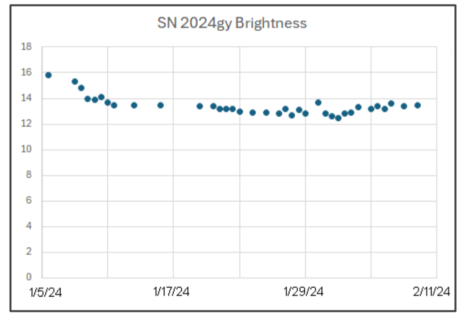


The small, white, comet-shaped object in the upper left area of the image is NGC 2261, Hubble’s Variable Nebula, which was the first light target of the 200-inch Hale telescope at Mt. Palomar on January 26, 1949. It was imaged by Edwin Hubble, who had been studying the nebula that bears his name since 1916. This nebula is illuminated by the star R Monocerotis, which is not visible because it is shielded by the nebular emission. A time lapse image of its variability over seven months in 2021-22 can be seen at http://tinyurl.com/HVNTL.

Supernova SN 2024gy in NGC 4216 by Steve Bellavia



Prolific supernova hunter Koichi Itagaki found this type 1a exploding star on January 4, 2024. It's in an 11^{th}-magnitude spiral galaxy in the Virgo cluster.



Steve Bellavia had made an image of the galaxy a couple of years ago in Cherry Springs. The supernova maintained its brightness for the first 5 weeks according to data compiled by the Rochester Academy of Science, https://www.rochesterastronomy.org/sn2024/sn2024gy.html.

May 31, 2022

Cherry Springs State Park, PA

February 8, 2024

Mattituck, NY

Vaonis Vespera Images by Jordan Solomon

Fish Head Nebula, IC 1795 in Cassiopeia.

The Orion Nebula (M42) from Ward Pound Ridge

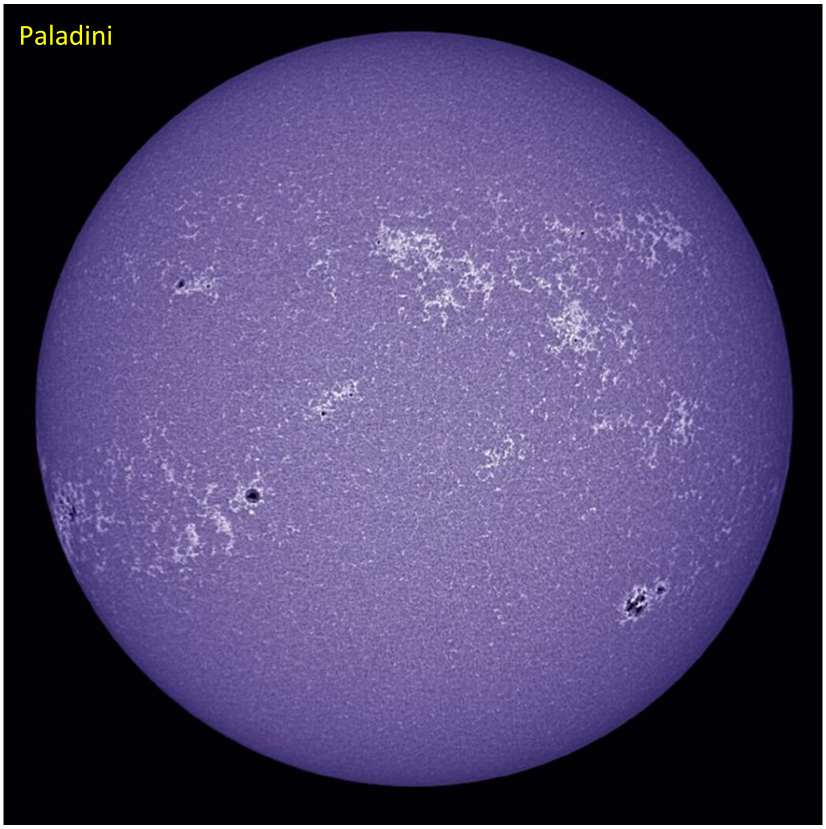
The Heart Nebula by Rick Bria

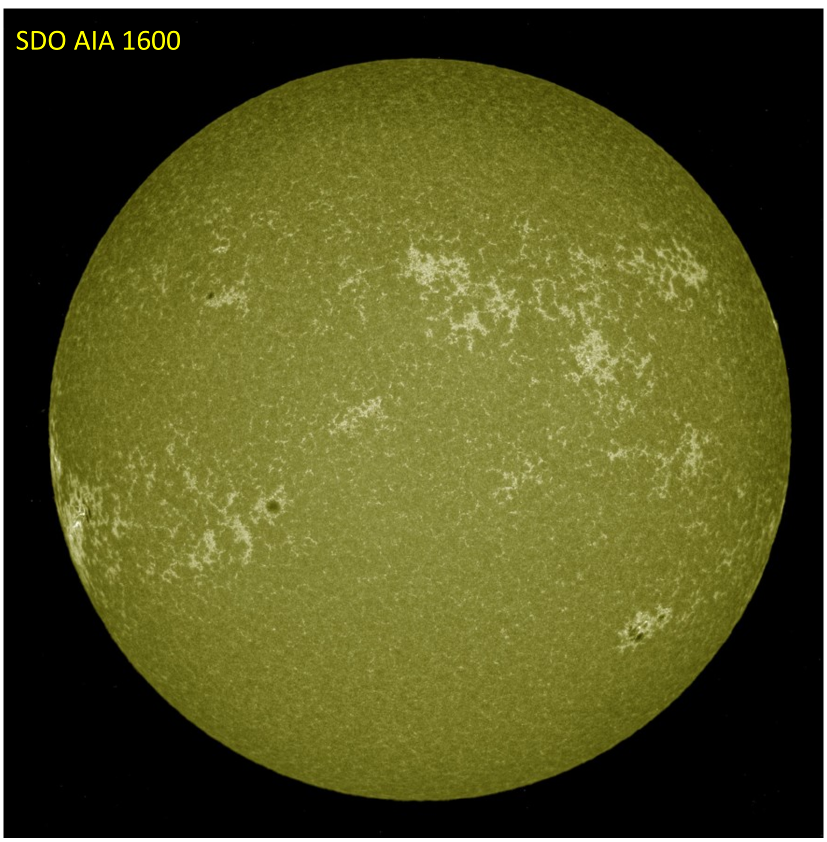
Rick sent in this oldie-but-goodie, made in 2013 with a Televue 76 refractor and a Canon 60Da DSLR camera. It has not appeared in *Sky-WAAtch* previously. The 60Da was an APS-C sensor (essentially a Canon T3i) with a reworked IR filter that would pass more red wavelengths than a regular DSLR. CMOS sensors are generally very sensitive in the red, and commercial digital cameras meant for ordinary photography (kids, dogs, vacations) all have an IR cut filter that balances the colors more like the human eye. Since much of the signal from nebulas is generated by hydrogen alpha at 656.28 nm, the red can be made more intense by using a DSLR with a more tolerant IR filter. With the availability of (filterless) one-shot cooled color astrophotography cameras, the use of DSLRs for astrophotography has markedly declined. But they can still do terrific work, and even ordinary DSLRs can still be functional for basic astroimaging.

The Heart Nebula, IC 1805, is one of the many interesting objects in Cassiopeia. It had been called the “Running Dog Nebula in the past, an epithet whose origin we can’t find. It surprisingly doesn’t get a mention in any of Stephen James O’Meara’s wonderful *Deep Sky Companion* books, or in Burnham, or in Phil Harrington’s *Cosmic Challenge*. Visual observer Sue French in *Deep Sky Wonders* seems to be more interested in the object’s central star cluster, although she does describe the nebulosity and notes that “under dark skies, this large, complex has been seen in instruments as small as 30-mm binoculars.” We must thank astrophotography for making the Heart Nebula a familiar object.

The whole nebula is almost 1.5° across. The bright knot at the bottom in this image is NGC 896, first noted by William Herschel and given the eponym “Fish Head Nebula.”

John Paladini vs. NASA





John sent in the top image, obtained on February 4, 2024 with a Lunt 60-mm Ca/K line telescope, and compared it to the AIA 1600 image from the Solar Dynamics Observatory (SDO), a mission that has been surveying our Sun in a variety of wavelengths since 2010.

The Ca/K line is at 393.4 nm, and is basically not visible to the human eye, so a camera is needed to capture the image. It emanates from a layer in the chromosphere that is just slightly lower and cooler than what is seen with a hydrogen-alpha telescope.

John's comment was simply:

> *60mm Lunt CaK module*
> *SDO by NASA it cost a little more!*

The SDO, an $850 million mission (for construction, launch and the first 5 years of operation, 2010 dollars), is essentially a follow-on mission to the Solar and Heliospheric Observatory (SOHO), has three instruments: Extreme Ultraviolet Variability Experiment (EVE), Helioseismic and Magnetic Imager (HMI) and Atmospheric Imaging Assembly (AIA). AIA provides full-disk images in nine wavelengths and white light. SDO was planned to be operational for five years, but is so successful and functional that it has been extended to 2030. The older SOHO continues to operate and has been extended to 2025. The SDO web site is at https://sdo.gsfc.nasa.gov/

A Lunt CaK module costs less than $2,000. It is fitted to a modest-sized refractor. https://luntsolarsystems.com/product/lunt-calcium-k-modules/.

Research Highlight of the Month

Healy-Kalesh, MW, *et. al.*, Discovery of a nova super-remnant cavity surrounding RS Ophiuchi, arXiv:2402.05855v1, posted February 8, 2024. Submitted to *MRNAS*.

Recurrent novae occur when a white dwarf (WD) in a close binary system accretes material from its companion. When enough material builds up on the WD surface, a thermonuclear explosion can occur. Much of the accreted material is ejected at enormous velocities, up to hundreds of thousands of km/sec. This high-velocity matter can displace the interstellar medium and form a "nova super-remnant" (NSR) cavity. Recurrent novae undergo repeated cycles of accretion, explosion and ejection, enlarging the NSR. Eventually, if enough accreted material remains on the surface, the white dwarf can become massive enough to collapse as a type Ia supernova. The first SNR was found around the annually erupting recurrent nova M31N2008-12a. This WD is expected to reach the Chandrasekhar limit in less than 20,000 years, the blink of an eye in the cosmic time frame. All nova systems, especially recurrent novas, should form an NSR cavity.

RS Ophiuchi is a system of a white dwarf and a red giant, with an orbital period of 454 days. About every 15 years, the system erupts and brightens from an apparent magnitude of 12.5 to 5. RS Ophiuchi has a short recurrence period and a fairly massive white dwarf (1.2-1.4 Mʘ), and should be surrounded by an NSR.

Based on data about the density and composition of the interstellar medium (ISM) and the estimated history of the system, the authors calculated that the radius of the NSR shell should be about 100 parsecs, with the inner evacuated cavity about 15 parsecs across. At RS Ophiuchi's distance of 1,4 kpc, the angular sizes should be 250 and 40 arcminutes respectively. They looked for "missing" cool gas in data from the Infrared Astronomical Satellite's (IRAS) "IRIS" catalog. They found an elliptical cavity-like structure in a 3x3 degree image at 100 microns (far infrared). At RS Ophiuchi's distance the cavity was much smaller than was predicted in the paper, just 16 x 5 parsecs, but was consistent with other simulations they had published previously. [Will this be a problem for the paper's referees?] The authors discussed the possibility that the structure could have been a superbubble formed by stellar winds from OB associations, or an actual supernova remnant, and provided explanations to reject these possibilities. They estimate that the cavity is real with 97.4% probability.

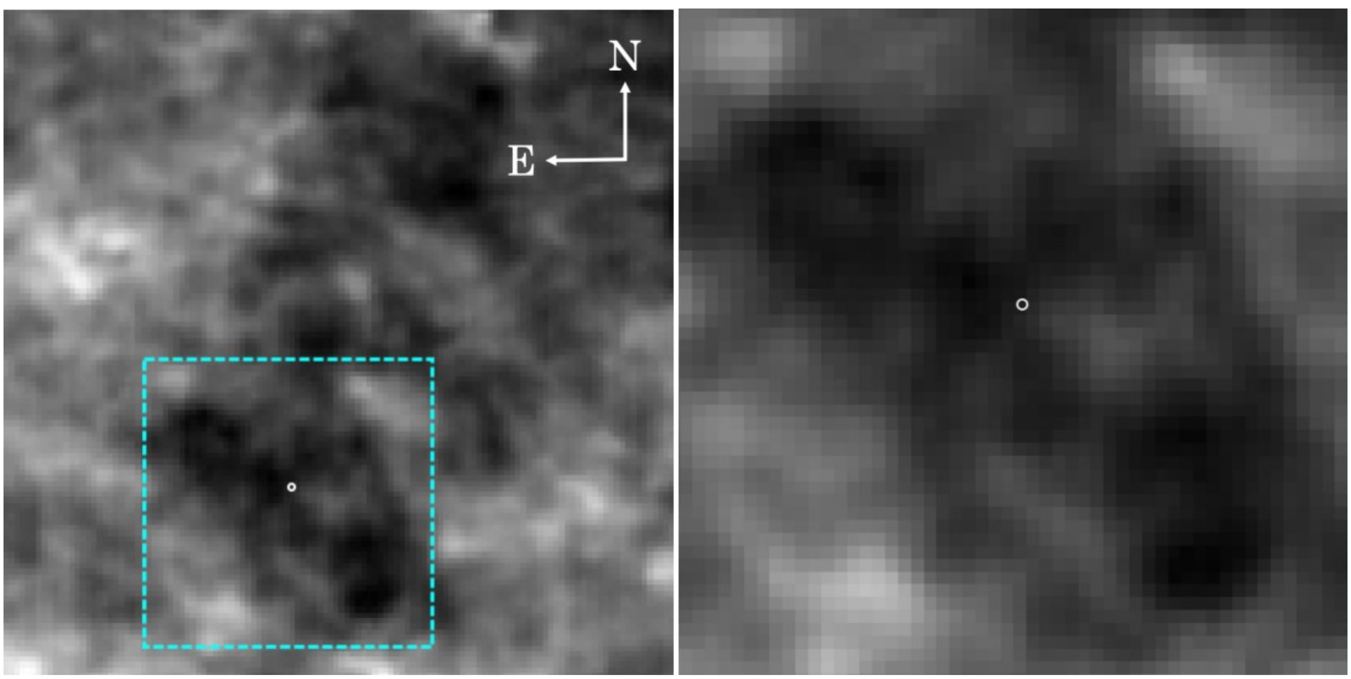


Figure 2 from Healy-Kalesh, *et. al*. Cavity surrounding RS Oph. The white circles are the current location of RS Ophichi. Left: A 3 × 3 degree IRIS image of the surroundings of RS Oph in the far infrared (100 μm). Right: A 1.3 × 1.3 degree region from the left image (see cyan box). The circle is the location of the star.

Member & Club Equipment for Sale

Item	Description	Asking price	Name/Email
Celestron Nexstar 5SE	Mint condition white Celestron 5-inch f/10 (1250-mm) Schmidt-Cassegrain. Go-to alt-azimuth, single fork arm. Only used a couple of times. Complete with hand control, tripod, finder, eyepiece, diagonal. Picture here. Celestron lists this instrument for $799. Weight 17.8 lbs complete, including tripod. Runs on 8 AA batteries or external 12-volts. A fantastic telescope for lunar, planetary and bright DSO observing.	$400	Heather Morris heathermorris4381@gmail.com
Celestron StarSense auto-alignment	Automatically aligns a Celestron computerized telescope to the night sky. Includes finder camera, hand control (substitutes for the original HC), two mounting brackets, cables. Works with any computer controlled Celestron scope that has a hand control. Like new condition, in original box. Image here. Celestron's description and FAQ are here.	$220	Manish Jadhav manish.jadhav@gmail.com
Celestron NexStar SLT 102-mm f/6.5 refractor	Go-to single-arm alt-az mount with Nexstar hand control. Tripod, Orion Sirius Plössl 20 & 7.5mm eyepieces, 3 color filters (#80A Blue, #12 Yellow & #25 Red), red dot finder, original manual. The fork arm outer case is damaged, and taped together, but it works.	$150	Bruce Rights brucerights@gmail.com
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.	$150	WAA ads@westchesterastronomers.org
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.	$40	Larry Faltz lfaltzmd@gmail.com
Tiltall photo/spotting scope tripod	TE Original Series solid aluminum tripod with 3-way head, center stalk. Very solid. 3-section legs. Height range 28.5"-74". Can carry up to 44 lbs. Folded length 29.6". Weighs 6 lbs. Carry bag. Image here. List $199.50. Great for a spotting scope. Donated to WAA.	$75	WAA ads@westchesterastronomers.org
RUBYLITH Screens	I have two 1/8" thick rubylith screens for placing over a laptop or tablet screen. Sizes are 14½x9" (for 17" diagonal 16:9 laptop) and 10½ x 7" for a tablet. Includes strong rubber retainers. I don't need them anymore. First come, first served.	Free	Larry Faltz lfaltzmd@gmail.com

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 members.

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 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!*