MONTHLY OBSERVER'S CHALLENGE

Compiled by:

Roger Ivester, North Carolina

&

Sue French, New York

April 2021

Report #147

NGC 3226 & NGC 3227, Galaxies in Leo

Sharing Observations and Bringing Amateur Astronomers Together

Introduction

The purpose of the Observer's Challenge is to encourage the pursuit of visual observing. It's open to everyone who's interested, and if you're able to contribute notes and/or drawings, we'll be happy to include them in our monthly summary. Visual astronomy depends on what's seen through the eyepiece. Not only does it satisfy an innate curiosity, but it allows the visual observer to discover the beauty and the wonderment of the night sky. Before photography, all observations depended on what astronomers saw in the eyepiece, and how they recorded their observations. This was done through notes and drawings, and that's the tradition we're stressing in the Observer's Challenge. And for folks with an interest in astrophotography, your digital images and notes are just as welcome. The hope is that you'll read through these reports and become inspired to take more time at the eyepiece, study each object, and look for those subtle details that you might never have noticed before.

This month's target

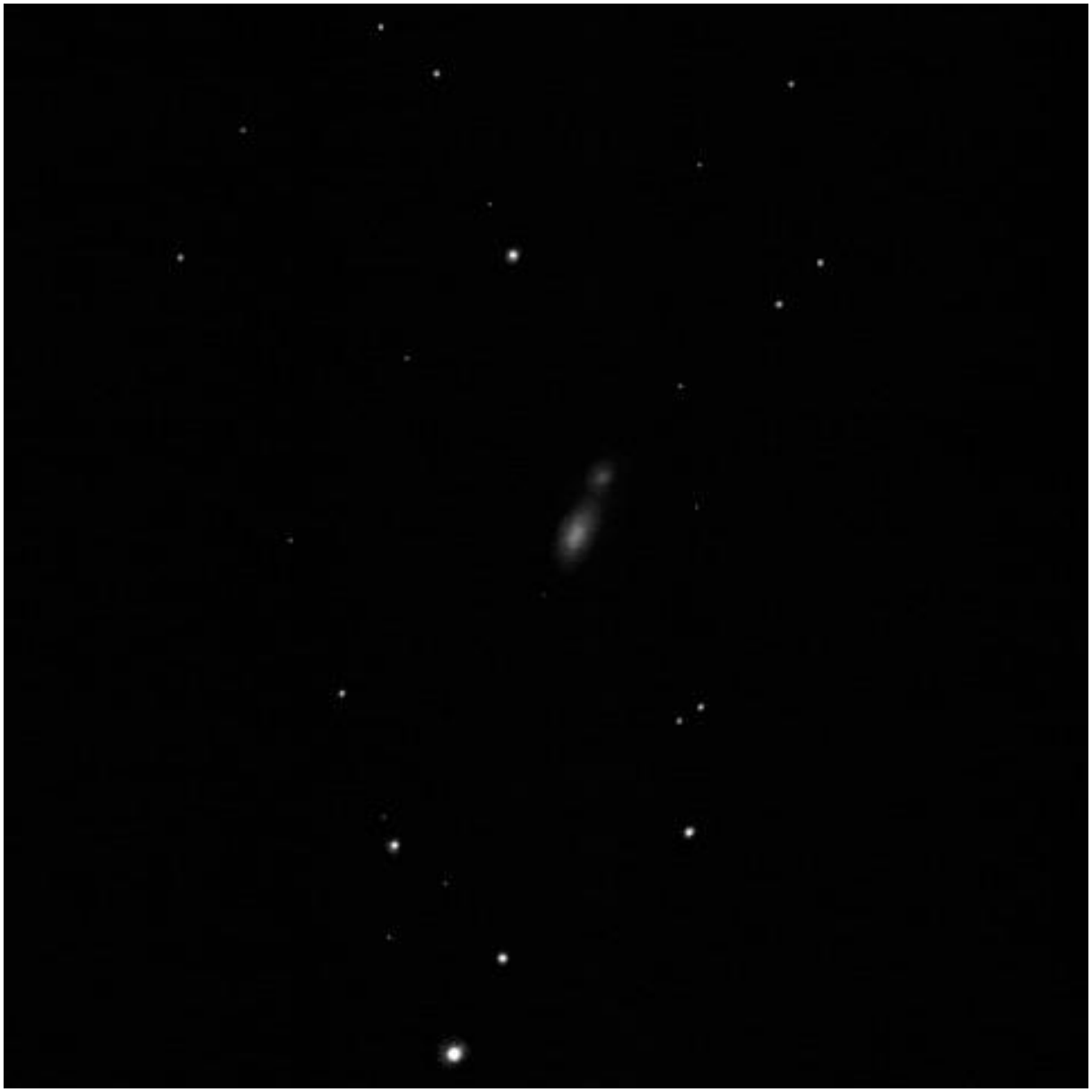
William Herschel discovered this interacting galaxy pair on 15 February 1784 with his 18.7-inch speculum-metal reflector. His hand-written journal of the discovery reads: "Two nebulae almost close together. Perhaps 1½ or 2′ asunder, they are pretty considerable in size, and of a roundish form; but not cometic; they are very faint." He also notes that on this night he first used: "A new, large object Speculum. It is very bright but not quite as distinct as my first, I shall however use it all the night."

Together known as Arp 94, NGC 3226 and NGC 3227 are wedded in a gravitational dance 47.2 ± 0.2 million light-years away from us. Their complex dance has spawned a remarkable array of tidal tails as well as one tidal dwarf galaxy — a gravitationally bound condensation of gas and stars formed during the repeated encounters of the two parent galaxies.

The most recent journal paper on this captivating system can be perused here:
https://www.aanda.org/articles/aa/full_html/2021/01/aa38955-20/aa38955-20.html
or click on the PDF button for a more reader-friendly version.

Uwe Glahn: Observer from Germany

Object: NGC 3226 & NGC 3227
Telescope: 4″ Bino, Magnification: 55×, NELM: 6.5+

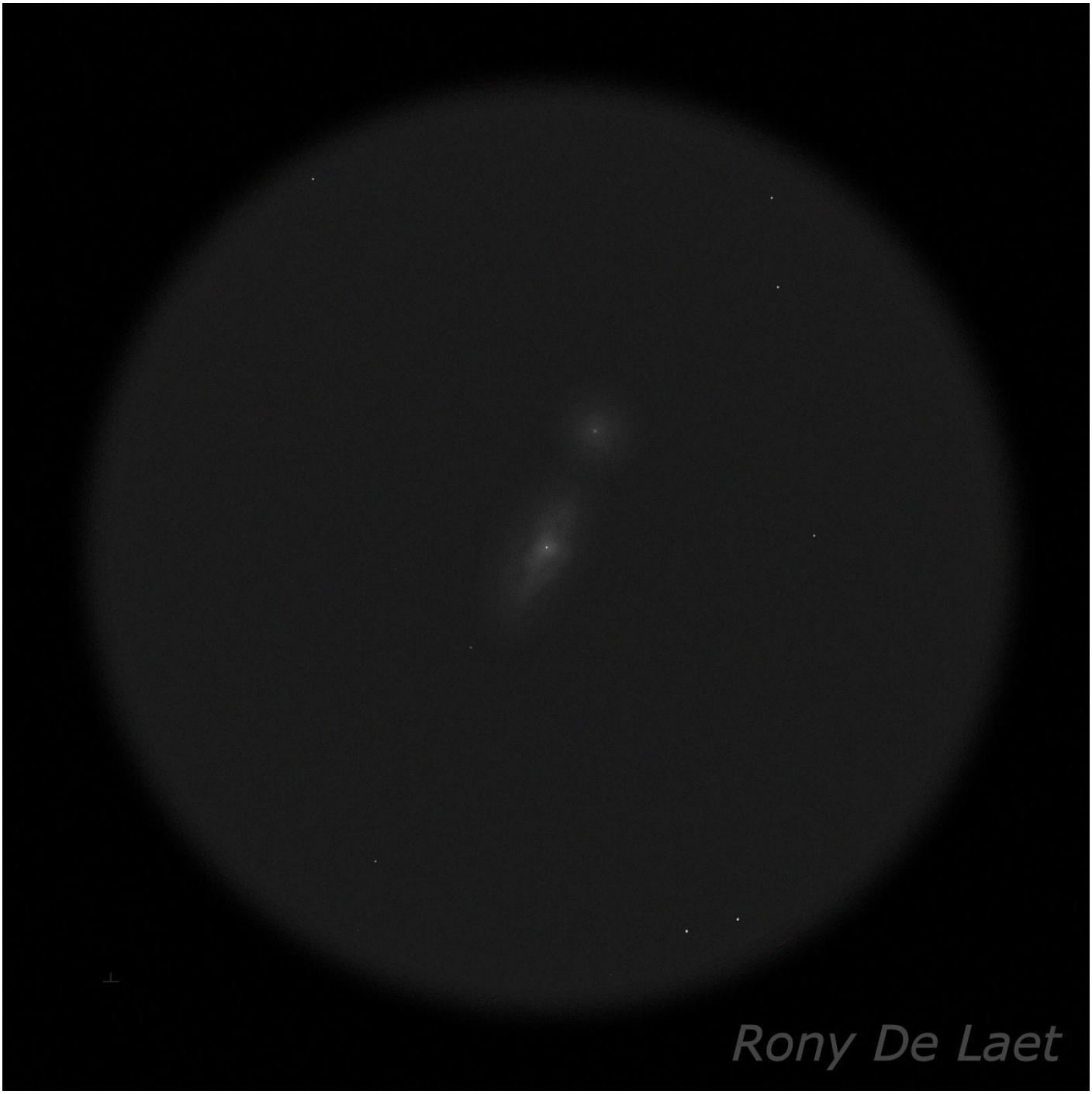


Rony De Laet: Observer from Belgium

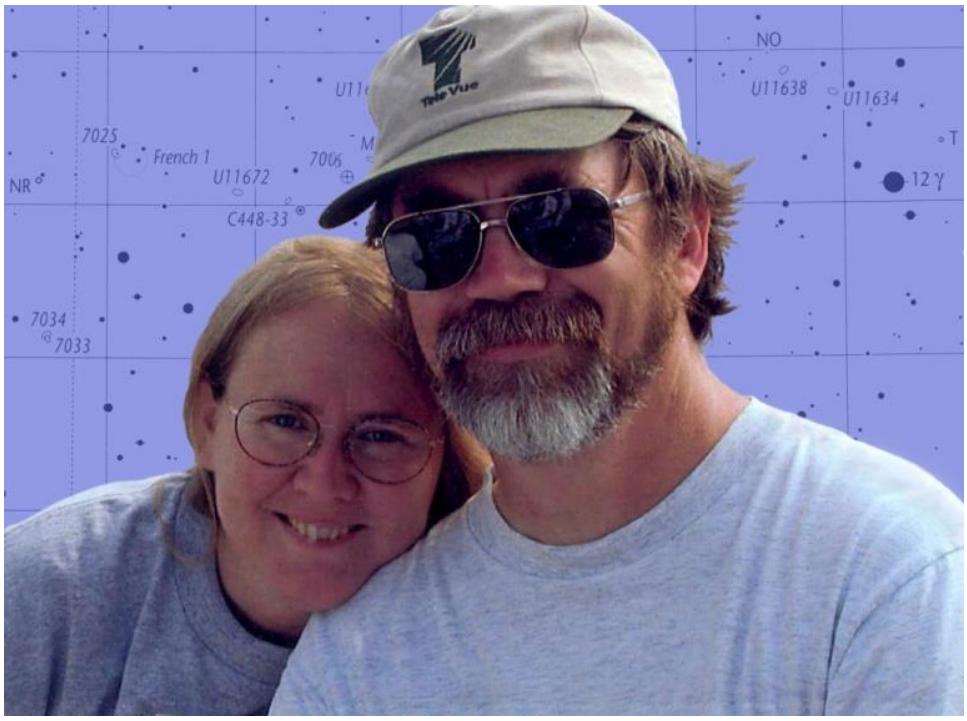
NGC 3226 and NGC 3227 form a nice pair of galaxies. NGC3227 is the brighter one. It has a distinct stellar nucleus and an elongated halo. Its core seems uniform at first, but with time subtle features become visible. 3226 has a substellar nucleus. It has a circular smooth halo. Its core has the shape of a water drop with its tail pointing to the SE. From my backyard, I can't tell if the galaxies connect to each other.

Site: Bekkevoort, Belgium (51° N)
Date: April 4, 2021
Time: around 21.00UT
Telescope: Taurus 16″
EP: Morpheus 6.5mm 76°, 277×
Filter: CLS
Seeing: 3.5/5
Sky brightness: 19.2 magnitudes per square arcsecond near zenith (SQM reading).
Sketch Orientation: N up, W right.
Digital sketch made with Corel Paint Shop Pro X2, based on a raw pencil sketch.

Sketch follows.


Rony De Laet

Sue French: Observer from New York



Through my 130-mm refractor at 23×, I see a moderately faint glow at the position of the interacting pair NGC 3226 and NGC 3227. At 63× it becomes evident that two galaxies dwell here. Although their halos blend together, each harbors a small, distinct, brighter center. NGC 3227 is the brighter and larger galaxy of the pair, its oval façade leans east-southeast. Precariously perched on NGC 3227's north-northeastern tip, NGC 3226 is wrapped in a halo that tips northeast.

NGC 3222 makes an appearance in the field of view 117×, 13′ west of the interacting duo. This little galaxy appears very dim and holds a weakly glowing, starlike nucleus. A 14th-magnitude star winks in and out of view near the galaxy's SW×W edge. At this magnification, NGC 3226 grows brighter toward the center, while NGC 3227 displays an oval core with a prominent stellar nucleus. I estimate combined length of the pair to be about 4½′.

Glenn Chaple: Observer from Massachusetts

NGC 3226/3227 – Interacting Galaxies in Leo
NGC 3226 (Mag: 11.4, Size: 2.8′ × 2.4′) NGC 3227 (Mag: 10.3, Size: 4.1′ × 3.9′)

Our April Observer's Challenge brings us to a cosmic double-header, the interacting galaxies NGC 3226 and NGC 3227. NGC 3227, the brighter of the pair at magnitude 10.3, is a Seyfert galaxy (a spiral galaxy with a quasar-like nucleus). Its partner, the dwarf elliptical galaxy NGC 3226, is about half as large and a magnitude fainter. The two are gravitationally bound and are listed in the *Atlas of Peculiar Galaxies* as Arp 94.

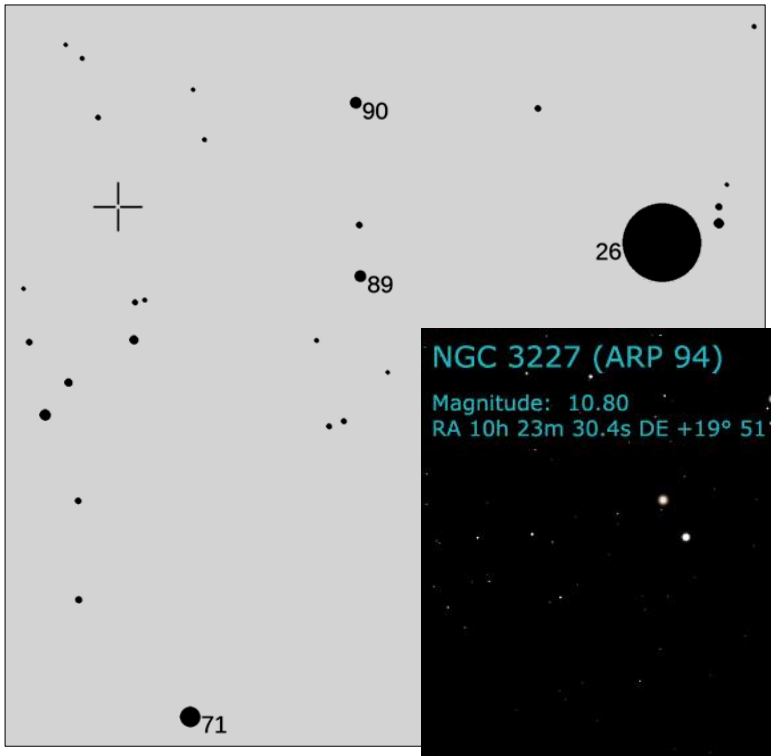
If you use a scope with GoTo technology, you'll find these galaxies by plugging in the coordinates Right Ascension 10h 23m 30.6s and declination +19°51′54″. I suggest you skip the electronics and simply aim your scope at the 2nd-magnitude star gamma (γ) Leonis (Algieba). NGC 3226 and NGC 3227 are less than a degree east. Before you go anywhere, however, center this star in the telescopic field and switch to an eyepiece that magnifies around 100×. Algieba is a showpiece binary pair whose components, of magnitudes 2.4 and 3.6, are currently separated by 4.7 arcseconds. These spectral class K1 and G7 giants shine with striking golden yellow hues.

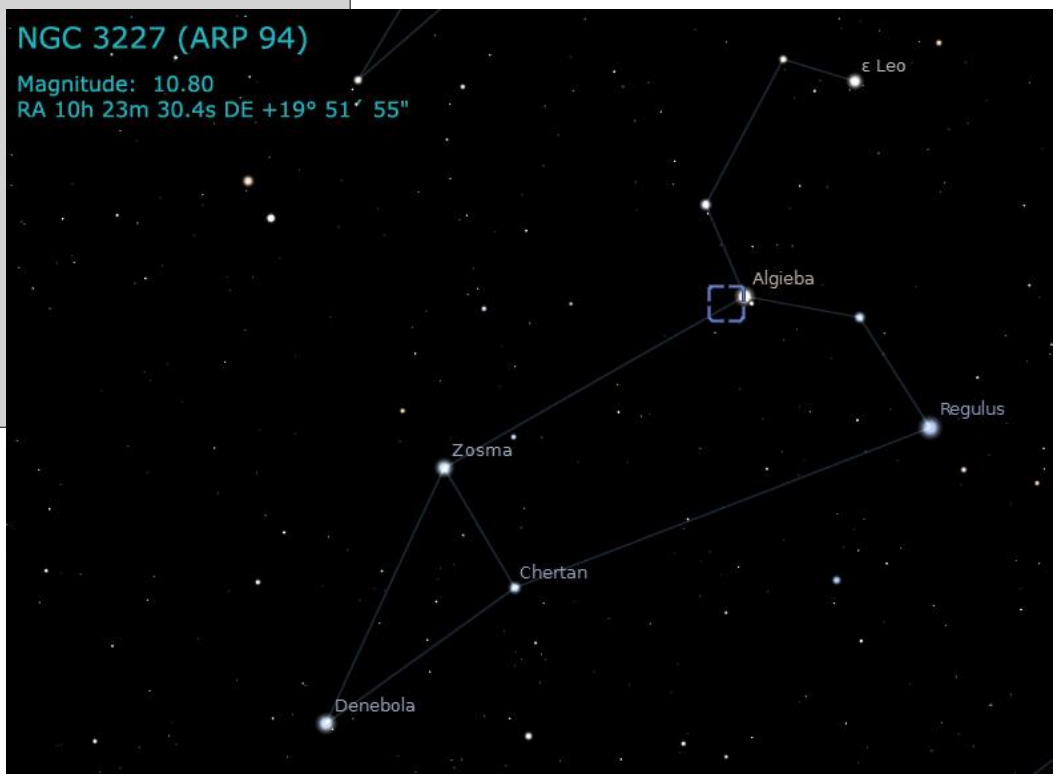
Once you've paid your respects to Algieba, keep your eye glued to the eyepiece as you slowly move eastward past a pair of 9th-magnitude stars to the spot marked with an "+" on the accompanying finder chart. At this location, I was able to see a pair of hazy smudges (the nuclei of the two galaxies) separated by about 2 arcminutes. I was using a 10-inch reflector and a magnifying power of 141× under magnitude-5 skies. There was no sign of the spiral arms of NGC 3227. The appearance of NGC 3226 and NGC 3227 was not unlike a small-scope view of M51 and its companion NGC 5195.

NGC 3226 and NGC 3227 were discovered by William Herschel on February 15, 1784. Their distance isn't accurately known. The SIMBAD astronomical database cites 5 measurements that range from 51 to 73 million light-years.

NGC 3226/3227 Finder Charts

Large scale chart from www.jwinman.com. Detailed chart adapted by Glenn Chaple from the AAVSO's Variable Star Plotter (VSP). Stars shown to magnitude 11.0. 2.6 magnitude star is Algieba. Field is 1° on a side with north up.





Sketch by Glenn Chaple (ATMoB0

ATM of BOSTON

OBSERVING LOG

NAME: Glenn Chaple

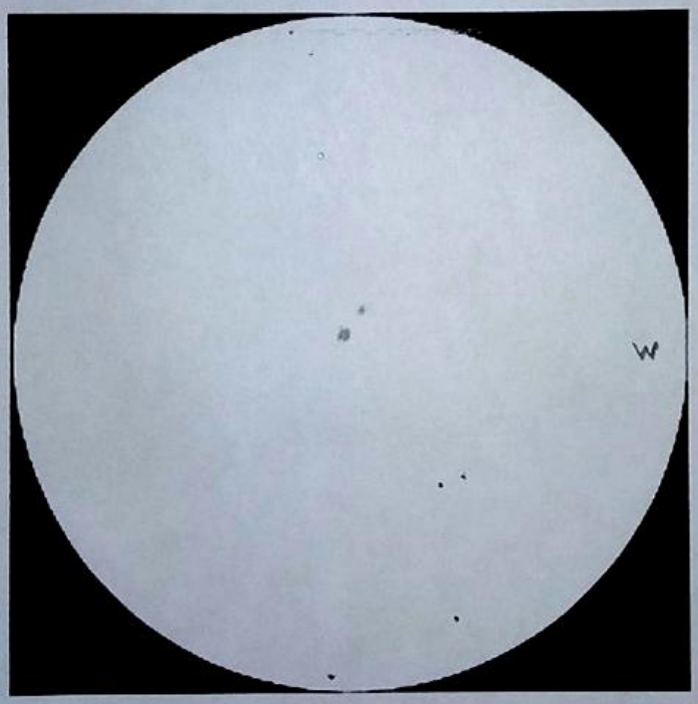
DATE (M/D/Y) 3/13/2021 TIME: 9:45 pm EST

OBSERVING SITE: 82 S. Harbor Rd. Townsend MA

SKY CONDITIONS: Seeing (Antoniadi Scale) IV Limiting Magnitude 5.0

OBJECT: NGC 3226/3227 TYPE: EG/SG CONSTELLATION: Leo

SKETCH (note direction of west)



NOTES:

Visible in 10-inch as double Nebula. Only nucleus of NGC 3227 visible

NGC 3227 barely visible in 4.5-inch at 150X

OBSERVING EQUIPMENT

Binoculars ____X____

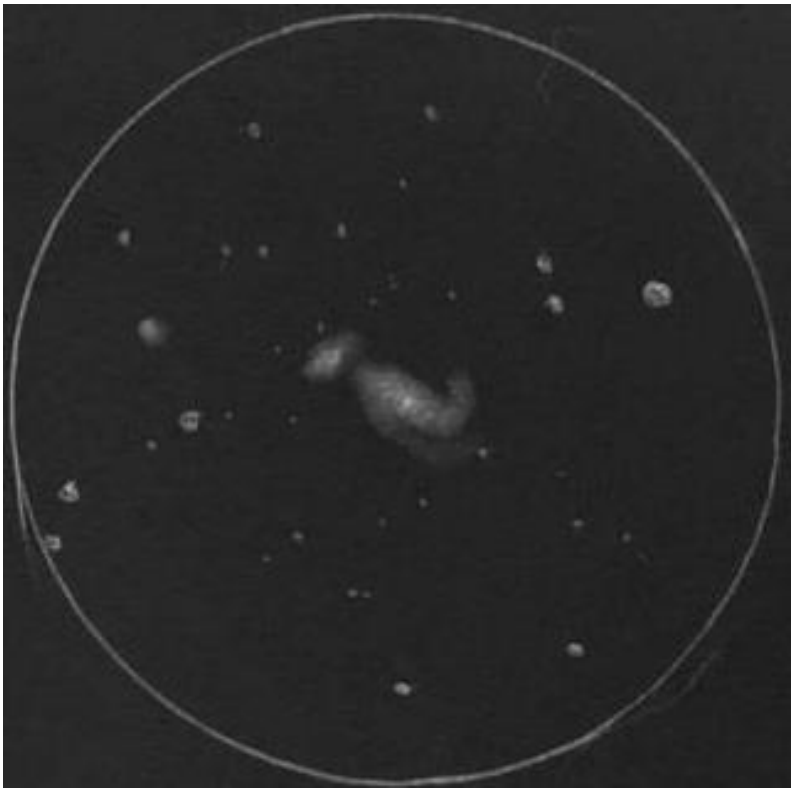
Telescope: 10-inch f/5 reflector Eyepiece: 9mm Nagler

Mag: 141 X Field Diam: 0.6° Filter (if any): _____

Larry McHenry: Observer from Pittsburg, Pennsylvania

NGC 3226 and 3227 are a pair of interacting galaxies located in the spring constellation of Leo – 'The Lion', about 48 arcseconds east from the bright mag +2.6 star Algieba (Gamma Leonis). NGC3227, at +10.3 Mag, is a spiral in the process of merging with +11.4 Mag dwarf elliptical galaxy NGC3226. Both galaxies have an Active Galactic Nucleus (AGN) fueled by a suspected black hole in each. The pair is about 77 million light-years distant. NGC 3226/3227 is listed as Arp 94 in Halton Arp's 'Atlas of Peculiar Galaxies' under his "Spiral Galaxies with Elliptical Companions" section.

Visual Screen Sketch:
03/02/2021 from Big Woodchuck Observatory backyard in Pittsburgh, PA.
Using an 8″ SCT optical tube @ f/6.3 on a GEM mount, with a CMOS/USB color camera and LP filter @ 60-second guided exposure livestacked for 30 minutes. West is @ top of sketch.



Visually, NGC 3227 is the larger of the two galaxies displaying spiral arms looping to the east and north. Both galaxies have star-like cores. Bonus galaxy NGC 3222 at +12.8 Mag is nearby to the SW and visible in the same FOV.

Video-Capture:
04/24/2014 from Cherry Springs State Park, using an 6″ RC optical tube @ f/5 on a GEM mount, with an analog deep-sky video-camera & IR filter @ 25 seconds, single exposure.

RA: 10h 23m Dec. +19º 54′ (**NGC 3326**) Mag. V=11.4; sfc. br. 13.3; Size 2.8′ × 2.0′
RA: 10h 24m Dec. +19º 52′ (**NGC 3327**) Mag. V=10.3; sfc. br. 13.1; Size 4.1′ × 3.9′

Chris Elledge: Observer from Massachusetts

On April 3rd @ 9:30pm EDT, I used a 10-inch f/5 reflector to observe NGC 3226 & 3227 from the ATMoB Clubhouse. Sky conditions were: Bortle Scale 6; NELM 4.5 near NGC 3226; Transparency: Good; Seeing: Average.

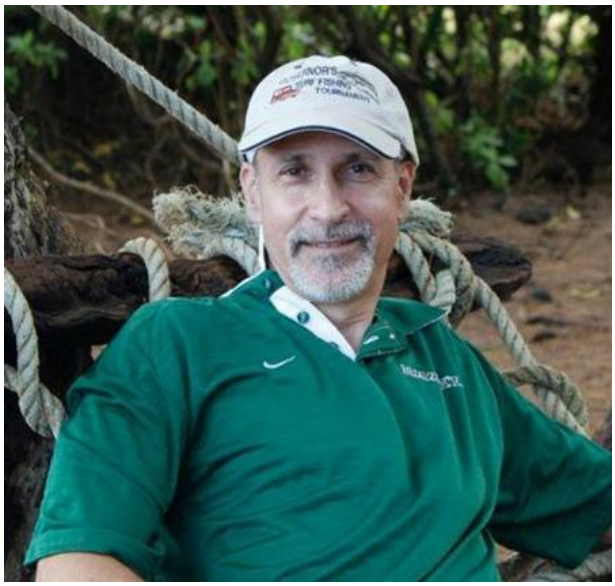
It's not hard to target the pair of galaxies since mag. 2 star Algieba is less than a degree away to the West. At 36× (35mm, 1.9º FoV) there is a zigzag of stars coming from the South towards the galaxies (HD 89930, TYC 1423-0364-1, TYC 1423-0156-1, HD 90053, TYC 1423-0248-1, & TYC 1423-0183-1). Just to the West of the end of the zigzag (0183-1) lies a pair of mag.10 stars in a North-South orientation (TYC 1423-0013-1 & -0045-1). Following the line drawn by these two to the North 11′ arrives at a pair of mag. 13 stars separated by 1.5′. The galaxies lie 4′ to 5′ to the SE of the pair.

It is crucial to keep Algieba out of the view to see the object since it produces quite a bit of glare. At 36× I can get a hint that there is something there with averted vision. Could be a nucleus of one of the galaxies flashing in and out, or possibly a faint field star.

At 115× (11mm, 0.7º FoV) a pair of blobby objects appear. They seem to be elongated in different directions. NGC 3226 is stretched North-South while NGC 3227 has a bit of SSE-NNW tilt. Together they form more of an angled boomerang shaped blob. The cores of the galaxies don't stand out to me. There's a very faint mag. 14 star in the center of NGC 3227.

Upping the power to 270× (4.7mm) makes the cores of the galaxies more apparent with averted vision. They are very small bright spots almost stellar in appearance. It is hard to distinguish between the mag. 14 star in NGC 3227 and its core. NGC 3326 is slightly brighter and more rounded than NGC 3327, which is more of an oval.

James Dire: Observer from Illinois



NGC 3226 and NGC 3227 comprise a pair of interacting galaxies in the constellation Leo. The galaxies are located 50 arcminutes east of the bright star Algieba (Gamma Leonis). NGC 3226 is a magnitude 11.4 elliptical galaxy. It is roughly 3.1 × 2.3 arcminutes in size. NGC 3227 is a spiral galaxy of magnitude 10.7 measuring 4.7 × 1.9 arcminutes. The cores of the two galaxies are separated by a mere 3 arcminutes.

NGC 3226 and 3227 are estimated to be between 66 and 76 million light-years away. Some sources mistakenly list one at 66 million light-years and the other at 76 million light-years. That would put them ten million light-years apart…too far to be interacting as they are. That separation would be four times the separation of the Milky Way and M31, which we know are too far apart to be distorting each other like NGC 3226 and NGC 3227 are. So the galaxies are close to each other and must be approximately the same distance away from us.

I took an image of the pair this month with a 132mm f/7 apochromatic refractor on a CGEM II mount. I used an SBIG ST-2000XCM CCD camera. The exposure was two hours using 10-minute subframes. In the image, north is up and east to the left. NGC 3226 is the northernmost of the pair. NGC 3227's spiral nature is still visibly intact. The galaxy has classification SABa, meaning it is in between a normal and a barred spiral galaxy with tightly wound spiral arms.

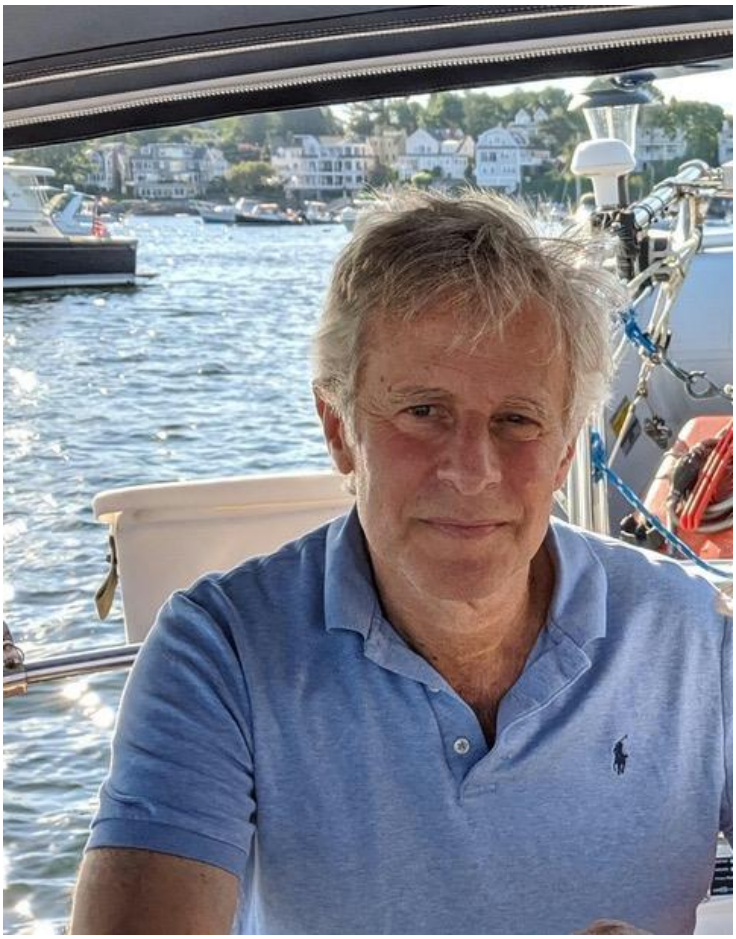
Longer exposures with larger instruments do a better job at showing the tidal streams around each galaxy caused by their close encounter. But my image does provide proof of the shearing of light matter from each galaxy caused by their gravitational tug of war. Perhaps the galaxies will eventually merge forming a giant elliptical galaxy.

Ten arcminutes west (to the right of these two galaxies in my image) is NGC 3222, a magnitude-13.7 spiral galaxy measuring 1.1 × 1.0 arcminutes in size. This galaxy may be four times further away than the NGC 3226-3227 pair. Below NGC 3222 is a chain of five 16^{th}- 18^{th}-magnitude galaxies arcing south and east. Another small spiral galaxy, shining at magnitude 15.6, is seen in my image

approximately eight arcminutes north of NGC 3226. Many other fainter galaxies are scattered throughout the image.

I viewed NGC 3226 and NGC 3227 April 29 with a 190mm (7.5 inches) f/5.3 Maksutov-Newtonian. The seeing was 2.5-3.0 arcsec with average transparency (Bortle scale 4.5). Both galaxies were clearly visible in the 24mm eyepiece (42×). Their cores were brighter than the outer parts of each galaxy, and the shape of the galaxies was very apparent. There was no dark space between the galaxies, but I could not see any of the tidal arcs. The view though a 14mm eyepiece was the same but larger (71×). Going to 6.7mm (150×) and 5mm eyepieces (200×) did not improve the view. It was actually worse since the light from the galaxies was spread out to the point I had trouble seeing the galaxies, even with averted vision. This was probably due to light pollution from nearby Peoria.

Barry Yomtov: Observer from Massachusetts



As I reported last month my primary optics (RASA 11) had to be set aside because my mount had to go for repair, so I imaged with the C9.25/Hyperstar. Fortunately my mount was repaired and returned with a fairly quick turnaround. I did manage to have a session with the C9.25/Hyperstar, for April's NGC 3226/3227. I've also been lucky to have a clear night to have an additional session with the RASA 11. For April I've decided to present a comparison of NGC 3226/3227 between the two optical systems and using the same camera.

	RASA 11	**C9.25/Hyperstar**
Aperture (mm)	279	235
Focal Length (mm)	620	540
Focal Ratio	f/2.22	f/2.3
Filters	Astrodon notched light pollution filter, and UV/IR cut filter (used for galaxy imaging)	none
Camera Pixel size (µm)	2.4 × 2.4	2.4 × 2.4
Camera Resolution (pixels)	5496 × 3673	5496 × 3673
Pixel Resolution in seconds (″)	0.80	0.92
Field of View in degrees (°)	1.22 × 0.81	1.4 × 0.93

By comparing the field of view (FOV) and the pixel resolution between the two sets of optics, the RASA 11 is about 87% of the C9.25/Hyperstar optics. The following figure is a comparison of the field of view between the two sets of optics using NGC3226/3227 as the selected object of interest.

(Field of View Calculator, courtesy of Astronomy Tools). I also compared the distance between two star locations and the ratio was also about 86.4%

The following are the processed images for each optical system.

C9.25/Hyperstar taken on March 19, 2021: 93 subs, 30 sec exposure, for 47 minutes total.

RASA 11 taken on April 4, 2021: 97 subs, 35 sec exposure, for 57 minutes total exposure time.

The RASA was able to detect more of the outer periphery as well as greater detail of the core of NGC 3227, compared to the C9.25/Hyperstar. The improved quality of the image can be contributed to (1) improved pixel resolution (0.8″ versus 0.92″) (2) 1.42× greater light gathering power with the 11″ RASA than with the C9.25″, and (3) the light pollution filter of the RASA reduces background light pollution noise thus improving the signal to noise ratio.

Mario Motta: Observer from Massachusetts

The image above is 2.5 hours of galaxies NGC 3226 and NGC 3227 with a Luminance filter with 1 hour each R,G,B, filters for a total of 5.5 hours of imaging. It was taken with my 32-inch f/6.5 telescope with a ZWO ASI6200 camera, then processed in PixInsight. The distance is 77 million light-years away. This spiral galaxy is interacting with a dwarf elliptical galaxy, also known as Arp 94. The Arp catalog is among my favorites, for unusual objects in the sky.

Michael Brown: Observer from Massachusetts

I observed the galaxy pair NGC 3226 and 3227 on March 30, 2021. It is in the same low power field as the attractive binary star Gamma Leonis. I was easily able to see the two galaxies, at 11th and 12th magnitude, with my 8-inch SCT. The brighter of the pair (NGC 3227) is to the south and is a Seyfert galaxy with an active galactic nucleus. The smaller and dimmer object (NGC 3226) is a dwarf elliptical galaxy. I could see the two bright centers and some surrounding glow, but had trouble discerning any additional detail. I perceived both galaxies to be fairly round, although I later realized from photographs (including my own) that they are tilted/elongated, especially NGC 3227.

I ventured outside four days later on April 3, 2021 to attempt a photograph, using my usual setup including the 8-inch scope and Canon Digital Rebel SLR. By the time I had completed alignment, tracking, focusing, and guiding setup, I was racing against time before the target reached the meridian, at which point the drive of my German equatorial mount would shut off. However, I managed to get enough shots for a total 33-minute exposure. My photo shows the bright nucleus of each galaxy and dimmer surrounding regions. An extended spiral arm of NGC 3227 is faintly visible to the east (left) of the main body of the galaxy. I also noticed a very small galaxy (presumably) to the west (right) of the pair, about 2/3 of the distance to the edge of the photo.

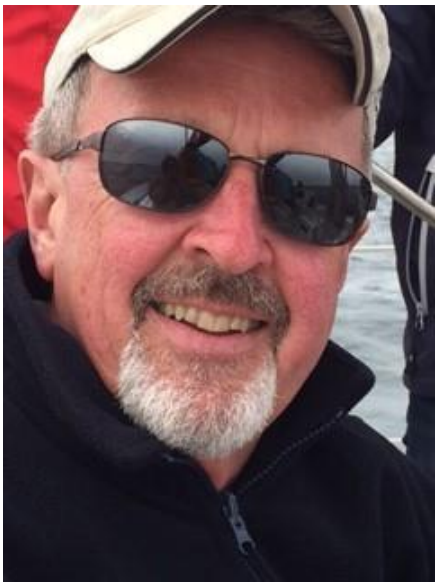
Image follows.

Joseph Rothchild: Observer from Massachusetts

I observed the galaxy pair, NGC 3226/3327 twice from my dark site on Cape Cod. Using my 10-inch Dobsonian, the galaxy pair was easy to find near Algieba, which is a double star. This was my first observation of these galaxies. They were best viewed with a 14mm eyepiece and Paracorr at 102×. The galaxies were close, but easily separated.

The fainter galaxy, elliptical NGC 3226 (mag 11.4), was smaller, round and with higher surface brightness. The spiral NGC 3227 (mag 10.7) was a featureless oval.

John Bishop: Observer from Massachusetts



On 4/3/21, I observed NGC 3226 and NGC 3227, an interacting galaxy pair in Leo. I observed from the ATMoB Clubhouse in Westford, MA. The sky was clear at 7:00 pm as the Sun set, with a good number of scopes set up on the observing field. I sensed a "pent up demand" to observe among the group, now being relieved thanks to recently eased COVID restrictions and better weather. Air temperature was 40 degrees F at 7:00 pm, and 28 degrees F at midnight.

I observed with my usual 8.25-inch f/11.5 Dall-Kirkham reflector, at 48× to 193×. The scope is a portable setup on an equatorial mount with a motor drive, but no goto.

The clear sky was deceptive. Contrast was poor; other observers reported that deep sky objects were washed out. NGC 3226 and NGC 3227 were much fainter than I expected given their visual magnitudes of 11.4 and 10.8, respectively. I assume that the objects' reported surface brightness, 13.5 and 14.0, explains some of the difficulty in seeing them in these conditions. (Magnitudes per Luginbuhl & Skiff).

The target objects are very close to Algieba (Gamma Leonis), the prominent star at the nape of the Lion's neck. I assumed I could center on Algieba using my 2-inch, 50mm eyepiece at 48×, move east slightly, and be right on the target. I was, but what I saw was – nothing! I waited, scanning the field with averted vision, and tapping the diagonal occasionally. Eventually, I saw a very faint brightening in the field, so faint I wasn't sure if it was real. As I increased power, I could see that the bright area was indeed an object (it was NGC 3227), but I could not be certain of its shape. Also as I increased power, and using averted vision, a second patch appeared nearby; this was NGC 3226. It was very faint, nebulous, of indefinite shape, and smaller than NGC 3227. With extended viewing, NGC 3226 was round; NGC 3227 was elongated. The objects were close enough that they could have been touching, but the image was too faint and unsteady to be sure. To my eyes, NGC 3227 was larger and brighter than NGC 3226. Both objects have a (relatively) bright nucleus.

To illustrate how washed out conditions were, at least once this night, while re-centering the objects with the hand controller (I had not precisely polar aligned the scope), I overshot, lost the target, and then had trouble getting back to it because it was so hard to see – you had to be right on it. One of the

Club's top observers, using his fine 18-inch Dob, agreed that these two galaxies were "very faint" this night. Welcome to Eastern skies!

I spent nearly two hours on and off tracking NGC 3226 and NGC 3227, trying to tease out a little more detail in clear moments, and just savoring the view, dim as it was. This is why I prefer to have a tracking motor, although I am just a happy visual observer using modest aperture. It allows me to spend time with the object, give my eyes a rest, catch the occasional clear moment, and even share the view with others, without having to relocate the target continually.

Close galaxy pairs are among the most interesting objects, even as faint as these are. Not a lot of detail, but you have to love the hobby.

Anas Sawallha: Observer from Jordan

Unfortunately I was not able to observe the interacting galaxies NGC 3226/3227. I tried on multiple nights, but just could not see them, despite using a 10-inch reflector.

This was due in-part to our spring nights which are somewhat dusty in the upper layer of the atmosphere, and when this condition does exist, it can even obscure some open clusters.

However, one night I was able to observe the core of galaxy NGC 3226 with averted vision, but still unable to sketch.

The spring galaxy season is actually is my favorite season since I love galaxies, but I guess the season is not in love with me. But I'm hopeful to be able to attempt from a very dark site in the near future to catch up on what I usually miss during the galaxy season.

I'm always pleased to take part of the observer's challenge report.

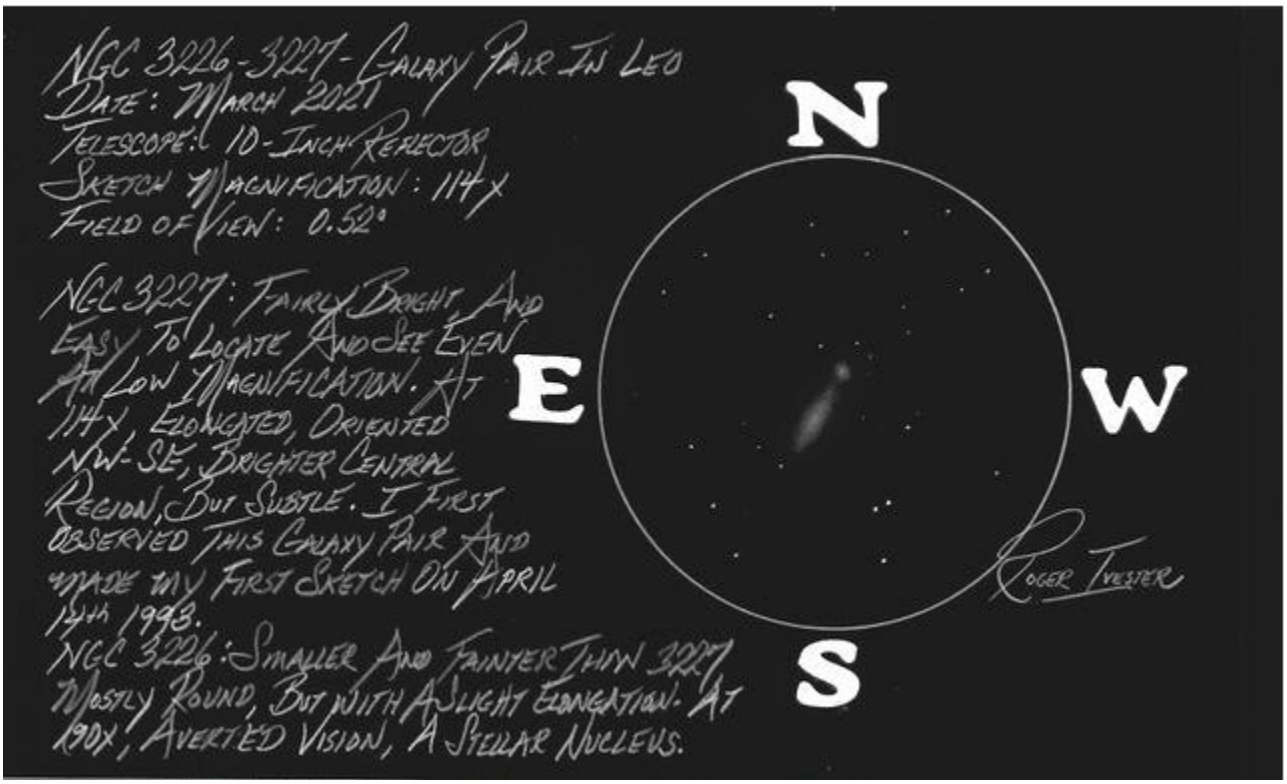
Roger Ivester: Observer from North Carolina

NGC 3226-3227: Interacting galaxy pair in Leo
Date: March 2021
Telescope: 10-inch f/4.5 reflector
Sketch Magnification: 114×
Field of View: 0.52º

NGC 3227: Fairly bright, and easy to locate and see even at low magnification. At 114×, elongated, oriented NW-SE, brighter central region, but subtle. I first observed this galaxy pair and made my first sketch on April 14th 1993.

NGC 3226: Much smaller and a fainter than NGC 3227, mostly round, but with a very slight elongation, NNE-WSW. At 190×, and with averted vision, a stellar nucleus is visible.

Sketch follows.



The following is the complete listing of all Observer's Challenge reports to-date.
https://rogerivester.com/category/observers-challenge-reports-complete/