MONTHLY OBSERVER'S CHALLENGE

Las Vegas Astronomical Society

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&

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April 2012

NGC-3115 – (Caldwell 53) Galaxy in Sextans (Spindle Galaxy)

Introduction

The purpose of the observer's challenge is to encourage the pursuit of visual observing. It is open to everyone that is interested, and if you are able to contribute notes, drawings, or photographs, we will be happy to include them in our monthly summary. Observing is not only a pleasure, but an art. With the main focus of amateur astronomy on astrophotography, many times people tend to forget how it was in the days before cameras, clock drives, and GOTO. Astronomy depended on what was seen through the eyepiece. Not only did it satisfy an innate curiosity, but it allowed the first astronomers to discover the beauty and the wonderment of the night sky.

Before photography, all observations depended on what the astronomer saw in the eyepiece, and how they recorded their observations. This was done through notes and drawings and that is the tradition we are stressing in the observers challenge. By combining our visual observations with our drawings, and sometimes, astrophotography (from those with the equipment and talent to do so), we get a unique understanding of what it is like to look through an eyepiece, and to see what is really there. The hope is that you will read through these notes and become inspired to take more time at the eyepiece studying each object, and looking for those subtle details that you might never have noticed before. Each new discovery increases one's appreciation of the skies above us. It is our firm belief that careful observing can improve your visual acuity to a much higher level that just might allow you to add inches to your telescope. Please consider this at your next observing session, as you can learn to make details jump out. It is also a thrill to point out details a new observer wouldn't even know to look for in that very faint galaxy, star cluster, nebula, or planet.

NGC-3115 – (Caldwell 53) Galaxy in Sextans (Spindle Galaxy)

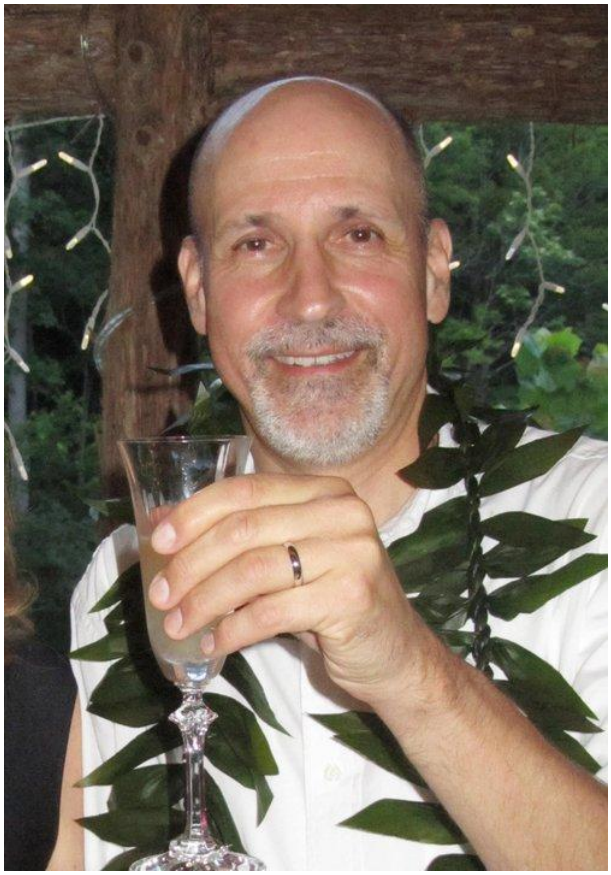
NGC-3115 is a lenticular galaxy discovered by William Herschel on Feb 22, 1787. It's called lenticular because it is, in a way, halfway between a spiral and an elliptical galaxy. It's been mistaken for an elliptical, yet it has some characteristics of a spiral galaxy. With stretched out limbs on each side and a central bulge, it seems to indicate a spiral, yet so far, astronomers have yet to detect a spiral shape within it. It lies about 32 million light-years away and is larger than our own Milky Way galaxy. Shining at mag. 9.9, it is a fairly easy target for even small scopes as long as the viewing conditions are decent.

A unique feature was discovered when in 1992, John Kormendy of the University of Hawaii and Douglas Richstone of the University of Michigan found a super-massive black hole at the galaxy's core. They estimated its' size at approximately a billion solar masses. The Hubble recently imaged this black hole indirectly and from the hot jets emitting out of the surrounding area, the images seem to prove its existence. That would place this feature as the nearest super-massive black hole if this nature to the Earth.

This is a nice challenging object that is only limited by your patience and sky conditions.

Observations/Drawings/Photos

Dr. James Dire: Observer from Hawaii



NGC-3115 is a mag. 9 galaxy in Sextans, located three and a quarter degrees east and a fraction of a degree north of the star Gamma Sextantis. Measuring 8.3 by 3.5 arcminutes, it's classified as a lenticular galaxy (S0) - a galaxy that's not quite spiral and not quite elliptical. NGC-3115 is seen almost edge-on. It isn't perfectly elliptical and does appear to have a disk and central bulge. However, it lacks any hint of spiral arms or the disk dust lanes seen in most edge-on spiral galaxies. The stars in the galaxy appear very old and there's no new star formation occurring, as the star-making material is probably all used up. It has a 2 billion solar mass black hole at the center.

Through the eyepiece of my 10-inch SCT, the galaxy appears cigar shaped with no detail. My 60 minute exposure, shown herein, was taken with a 102mm (4-inch) f/6.3 apochromatic refractor and an SBIG ST-2000XCM CCD camera. There's little detail in the image except that the galaxy's disk and central bulge are slightly perceivable. Near the bottom center of the image is a very small face-on spiral galaxy of mag. 12.5.

Jay And Liz Thompson: Observers from Nevada

We observed NGC-3115 from our backyard in Henderson, NV on April 15, 2012. We used a 14-inch f/11 and a 14mm eyepiece yielding 279X. We found NGC-3115 the old-fashioned way, by star-hopping from Alpha Hydrae. The nucleus was evident with direct vision. Averted vision helped bring out the outer part. The galaxy was elongated about 4:1 and at a position angle of approximately 45º.

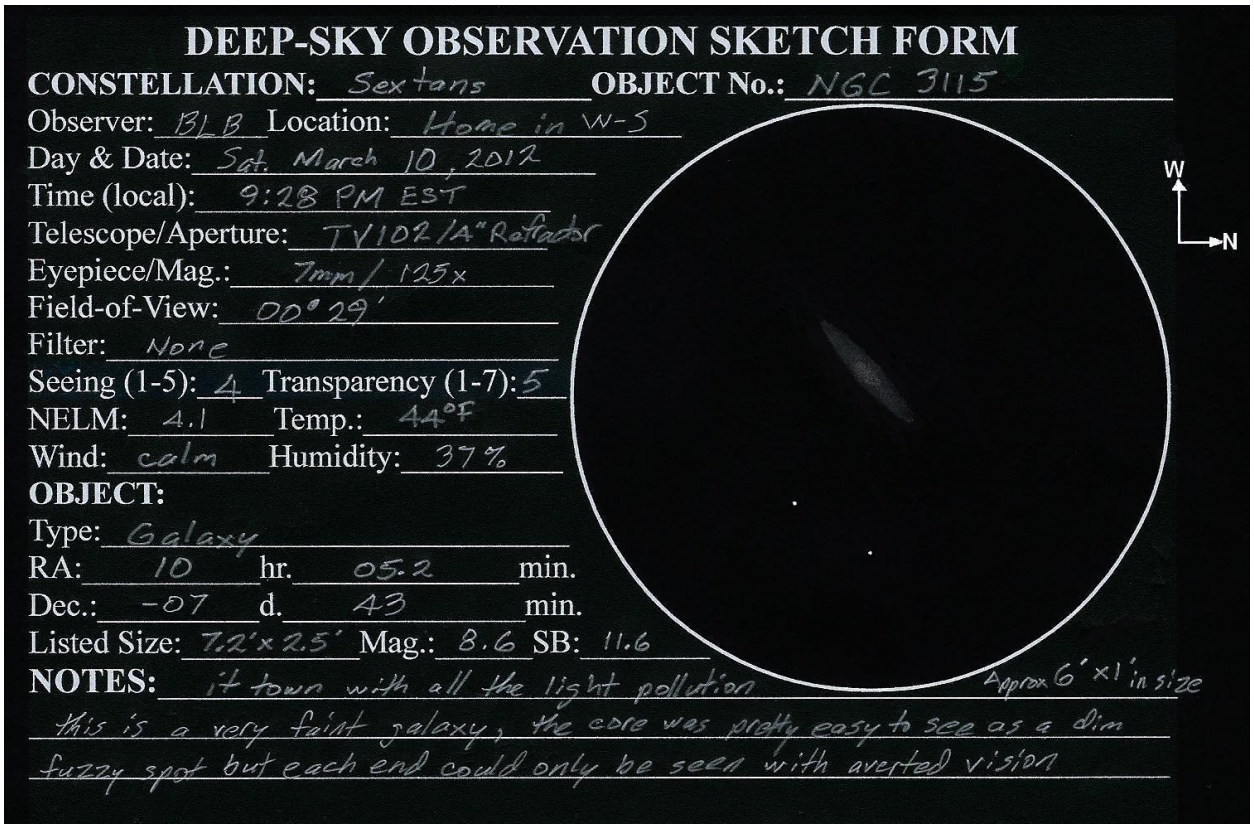
Buddy Barbee: Observer from North Carolina

This observation of NGC-3115, known as the Spindle Galaxy, was made Saturday, March 10, 2012 from the backyard of my home in Winston-Salem, NC. I was using a 102mm (4-inch) refractor with a 7mm eyepiece for a magnification of 125X. It was a beautiful clear night with a mild temperature about 44º F and a low humidity of 37%. The naked-eye limiting magnitude was only 4.1.

Using a 24mm eyepiece for a magnification of 37X and a true field-of-view of 1.8º, finding NGC-3115 was very easy. Although the galaxy was visible at this magnification, it was only a small blob-like hazy spot. After centering the galaxy in my field-of-view, I started playing with the magnification to see what gave me the best view of the galaxy. Having settled on the 7mm eyepiece for the best view, I started looking at the galaxy, giving my eye time to see all that could be seen. With direct vision, only the galaxy's core could be spotted. The core appeared to be almost a rectangular hazy spot that was somewhat mottled. In town with all the light pollution, the halo that gives the galaxy its spindle shape could only be seen with averted vision. Using averted vision, the halo tapered to almost nothing on each side of the core and was oriented from northeast to southwest. With averted vision, the overall size of the galaxy was approximately 6' long by 1' wide. Without averted vision, the galaxy was approximately 1.5' long by 1' wide.

If it were not such a bright galaxy, it would have been pretty hard to see this one in town with all the light pollution. The key to seeing this galaxy was upping the magnification enough

to darken the sky, but not so much that the galaxy started to disappear and using averted vision to see it's full length.



DEEP-SKY OBSERVATION SKETCH FORM

CONSTELLATION: Sextans **OBJECT No.:** NGC 3115

Observer: BLB Location: Home in W-S

Day & Date: Sat. March 10, 2012

Time (local): 9:28 PM EST

Telescope/Aperture: TV102 4" Refractor

Eyepiece/Mag.: 7mm / 125x

Field-of-View: 00° 29'

Filter: None

Seeing (1-5): 4 Transparency (1-7): 5

NELM: 4.1 Temp.: 44°F

Wind: calm Humidity: 37%

OBJECT:

Type: Galaxy

RA: 10 hr. 05.2 min.

Dec.: -07 d. 43 min.

Listed Size: 7.2' x 2.5' Mag.: 8.6 SB: 11.6

W

N

Approx 6' x 1' in size

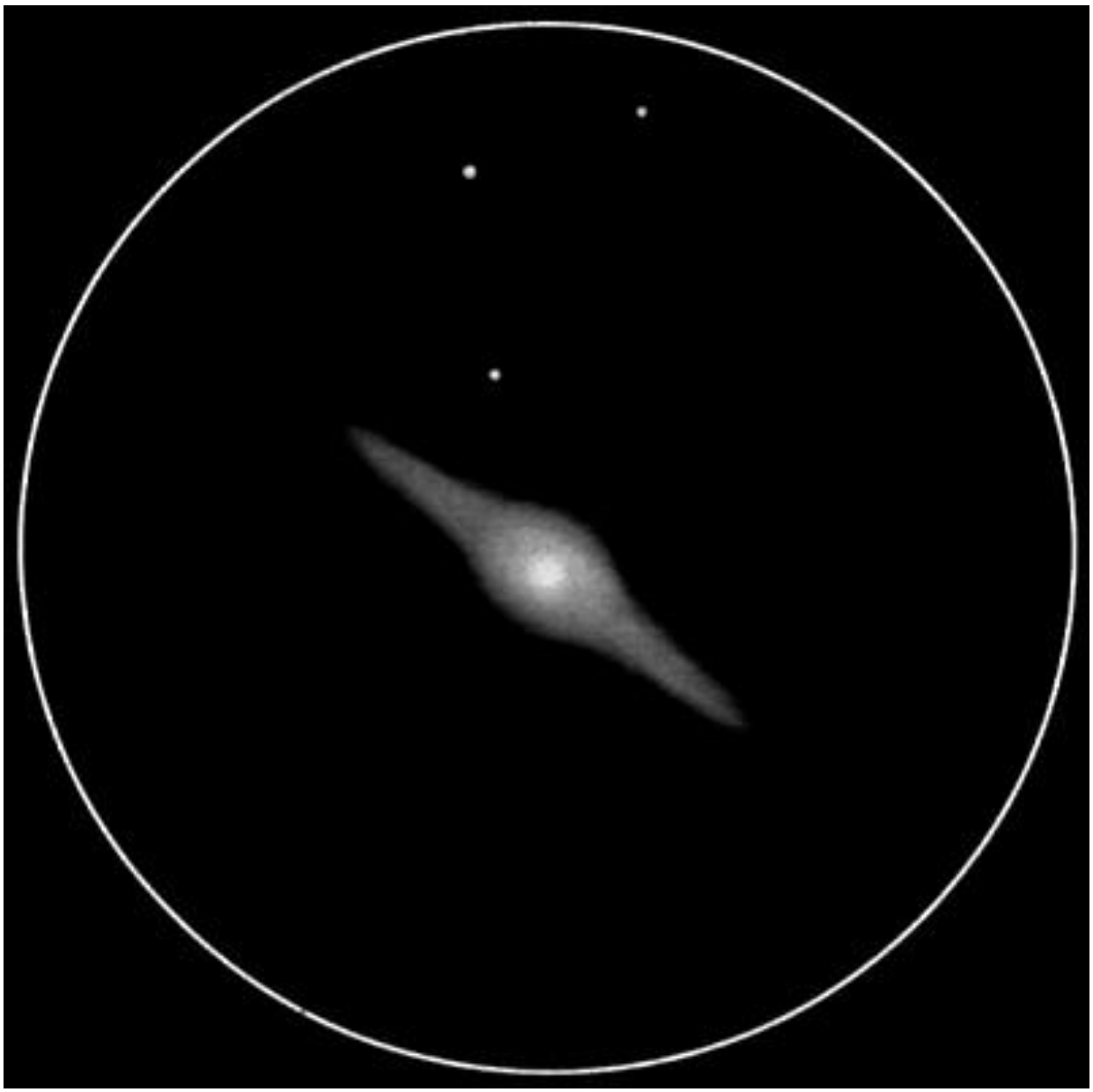
NOTES: it town with all the light pollution

this is a very faint galaxy, the core was pretty easy to see as a dim fuzzy spot but each end could only be seen with averted vision

Jaakko Solaranta: Observer from Finland

I observed NGC-3115 on the April 8, 2012 using my 8-inch reflector with magnifications between 100X and 299X. The observing site used was mediocre, only 15 miles east from my urban house. Nonetheless, the sky still was considerably darker than at home. My SQM-L meter showed measurements slightly above 20 near zenith, and to the south, while naked-eye limiting magnitude was 6.4.

First using the telescope's 6X30 finder, I could just see the galaxy with it when using a dark hood over my head. When I moved to the eyepiece, NGC- 3115 appeared as a high surface-brightness, NE-SW elongated "spindle," with a brilliant, round core without much detail. During fleeting moments, I felt I could glimpse some additional detail from the core-region, but this might have been and illusion. Both edges appeared quite sharp, like typical to edge-on galaxies. The very faint mag. 14 galaxy UGCA-200, SE of NGC-3115 was invisible. The drawing presented here was done at 299X.



Fred Rayworth: Observer from Nevada

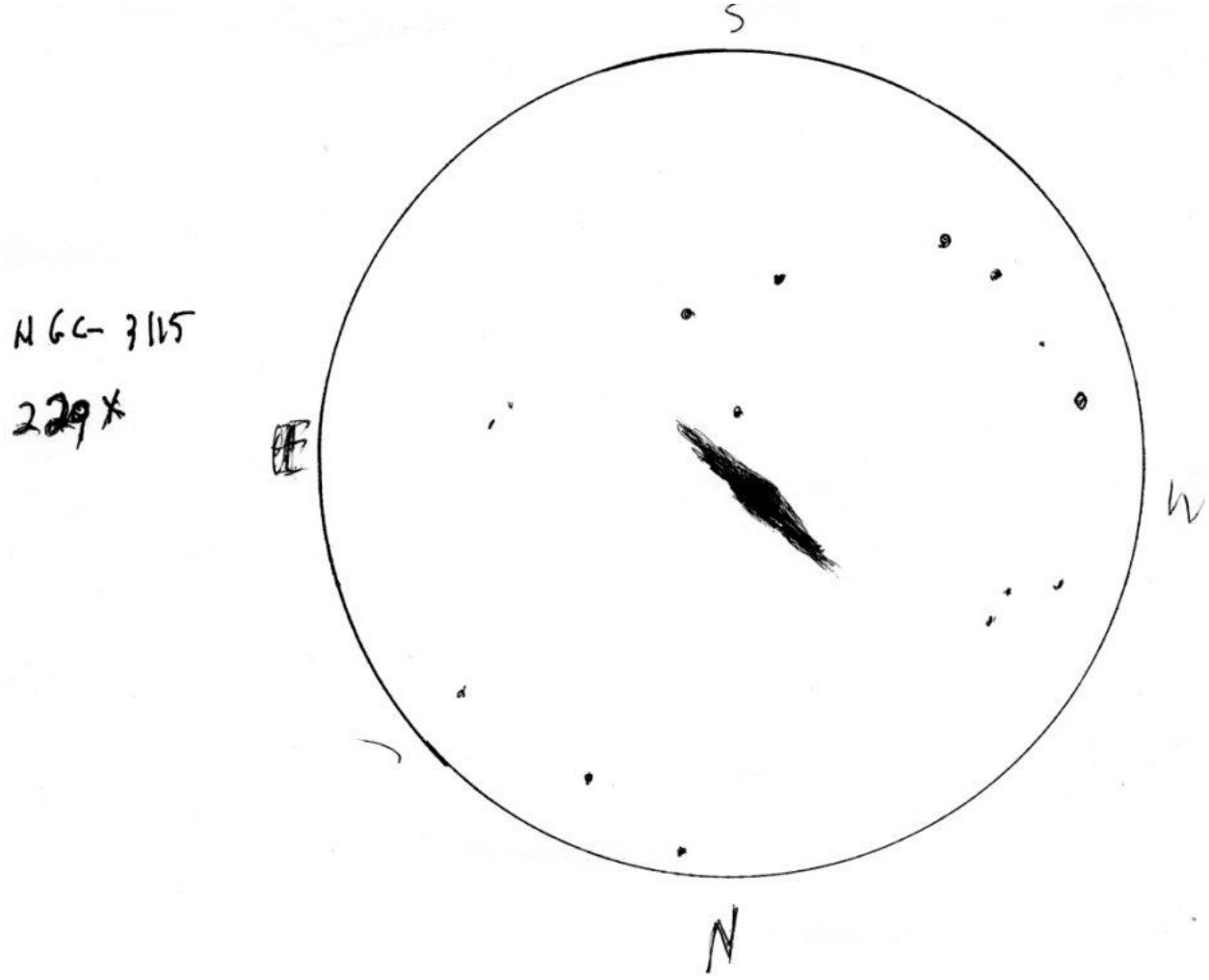
I had a chance to see it one time on May 7, 2005, which also happens to be the anniversary of the sinking of the *Lusitania*. This was the one time I tried observing from Nelson's Landing, a site nestled along the banks of the Colorado River downstream from Hoover Dam. At an elevation of 817 feet, it probably wasn't the best place to be. However, it was reasonably dark. The problem was the bugs and the wind.

At the time I still had my home-made 16" f/6.4 scope. After conditions calmed down, I found NGC-3115 and observed it at 70X. I saw a nice bright oval with a brighter core. It was quite elongated. It was also medium-sized compared to the other faint smudges I was spotting in the area. I didn't have much else to say about it as I didn't try any higher magnifications due to sky conditions and it didn't look all that interesting.

I'd wanted to take another crack at it under more favorable conditions and finally got a chance on May 12, 2012 from Redstone Picnic Area on the North Shore Road of Lake Mead. This time, I was using my 16-inch commercial f/4.5 Newtonian. At 102X, it was an oblong bright, fat disk with a bright, almost stellar core with the arms fading gradually at the ends. It appeared featureless outside of the brighter core. I noticed an interesting feature when I cranked the magnification up to 220X. The core seemed a bit brighter and because of the contrast between it and the wings, or arms of the rest of the galaxy, as I scanned it with averted vision, I got the impression of mottling or more accurately, something going on around the center of the

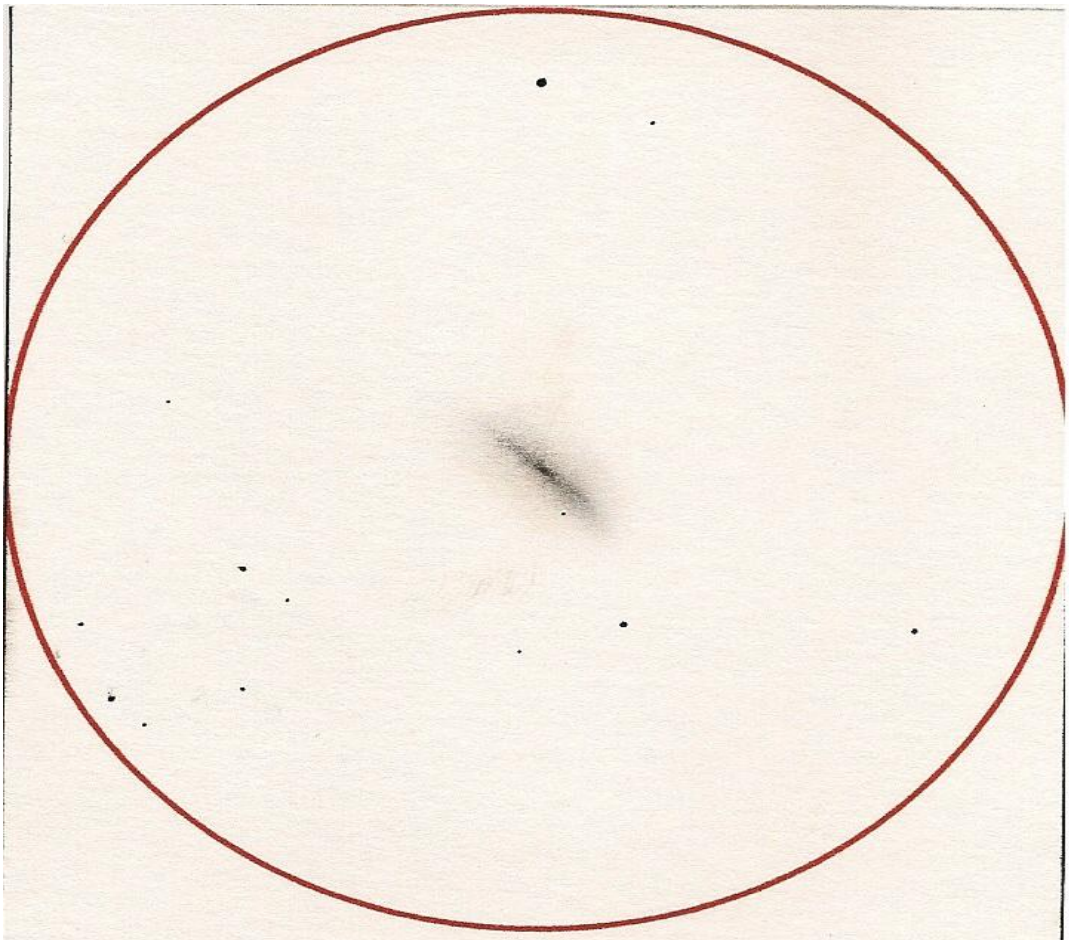
disk. I attribute this to an optical illusion as images taken by amateurs and even the Hubble have shown this galaxy to be practically featureless. It was still interesting to see this odd feature, though my observing partner that night didn't notice it.

On May 19, 2012, I had another chance to observe it from under slightly better conditions at Redstone (more stable skies but with low-level haze). This time, I tried up to 390X though that magnification didn't improve the view any. The galaxy still revealed the same bland bulging featureless narrow oval with a brighter almost stellar core. Backing off to 229X, I still got the impression of mottling around the core, though fleeting, and it appeared softer and disappeared completely with direct vision. This time I also tried to draw in a few nearby stars in my log book which I added to the drawing later (as well as the cardinal directions) which are all just approximations.



Brandon Doyle: Observer from New York

NGC-3115 is a brilliant galaxy in the constellation Sextans, which is normally in the southern sky this time of year. Being just a bit fainter than mag. 9, this is one very bright galaxy! It's definitely among the more intense objects I've seen at the eyepiece of my 10-inch. Fortunately, it was a warm night and I wasn't pressured for any reason to be getting in earlier than usual, so I had quite a bit of time to take in the sight. At 200X, this object appeared as an elongated streak in the field with a much brighter nucleus, and unfortunately, didn't put on much of a show when it comes to the details I've seen in other galaxies, i.e. spiral arms and/or a bit of structure or mottled detail. Close to the core, there appeared to be some granulated light, and I also noticed that the edge to the north stretched a bit further than the other side. This night, I was also able to sketch a few other objects that I checked out for the first time, including NGC-2683 and NGC-4790. Even while pointing my telescope at an object that was only about 30° above the horizon, I noticed how the field stars still resembled fine points, which was a testament of the good sky quality.



Object: NGC 3115 - Spindle Galaxy - LVDB

Date: 4 . 16 . 11 - Site: Backyard

Seeing: 1 : 10 - Transparency: 1.5 : 5

Constellation: Hydra

Type: Galaxy

Magnification: 200 X - AFOV: 38 ° - TFOV: 0.29 °

Eyepiece(s): Canon TMB Plan. II

Instrument(s): 10" Orion Intelliscope Dobsonian

Filter(s) Used: None

Artist(s): Brandon Layla

Start Time: 9 : 35 - End Time: 9 : 46

Wind Vel: 0 mph - Cloud Cover: 5 % -Temperature: 30 °F

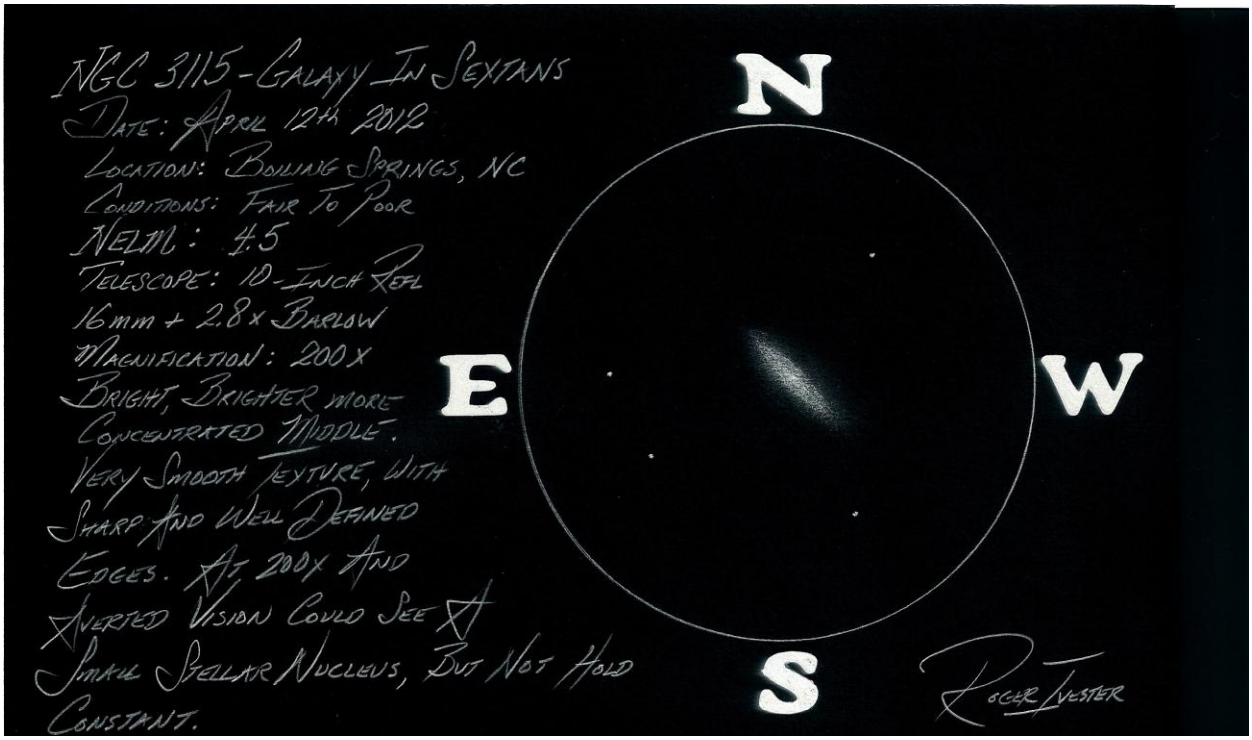
Wind Direction: ← - Orientation:

Description: Very thin & edgy. Slightly elongated edge to northern edge. Used star field

Roger Ivester: Observer from North Carolina

On April 12, 2012, I observed NGC-3115 from my moderately light-polluted backyard in Boiling Springs, North Carolina. The conditions were fair to poor with a NELM of 4.5. I used my 10-inch f/4.5 reflector, a 16mm and a 2.8X Barlow for a magnification of 200X.

The galaxy was bright, with a brighter more concentrated middle. It was highly elongated with a very smooth texture, and sharp well defined edges. When using 200X and averted vision, I could see a stellar nucleus, but couldn't hold it constantly. It was a beautiful and bright galaxy with high surface brightness. However, little detail could be seen with such an amateur scope. To many observers, there's little difference, from a visual perspective, when using a 3-inch scope versus much larger aperture. I'd have to agree.


NGC 3115 - Galaxy In Sextans
Date: April 12th 2012
Location: Boiling Springs, NC
Conditions: Fair To Poor
NELM: 4.5
Telescope: 10-Inch Refl
16mm + 2.8x Barlow
Magnification: 200x
Bright, Brighter more
Concentrated Middle.
Very Smooth Texture, With
Sharp And Well Defined
Edges. At 200x And
Averted Vision Could See
Small Stellar Nucleus, But Not Held
Constant.
N
E
W
S
Roger Lvester

Gus Johnson: Observer from Maryland. **NOTE:** On April 19, 1979, Gus Johnson, visually discovered Supernova 1979C in spiral galaxy M-100. NASA announced on November 15, 2010, there was evidence of a black hole as a result of this supernova explosion.

NGC-3115: Galaxy in Sextans

April 20, 1987: Smooth texture in an 8-inch @ 118X and I saw 3 stars in the southeast sector. Steve Lucas saw 2 stars with a 13-inch. Lens shape and not as wide in the 8-inch versus 13-inch.

April 22, 1992: Very smooth. I could see the galaxy very dimly with 8X50 binoculars. S&T Deep Sky Wonders, Walter Scott Houston could also see it in binoculars.

Jim Gianoulakis: Observer from Nevada

NGC-3115 is also known as the Spindle Galaxy as well as Caldwell 53. This galaxy is a lenticular (S0) galaxy and resides in the constellation Sextans. The galaxy was discovered by William Herschel on February 22, 1787. NGC-3115 is about 32 million light-years away from us and it is several times larger than our Milky Way. It is a lenticular galaxy because it contains a disk and a central bulge of stars, but without a detectable spiral pattern. It is seen almost exactly edge-on and was occasionally mis-classified as elliptical. There is some speculation that in its youth, it was a quasar.

Star formation:

NGC-3115 has consumed most of the gas of its youthful accretion disk. It has very little gas and dust left that would trigger new star formation. The vast majority of its component stars are very old.

Black hole:

In 1992 John Kormendy of the University of Hawaii and Douglas Richstone of the University of Michigan announced what was observed to be a super massive black hole in this galaxy. Based on orbital velocities of the stars in its core, the central black hole has mass measured to be approximately one billion solar masses. The galaxy appears to have mostly old stars and little or no activity. The growth of its black hole has also stopped.

In 2011, NASA's Chandra X-ray Observatory examined the black hole at the center. A flow of hot gas toward the super massive black hole has been imaged and that provided, for the first time, clear evidence for such a flow observed in any black hole. As gas flows toward the black hole, it becomes hotter and brighter. The researchers found the rise in gas temperature begins at about 700 light-years from the black hole, giving the location of the Bondi radius. This suggests that the black hole in the center has a mass of about two billion times that of the Sun, supporting previous results from optical observations. This would make NGC-3115 the nearest billion-solar-mass black hole to Earth.

About the photo: This RGB photo is a stack of 24 three minute exposures. Darks and flats were applied. The camera used was a QSI 583 WSG guided by a Lodestar guide camera using Maxim DL. The photo was taken with a 14" SCT at F7.7. This was first light for this combination and I have some work to do to master this setup. This was taken the night of May 6, 2012 with a full moon present.