MONTHLY OBSERVER'S CHALLENGE

Compiled by:

Roger Ivester, North Carolina

&

Sue French, New York

November 2021

Report #154

NGC 7662 Planetary Nebula in Andromeda

Sharing Observations and Bringing Amateur Astronomers Together

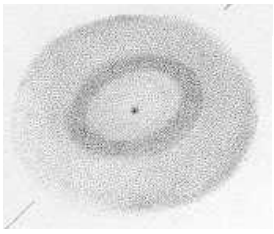
Introduction

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:

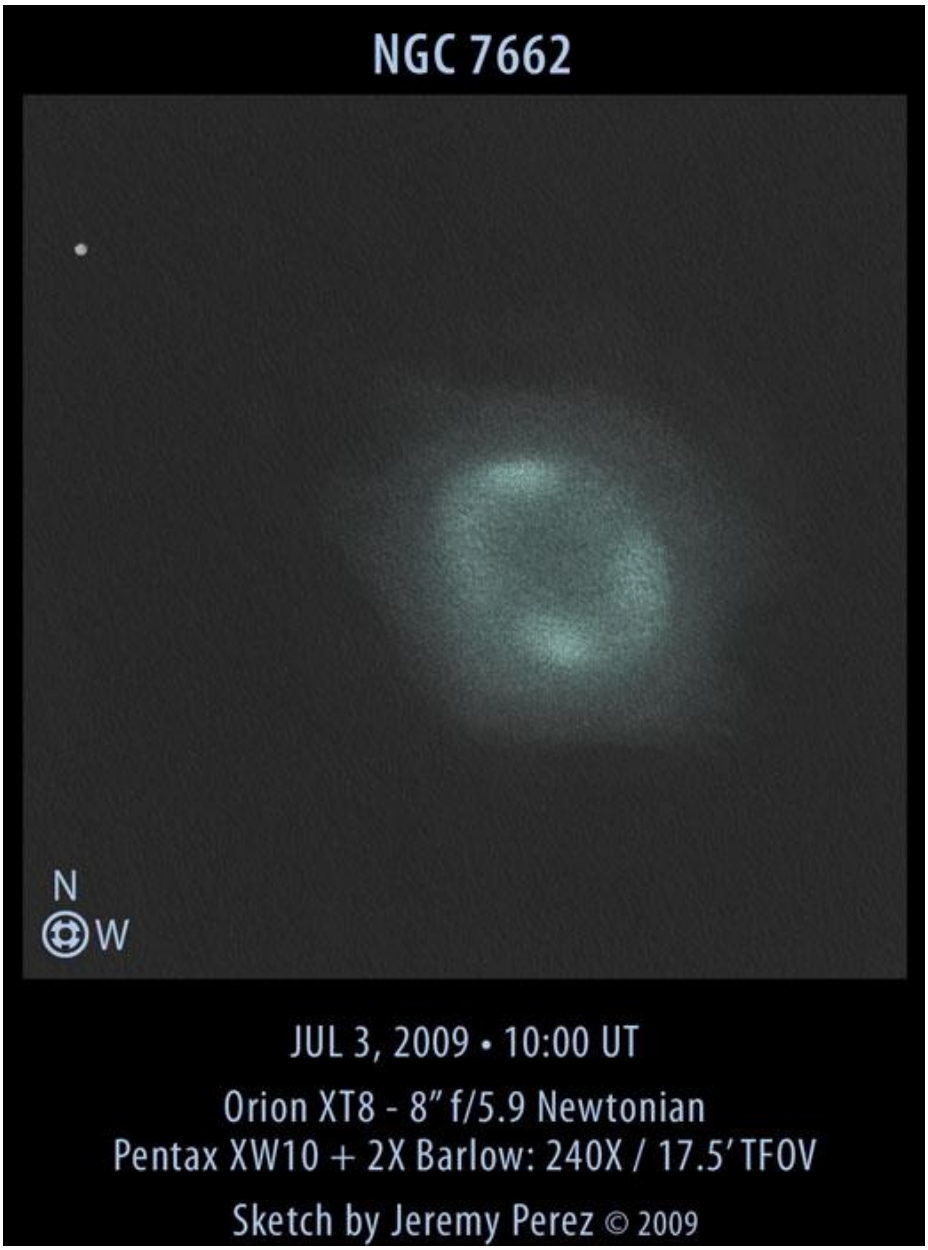
Commonly called the Blue Snowball, the planetary nebula **NGC 7662** dwells in the northern reaches of Andromeda. Its nickname springs from an article by Leland S. Copeland in the February 1960 issue of *Sky & Telescope* magazine. Copeland describes the nebula as "looking like a light blue snowball."

William Herschel discovered this nebula on October 6, 1784, with this 18.7-inch reflector. His journal entry reads: *A wonderful bright, round planetary pretty well defined disk, a little eliptical* [sic]*; perhaps 10 or 12″ diameter.* Another entry from October 3, 1790, endearingly states: *My planetary nebula. A very beautiful object, with a vS* [very small] *star following; giving one the idea of a large Planet with a vS satellite.* In his impressive new book, *William Herschel Discoverer of the Deep Sky*, NGC/IC researcher Wolfgang Steinicke credits William Herschel with 10 observations of NGC 7662.



William Lassell made this sketch from the view through his 48-inch reflector. It was published in the *Memoirs of the Royal Astronomical Society* in 1866, in which he also noted the nebula's bluish color.

Welcome to our new contributor.
Jeremy Perez: Observer from Arizona



I made this follow up observation of the blue snowball to get a more detailed look at structure for the October 2009 issue of *Astronomy Now*. The inner and outer shells possessed a soft, pentagonal shape. The inner shell was annular and had brighter condensations to the west, southwest and northeast. The outer shell appeared to have soft webs extending outward. As before, it possessed a beautiful blue-green color.

Object Information:

NGC 7662 was discovered by Friedrich Wilhelm Herschel in 1784. It is also cataloged as: PK106-17.1, H IV-18, h 2241, GC 4964, PN G106.5-17.6

Subject	NGC 7662
Classification*	Planetary Nebula (4(3))
Position*	Andromeda [RA: 23:25:53.93 / Dec: +42:32:06.1]
Size*	32" x 28"
Brightness*	8.3 vMag (9.2 bMag)
Date/Time	JUL 3, 2009 - 03:00 AM MST (JUL 3, 2009 - 10:00 UT)
Observing Loc.	Flagstaff, Arizona, USA - Home
Instrument	Orion SkyQuest XT8 (203 mm dia./1200 mm F/L)
Eyepieces/Mag.	Pentax XW10 + 2X Barlow (240X)
Conditions	Clear, calm
Seeing	6/10 Pickering
Transparency	~ Mag 5.8 NELM

Welcome to our new contributor.
Bertrand Laville: Observer from France

25-inch Obsession
Location: Observatoire des Baronnies Provençales
NELM Ursa Minor): 6.4
Duration of observation: 80 minutes
Object position: Alt: 73.5°, Az: 86.5°

890× Nagler 3.5mm without filter
The planetary is high and bright; the seeing is good and progressively becomes very good. Beautiful blue color. The inner ring requires attention, and the bending at the fracture is not seen, although it is known. The light concentrations at the periphery of the outer ring are well seen, with attention and knowledge of them. The central star is only suspected, and of the same color as the planetary.

390× Ethos 8mm without filter
It is with this configuration that I saw, but very difficult, the bending of the two "ends" to the right of the rupture of the internal ring. Central star is still only suspected.

390× Ethos 8mm/solar filter
The planetary has almost disappeared; the central star was glimpsed, difficult, but pure white.

150× Ethos 21mm without filter
The outer - outer ring is well seen. And I also perceive another ring, "external - external - external", very pale, circular, of almost 3′. (Note 2015 09 25: when I clean up my notes, I noticed that this ring, which I did not know existed, is clearly visible on the DSS image. (Moreover, the limits of this ring on my drawing correspond exactly to the limits of the DSS image !!!)

You can see more of Bertrand's sketches at: http://www.deepsky-drawings.com/

Uwe Glahn: Observer from Germany

First sketch: Detailed

Telescope: 20″ f/4.3 Newton

Magnification 620×

NELM: fst 6m5+

Seeing: II-III

Second sketch: Halo

Telescope: 27" f/4.2 Newton

Magnification: 172×

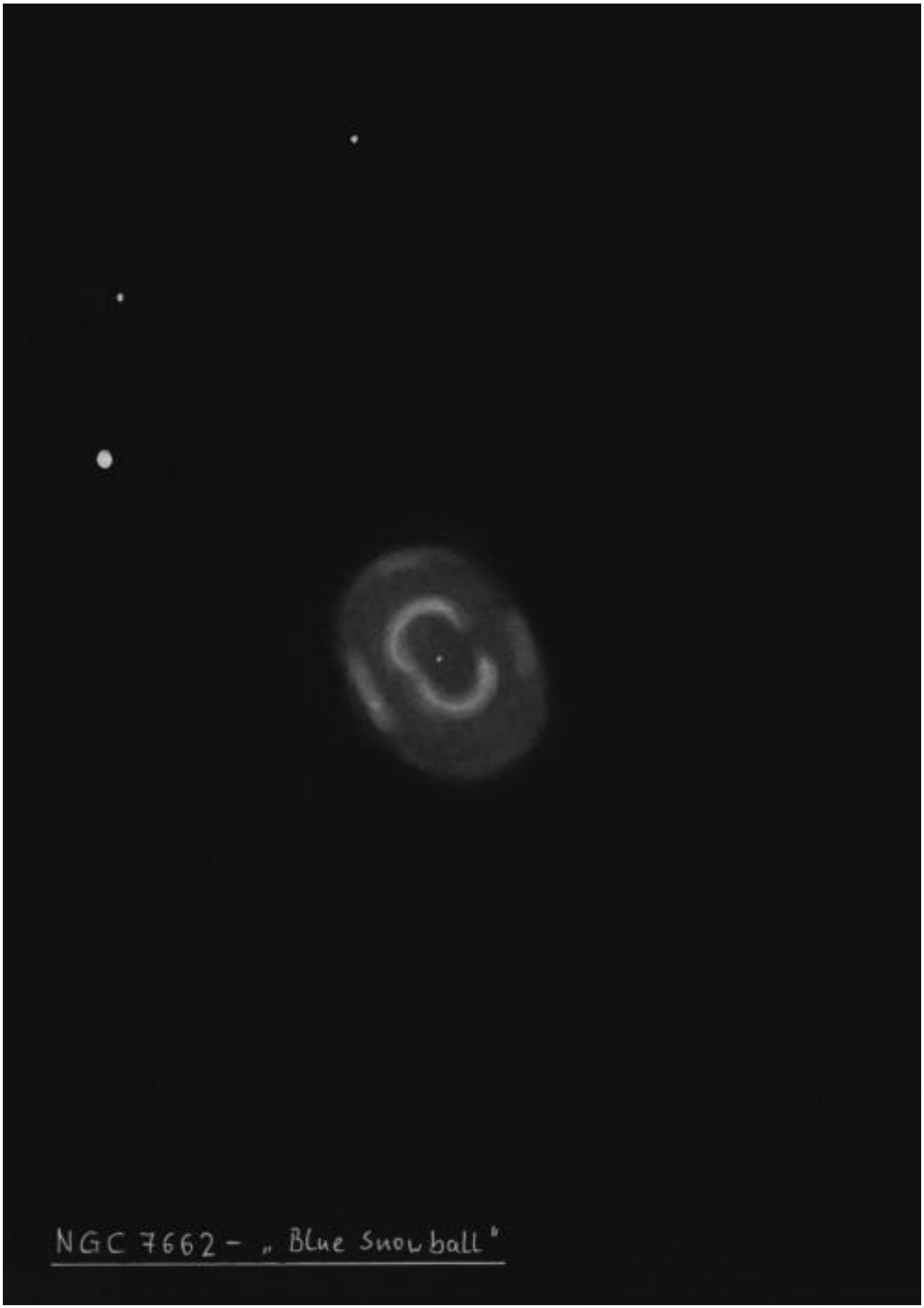
Filter: [OIII]

NELM: fst 6m5+

Seeing: III

Location: Sudelfeld

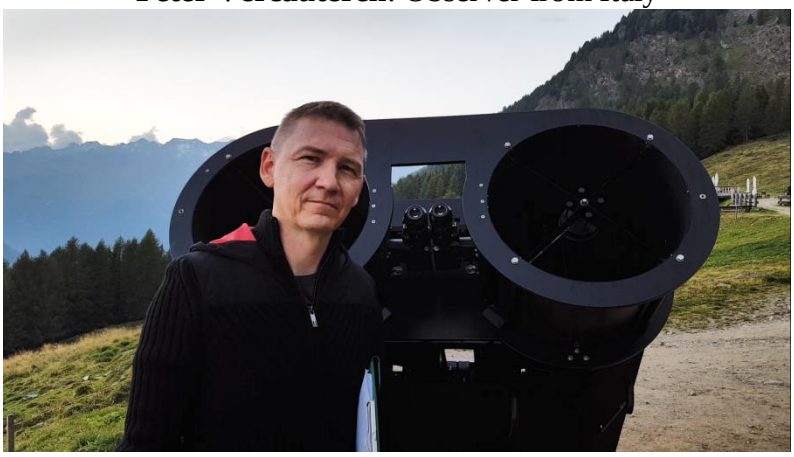
You can see more of Uwe's sketches at: http://www.deepsky-visuell.de/



NGC 7662 - „ Blue Snowball "


NGC 7662

Peter Vercauteren: Observer from Italy



The "Blue Snowball" (NGC7662) is one of the brightest and most easily visible planetaries on the northern hemisphere, and you can even spot it with a small telescope.

You can see more of Peter's sketches here: www.astronomydrawings.com

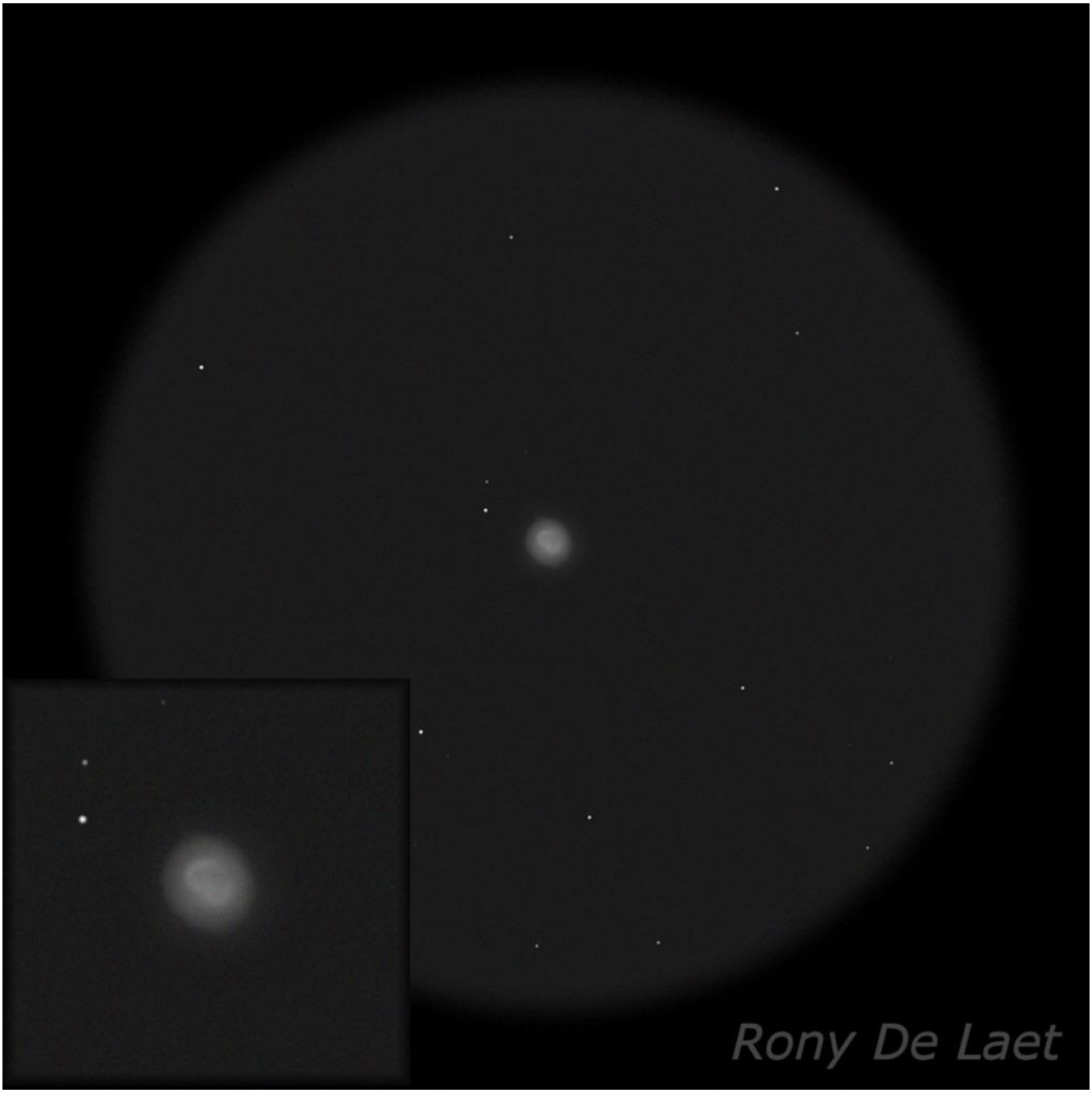
Rony De Laet: Observer from Belgium

NGC 7662 (Caldwell 22) is easily recognisable as a bright and slightly bluish planetary nebula in my lowest power eyepiece. But with increased power there is hardly any structure to be seen. Nor is the central star visible. The nebula appears bright but amorphous. I don't see any improvement with an OIII filter. I move over to my 3mm eyepiece. But even at 600× there is no trace of the central star. Although the limiting magnitude is near 15.2 in that part of the sky, the seeing is not cooperating. Back at 400× things start to look a little better. There is a hint of an central ring or better two opposite arcs: one brighter to the north-east and one dimmer to the south-west. While the arcs seem to connect to the south-east, the north-west side remains open. The core of the nebula appears off-centre due to a slightly darker patch near the open end of the arcs. There is a variety of light intensities within the central part of the nebula. It takes a lot of time to tease out any detail. Now back to the edges of this planetary. They too seem to harbour subtle arcs of light. I switch to 200× and put in the OIII filter. The planetary is embedded a weak elliptical halo, which is twice the size of the planetary.

Site : Bekkevoort, Belgium (51° N)

Date : November 10, 2021
Time : around 20:30 UT

Telescope : Taurus 16″
EP: Morpheus 9mm 76°, 200× / 6.5mm 76°, 280× / 4.5mm 76°, 400× / Omegon 3mm 55°, 600×
Filter : OIII or none
Seeing : 2/5
Sky brightness : 19.7 magnitudes per square arc second 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.

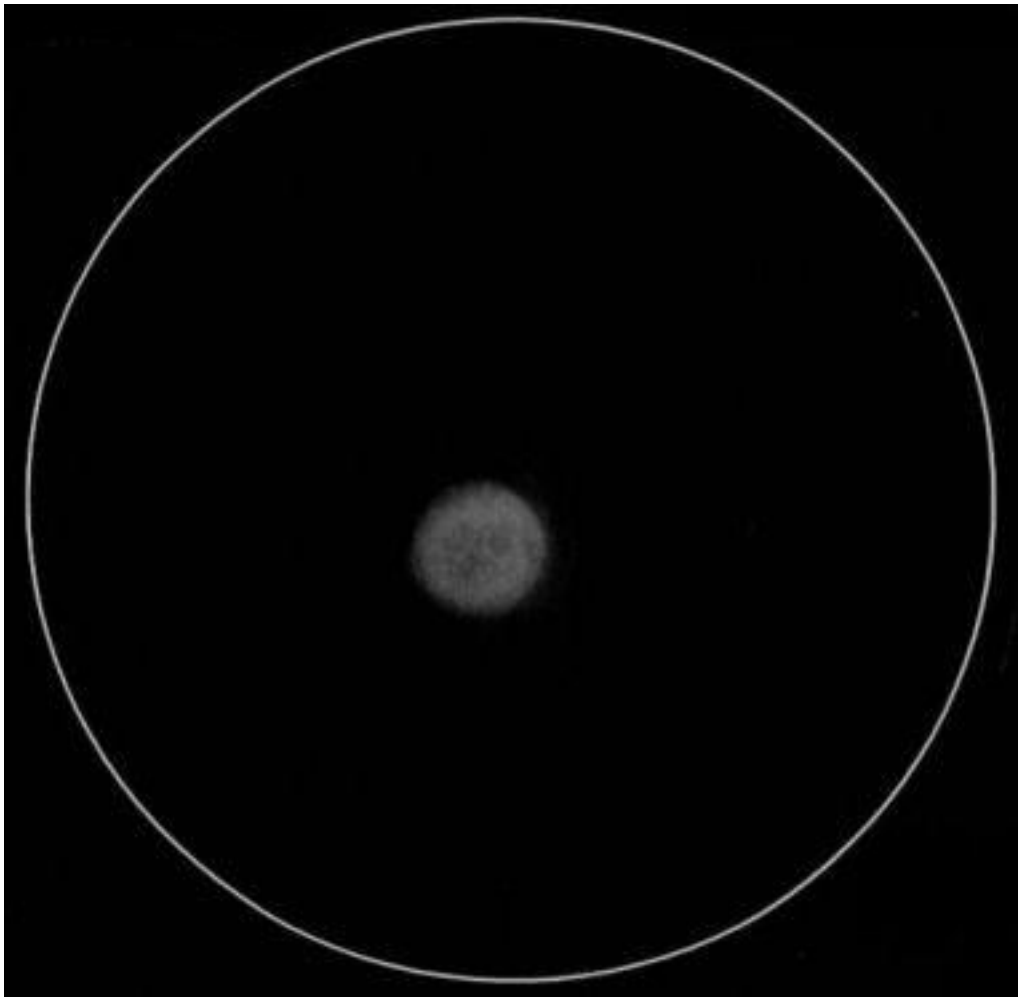

Rony De Laet

Jaakko Saloranta: Observer from Finland

Object: **NGC 7662**
Location: **Rajakylä, Vantaa**
Instrument: **203/1200 Newtonian**
Magnification: **380×**
Lim. Mag.: **4.27**
Seeing: **3**
Weather: **Clouds, fog, the whole sky is covered in crud!**

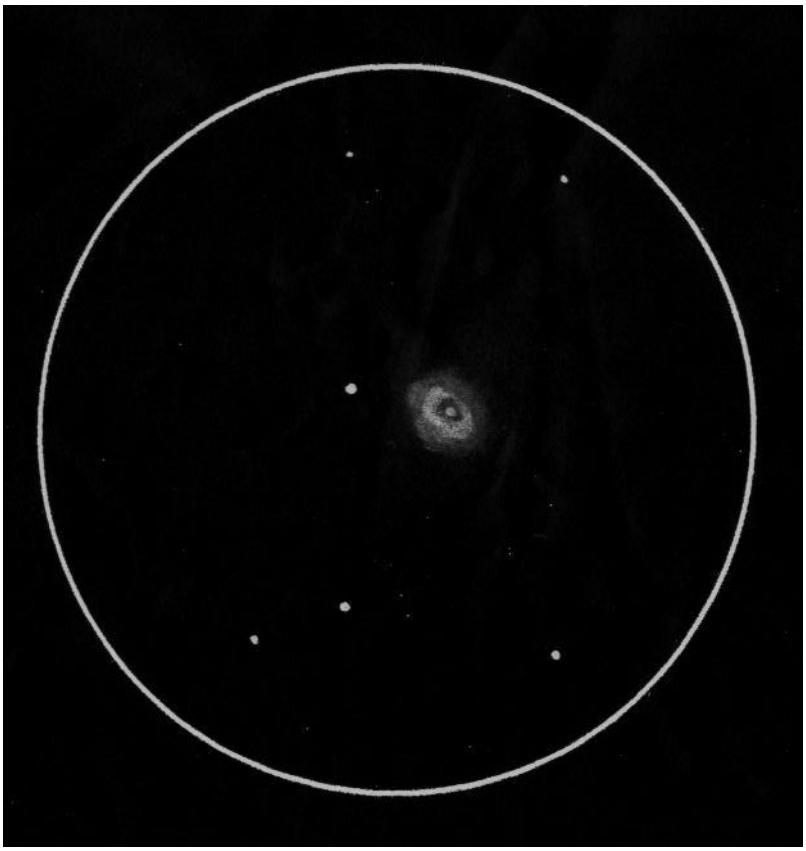
A very bright planetary with nice bluish disk with lower magnifications. The disk is somewhat elliptical, but still more round. 380× shows signs of ring-structure, but it is very difficult to see. No color with 380×, center a bit fainter.

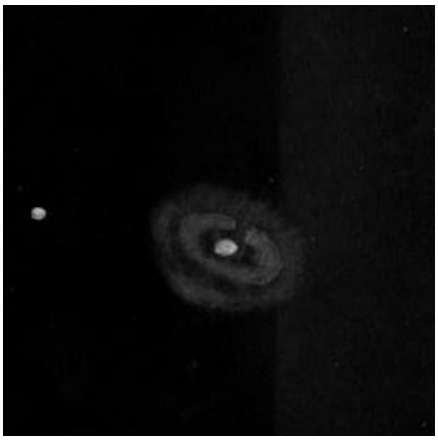
Sketch follows.



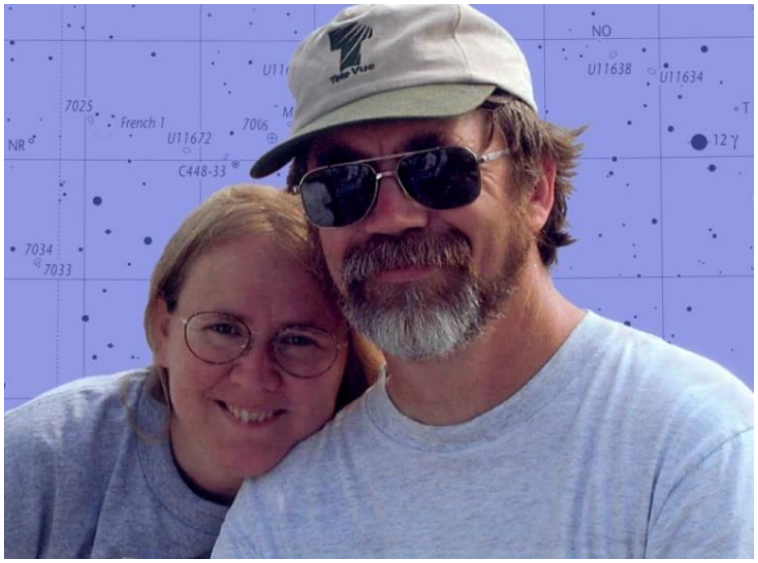
Dale Holt: Observer from England, 30 miles north of London

For NGC 7662 I used a 14-inch Newtonian reflector and a Watec 120N+ deep sky video camera with custom cooling. The camera is B&W and delivers its image in near real time, typically 15 sec exposure to a CRT monitor in my observatory office where I sketch from the screen. I put the 14-inc on NGC 7662 and set the Watec 120n vid cam to work. Wow what detail that thing shows each time you point it at old friends it shows them in a totally different light.

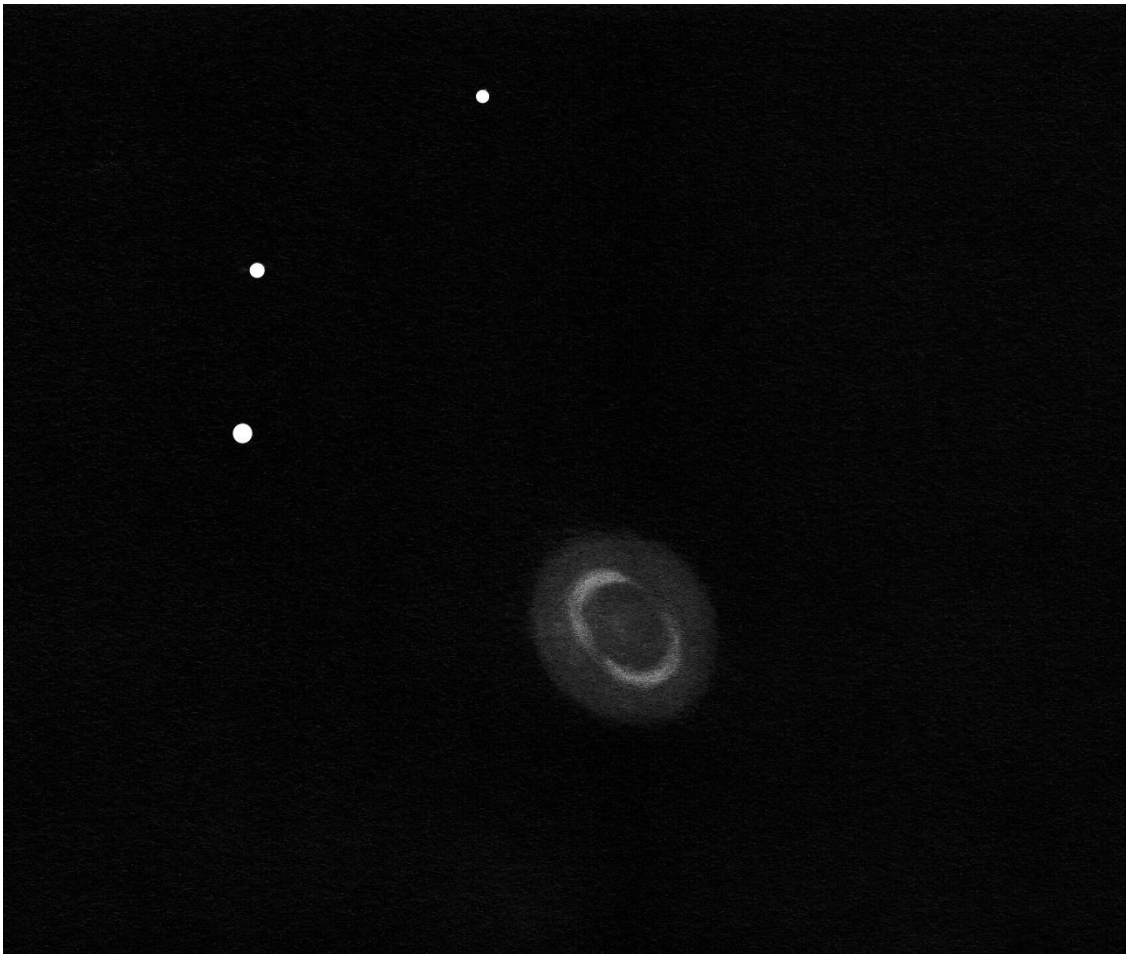




Sue French: Observer from New York



The Blue Snowball is readily visible as a very small, blue disk in my 130-mm scope at 23×. At 102× it appears annular with a somewhat dimmer fringe and interior. The nebula remains nicely blue and is a beautiful sight at 164×. The bright ring looks slightly oval northeast-southwest, and a 13th-magnitude star lies off its east-northeastern edge. NGC 7662 stays remarkably bright and blue even at 234×. The annulus seems irregular in brightness and more subdued in the northwest. My sketch shows the view of this stunning nebula through the 15-inch scope at 493×.



Glenn Chaple: Observer from Massachusetts

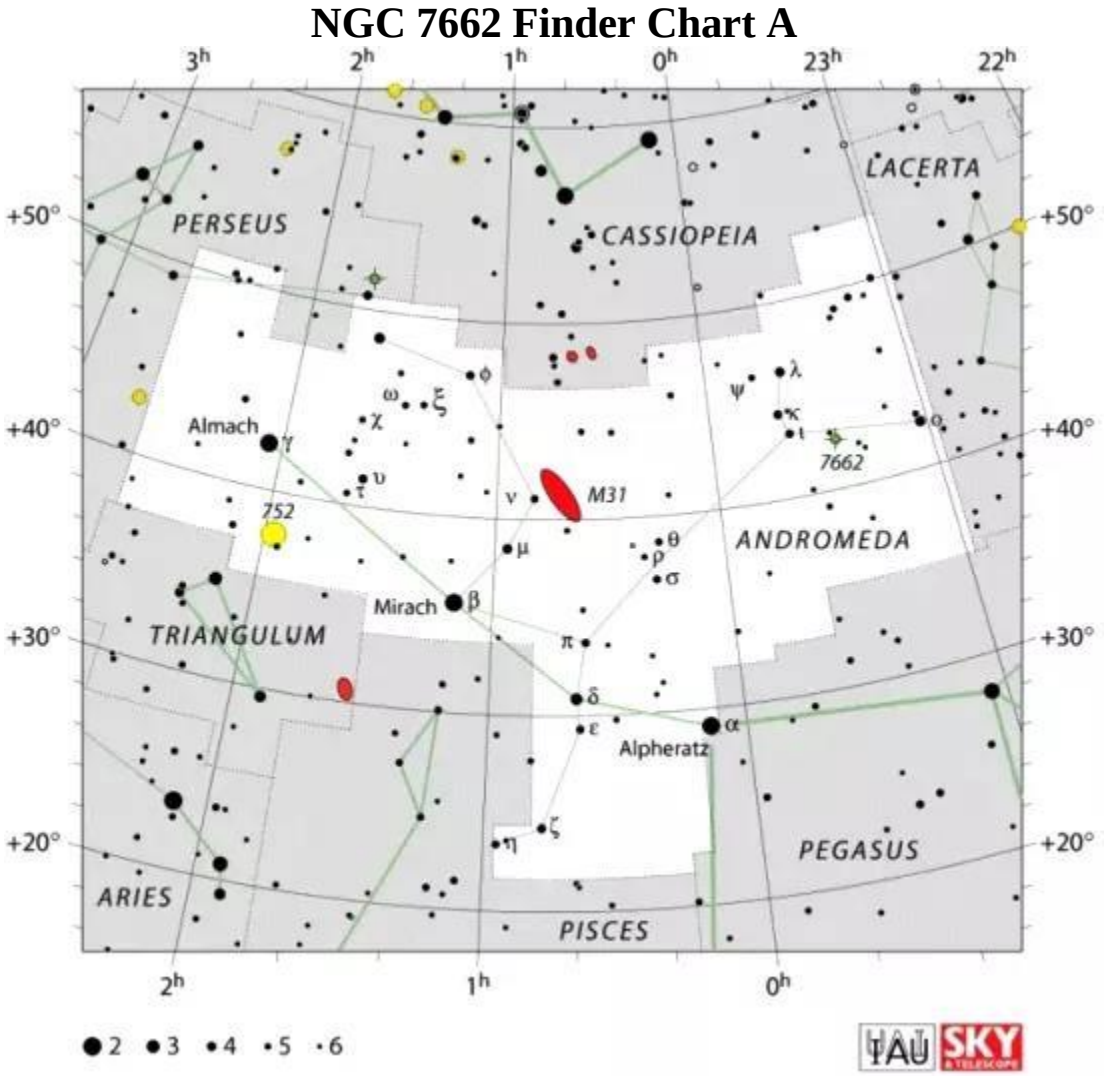
Last month's Observer's Challenge focused on NGC 6857, an emission nebula that astronomers once mistook for a planetary nebula. Our November Observer's Challenge, NGC 7662 in Andromeda, is a **bona fide** planetary nebula. It was discovered by William Herschel on October 6, 1784, one month after he found NGC 6857. At a magnitude of 8.3, NGC 7662 is a full 3 magnitudes brighter than NGC 6857. It's one of the brightest of all deep sky objects in its class, easily seen in a small scope. So what is its challenge?

If you're a novice backyard astronomer, even the brightest and easiest planetary nebula can test your developing observing skills. These objects are small and will appear stellar at low magnifications. Begin your NGC 7662 quest at "Frederick's Glory," a Y-shaped asterism in the northwest part of Andromeda (refer to Finder Chart A). Using a low-power eyepiece and Finder Chart B, start at iota (ι) Andromeda, the 4.3-magnitude star on the chart. From there, move 2 degrees westward until the 6th-magnitude star 13 Andromedae (the unlabeled star one-half degree northeast of NGC 7662) enters the field. Switch to a medium-power eyepiece (60× works fine) and sweep the area around 13 Andromedae until NGC 7662 comes into view as a small out-of-focus star. Center it in the field of view and switch to the highest magnification your telescope aperture and seeing conditions allow. Owners of GoTo scopes can "cheat" by punching in the celestial coordinates Right Ascension 23h 25m 54s, Declination 42° 32′ 6″ and slewing straight to the target.

Here's a fact about NGC 7662 that I haven't mentioned. It's noted for its blue color, hence the popular nick-name, the "Blue Snowball." I was unable to detect any color at all when viewing NGC 7662 with a 60mm (2.4-inch) refractor, but the color was vivid when I viewed it with an 18-inch Dob. What is the smallest aperture that will bring the "Blue Snowball" to light? For that matter, what is the smallest aperture that reveals its 13th-magnitude central star?

Challenge yourself by looking for NGC 7662 with binoculars. Using Finder Chart B as a guide, you should come across an 8th-magnitude "star" in the position indicated on the chart. Reasonably dark skies will be a must if you're working with standard 7×30s or (better yet) 7×50s.

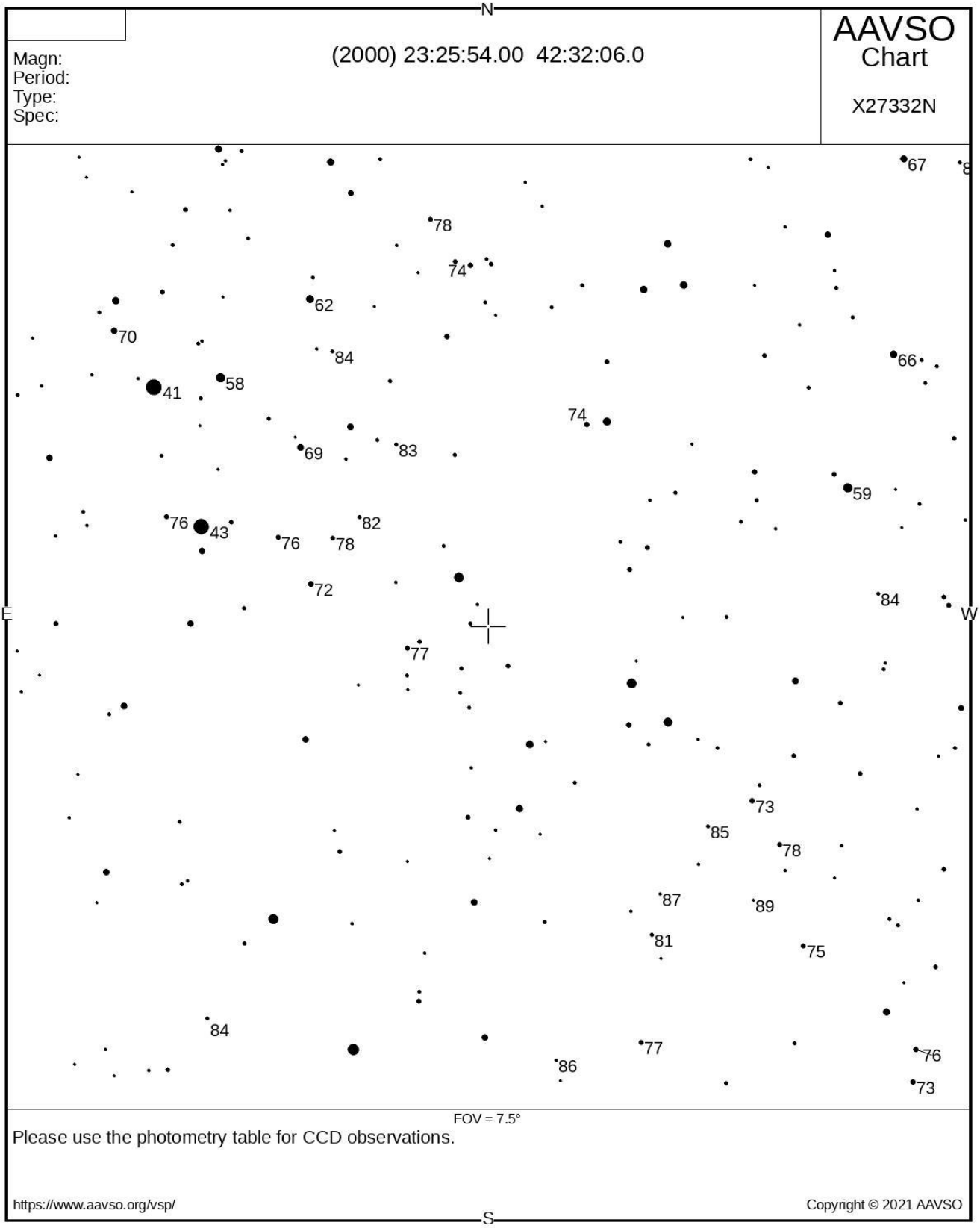
As is the case with many planetary nebulae, the distance to NGC 7662 is uncertain at best. Calculations fall between 1800 and 5600 light-light years. I'll settle on a figure of 2500 light years, given by NASA and the Universe Guide website (universeguide.com). The latter source includes an interesting table that shows the time needed to arrive at NGC 7662 by various means of travel. Light speed gets you there in 2500 years. The New Horizons Probe, which took 15 years to reach Pluto would require 51 million years. A Mach 2 jet airliner would reach its destination in a little over 1 billion years, while a speeding (120 mph) car would require nearly 14 billion years, not counting a lot of stops for gas!. Want to take a stroll to the Blue Snowball? If you leg it out at a 15-minute-per-mile pace, plan on around 420 billion years! I don't know about you, but I'm sticking to my backyard and a telescope.



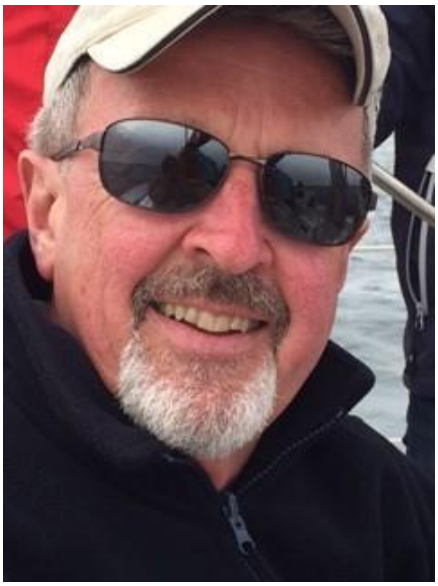
Using chart B, it was surprisingly easy to see with my 7×50 binocs. The limiting magnitude was 5, and the Milky Way was slightly visible. As for the blue color, I *thought* I could detect a slight bluish hue with my 4.5-inch Dob, but that could well have been the power of suggestion, as I already knew I was looking at the "Blue Snowball."

NGC 7662 Finder Chart B

Chart made using the AAVSO's Variable Star Plotter. Numbers refer to a star's magnitude, decimals omitted. Magnitude 4.1 and 4.3 stars are kappa (κ) and iota (ι) Andromedae, respectively. North is up in this 4 by 5 degree field. Stars shown to 10th-magnitude.



John Bishop: Observer from Massachusetts



NGC 7662 is a planetary nebula in Andromeda. It has a popular name, the "Blue Snowball." I have not observed this object in several years, so it was a good time to revisit.

I observed NGC 7662 on November 27, 2021, from the ATMoB Clubhouse in Westford, Massachusetts, with my 8.25 inch f/11.5 reflector, at magnification of 48× to 192×. I did not use any filters. The sky was clear; seeing and transparency were good for this location. Temperature was 25 degrees F. at 11:30 pm.

NGC 7662 is relatively easy to find. From Iota Andromedae proceed to 13 Andromedae. NGC 7662 is a short distance away, to the southwest. At low power, the object is non-stellar, a small, faintly blue sphere. The terms "planetary" and "Blue Snowball" truly fit here. Some have compared NGC 7662's image to that of Uranus. With increased power, the image is a solid, featureless gray disc. I did not see variations in the surface brightness that others have reported. At higher power, the disc is slightly out-of-round.

A fairly big, bright sphere with a hint of color.

Joseph Rothchild: Observer from Massachusetts

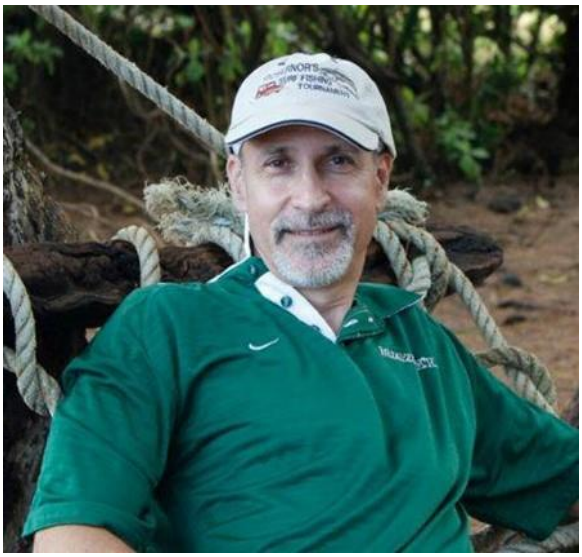
I observed NGC 7662, the Blue Snowball planetary nebula on November 8, 2021. It was easy to find near a naked eye asterism of 3 stars in Andromeda . The nebula is small, but has high surface brightness. I estimated that it was about 1/4 the diameter of M27 (Dumbbell nebula).

I observed with my 10″ reflector under dark skies at magnifications of 53×, 102× and 179×. The nebula takes magnification well, but I was unable to discern any internal structure. It was slightly eccentric and had a slightly bluish hue as its name implies.

Mario Motta: Observer from Massachusetts

Using NB filters through my 32-inch scope with SBIG STL 1001E camera, cropped and enlarged ×2 as it is a very small sized object, taken with 1 hour each of H-alpha, S3, and O2 filters.

James Dire: Observer from Illinois



NGC 7662, also known as Caldwell 22 and the Blue Snowball Nebula, is a magnitude 8.2 planetary nebula in the constellation Andromeda. The nebula lies 14.3 degrees west of the famous Andromeda Galaxy, M31. The nebula also lies 4.3 degrees east of the star Omicron Andromedae (mag. 3.64) and 2.3 degrees west-southwest of the star Iota (ι) Andromedae (mag. 4.28). The nebula is about 32 × 28

arcseconds in size, making it a challenge to image in small telescopes. But its great surface brightness is splendid for visual observation.

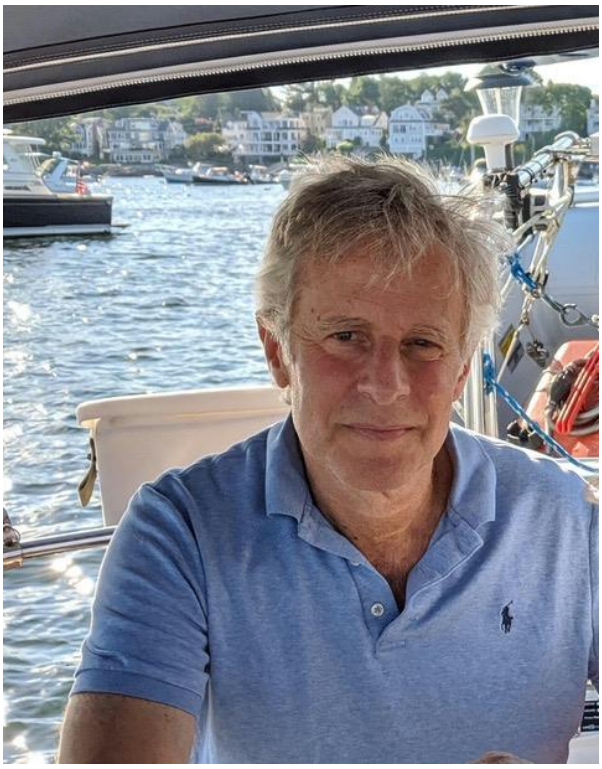
Like most planetary nebula, NGC 7662 formed when the central star began throwing off its outer layers as the star reached the end of its life on the main sequence. The nebula's distance is estimated to be around 1800 light-years away, making the nebula about 1.6 light-years in diameter.

In small telescopes the nebula may appear star-like at low powers with a slight blue color. Larger apertures at high magnification bring out its planetary nebula nature and its blue color is more striking. The largest amateur telescopes are able to resolve the central star.

My image of NGC 7662 was taken with a 132mm f/7 apo using an SBIG ST-2000XCM CCD camera. The exposure was 20 minutes. In the image, north is up and east to the left. The brightest star in the image, lying left of the nebula is SAO 53026, a magnitude 8.21, yellow-white F star. The next brightest star, to the upper left of the nebula is SAO 53017, a magnitude 8.81 red dwarf. The red dwarf appears brighter than the F star because the CCD camera is more sensitive to red light. The faintest stars in the image are magnitude 15.

The inset on the upper right of the image is a zoomed in view of the nebula from the original image. This view shows some of the lobe structure within the nebula. I was unable to resolve the central star with this small telescope.

Barry Yomtov: Observer from Massachusetts



The November challenge object is NGC 7662 (the Snowball Nebula). I had to get creative with my processing of this planetary nebula. Stacking such a small object that has a magnitude similar to the Ring Nebula (M57) yields a stacked image that becomes essentially "over exposed." Even when acquiring the individual images, I had to limit the exposure duration to 5 – 10 seconds. So, I stacked 99 images with an exposure of 10 seconds (17 minutes total exposure time) to reduce the background noise. Then I inserted a single image of the nebula which provides the detailed variations of the nebula's interior. Image was taken on October 6, 2021.

Roger Ivester: Observer from North Carolina

NGC 7662: Planetary Nebula in Andromeda

Date: December 25, 1997

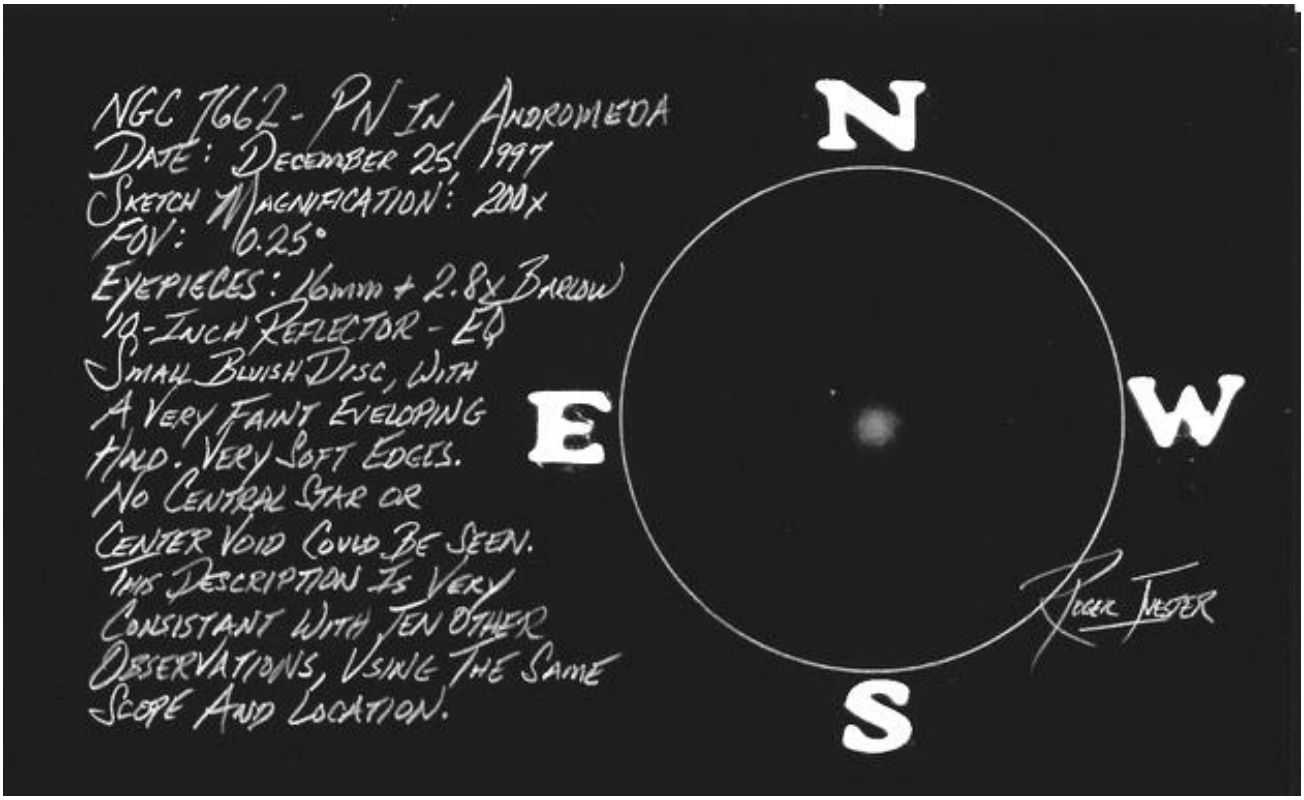
Telescope: 10-inch f/4.5 reflector and equatorially mounted

Sketch Magnification: 200×

Field-of-View: 0.25º

Small and bright blue disc, with a brighter more concentrated interior, and with a very faint outer halo. Very soft edges. No central star or void could be seen. This description is very consistent with ten other observations, using the same scope and location, over the past 30 years. No filter was used.

Sketch follows.



The following is the complete listing of all Observer's Challenge reports to-date.

https://rogerivester.com/category/observers-challenge-reports-complete/