MONTHLY OBSERVER'S CHALLENGE

Las Vegas Astronomical Society

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DECEMBER 2016

M74 (NGC-628) Spiral Galaxy In Pisces

Introduction

The purpose of the Observer's Challenge is to encourage the pursuit of visual observing. It's open to everyone that's interested, and if you're able to contribute notes, and/or drawings, we'll be happy to include them in our monthly summary. We also accept digital imaging. 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 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's the tradition we're stressing in the Observers Challenge. We're not excluding those with an interest in astrophotography, either. Your 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.

M74 (NGC-628) Spiral Galaxy In Pisces

M74, also known as NGC-628 and dubbed the "Phantom Galaxy", is a spiral galaxy located in the constellation of Pisces. It was discovered by Pierre Méchain in 1780. He, in turn, told Charles Messier about it who added it to his catalog of non-comets and it became Messier 74, or M74.

It lies about 32 million light-years away and contains around one hundred billion stars. Three supernovae have been identified within it. It's part of the M74 galaxy group that includes NGC-660 and 4-6 more obscure members. There's also a suspected black hole within it.

M74 has the second lowest surface brightness of all the Messier objects. Though it's not hard to see "something" through smaller instruments, to detect the spiral arms, it takes modest to larger instruments and superb observing conditions. The apparent mag. 10.0 is misleading. However, with the right conditions, an experienced eye and patience, one can eke out surprising results.

Observations/Drawings/Photos

Note: We'd like to welcome new Challenge participant Mike McCabe from Bridgewater, Massachusetts. Mike is a member of the Astronomical Society of Southern New England and the South Shore Astronomical Society. Welcome Mike!

Mike McCabe: Observer from Massachusetts

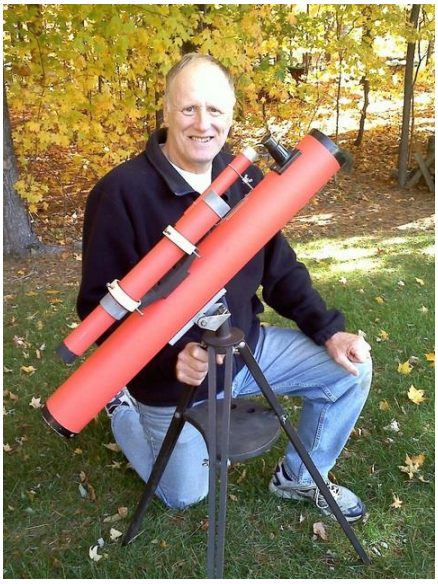
I took my first stab at M74 on Christmas night, December 25, 2016, using my old 12.5-inch Dobsonian. I was a little caught off guard by how dim it was, as I hadn't done any preliminary research on the object and had never tried to observe it before. They don't call it the Phantom Galaxy for nothing! Working at powers of 62X and 122X, I wasn't able to discern much about the object except that the core was definitely brighter than the minuscule amount of fuzz surrounding it. Even the view of M33, which was very nearby to M74, was showing structure in the spiral arms when I could hardly tell that M74 was in the eyepiece.

Two nights later, on December 27, 2016, I met up with a fellow observer and we set up his 18-inch Dobsonian to have a go at it. The transparency was variable, and at first, we had a bit of trouble even finding M74. We eventually did, though, and when the transparency was fair or better, we saw the core was other than round and occasionally, a hint of a spiral arm appeared below the core. As the evening wore on, the transparency deteriorated and we were forced to pack it in on this object.

We both agreed that this was one object that needed to be revisited under better conditions in order to be able to glean any significant detail. Our local skies provided about a mag. 4 naked eye limit, which definitely didn't help matters.

For us to see this object well, a road trip will be in order.

Glenn Chaple: Observer from Massachusetts



For backyard astronomers who tackle the annual Messier Marathon, M74 is a serious stumbling block. Even in December, when Pisces rides high in the south after evening darkness has set in, this face-on spiral galaxy is difficult to view. During Messier Marathon time in mid to late March, M74 is all but lost as it sets in the glow of evening twilight.

What makes M74 such a challenge is its low surface brightness. A mag. 9 galaxy shouldn't be difficult to observe, but when its light is spread over an area one-third the moon's apparent diameter, it becomes a phantom best saved for especially clear nights.

I've seen M74 in a 3-inch f/10 scope, but only with averted vision after knowing exactly where to look. A 3-inch f/6 rich-field scope captured both M74 and the mag. 3.6 star eta (η) Piscium, 1½° to its west-southwest. In both instances, I worked with a magnification under 40X. To me, M74 was large and roundish – a smaller version of M33 and M101. Even when viewed with my 13.1-inch f/4.5 reflector, M74 was a vague glow.

M74 was discovered by Pierre Méchain in the autumn of 1780. It lies an estimated 33 million light years from earth.

Gus Johnson: Observer from Maryland

In November, 1968, I observed M74 with a 6-inch reflector @ 59X. I saw a large glow, gradually brightening toward the center.

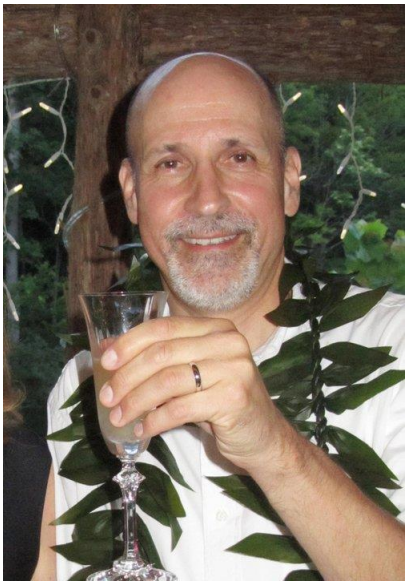
In October, 1979, using the same 6-inch reflector @ 59X, I observed a large, dim glow with low surface brightness, plus a sprinkling of a few faint stars.

In January, 1986 I used an 8-inch reflector @ 75X I saw it with a brighter center, still faint, mostly round halo with a pair of stars on the west side.

Mario Motta: Observer from Massachusetts

M74, taken with the 32 inch, 90 minutes total stacking of 10 minute subs, with SBIG STL 1001E.

Dr. James Dire: Astronomy Professor & Observer from Hawaii



M74 is a face-on spiral galaxy in the constellation Pisces. The galaxies lies 80 arcminutes east-northeast of the mag. 4 star Kullat Nunu, Eta Piscium. The galaxy is mag. 9 and 9.8X9.1 arcminutes in size. It was discovered by Messier's colleague Pierre Méchain in September, 1780 and verified by Messier in October, 1780.

It's classified as an Sc spiral galaxy. This means the core is relatively small in size. In the eyepiece, the core appears very star-like. The galaxy has two dominant spiral arms, each having minor branches emanating from them. Because it's face-on and diffuse, M74's spiral arms are very difficult to see. A 12-inch or larger telescope is required to see much more beyond the nucleus and a 16-inch or larger is required to see any structure in the spiral arms.

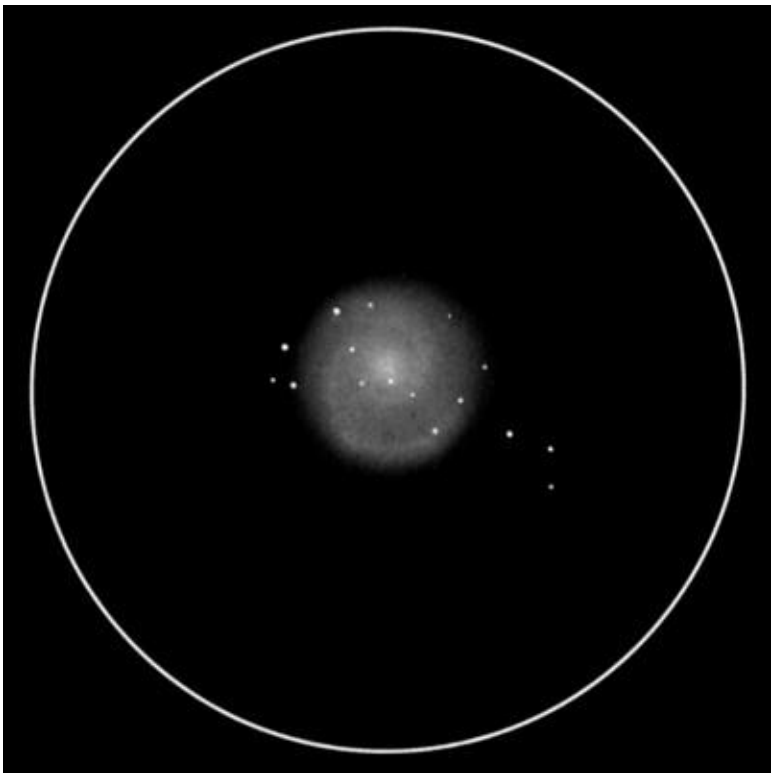
M74 is very similar in appearance to M33. However, it's located more than 15 times farther away. Were M74 as close as M33, it would be a naked eye galaxy rivaling M31 in brightness. It's thought to be very similar in size to our Milky Way Galaxy. The center of M74 is thought to contain an intermediate sized black hole possibly 10,000 solar masses in size.

My image was taken with a 190mm f/5.3 Maksutov-Newtonian with an SBIG ST-2000 XCM CCD camera. The exposure was 90 minutes. Note the numerous foreground stars scatter about the galaxy, some which can be seen in amateur telescopes.

Jaakko Saloranta: Observer from Finland

With a 3-inch reflector @ 64X, I observed M74. I saw a fairly bright, round halo of even brightness with a brighter nucleus.

With an 8-inch reflector @ 100X, it was bright, with a 2' nucleus surrounded by a round 8', faint, very diffuse halo. Details were very difficult to discern. I saw several mag. 12 - 14 supernova stars within the halo. They were easily visible, even with direct vision. However, they were invisible under urban skies.



Jay And Liz Thompson: LVAS Observers from Nevada

We observed M74 through a variety of telescopes ranging from 3-inches to 24-inches, and from both dark-sky and moderately light-polluted locations.

With a 16-inch from the edge of Henderson, NV, M74 was visible at 290X. It appeared as an indistinct round glow with a slightly brighter center.

Under dark skies, M74 was visible in a 3-inch Newtonian at 18X and a 90mm Maksutov at 40X. In both cases, M74 was faintly visible as a soft glow. Increasing aperture to 10-inches gave better views, with M74 exhibiting structure at 50X. At 100X through the 10-inch, we detected some spiral structure with averted vision.

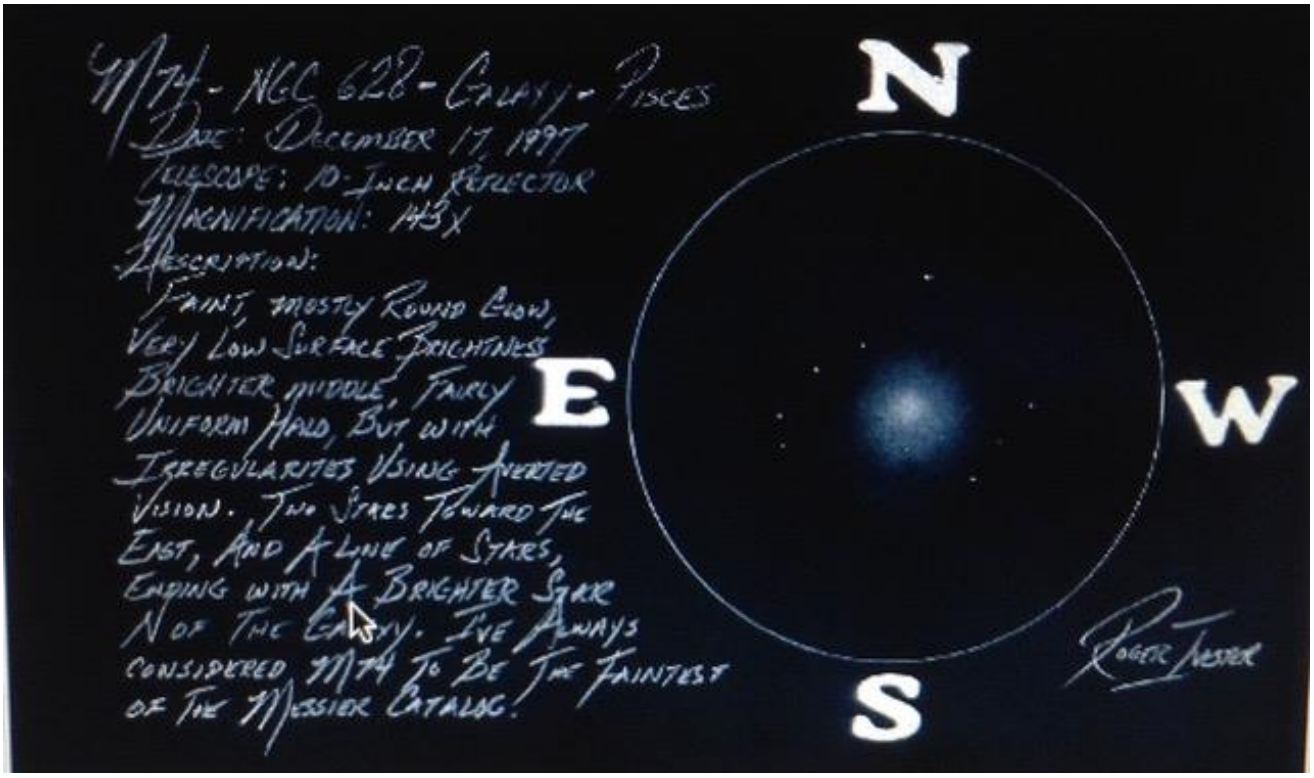
The best views were with the 24-inch under dark skies. M74 showed up as a reasonably evident smudge with good size at 116X, with a prominent, but small central area and a fairly large disk. At 152X, the disk appeared non-uniform with hints of spiral structure. At 277X, it showed up very well. With averted vision, we saw some spiral structure as well as embedded faint stars.

Roger Ivester: LVAS Observer from North Carolina

On December 17, 1997, I observed M74 with a 10-inch f/4.5 reflector at 143X. It was a faint mostly round glow, with very low surface brightness. It had a brighter middle, fairly uniform halo, but with irregularities using averted vision. I imagined a stellar nucleus. Two stars sat toward the east, and a line of stars ended with a brighter star north of the galaxy. I've always considered M74 to be the most difficult object in the Messier catalog (see sketch).

On November 10, 1999, I observed it with a 102mm (4-inch) f/9.8 refractor at 63X. It was very faint with extremely low surface brightness and a halo that faded very gradually outward. It had a brighter center, however, not well concentrated.

In November, 1995, I used a 4-inch f/10 Schmidt-Cassegrain at 63X. It was brighter in the middle with a faint, diffuse halo. The galaxy was mostly round with a brighter nucleus.


M74 - NGC 628 - Galaxy - Pisces
Date: December 17, 1997
Telescope: 10-Inch Reflector
Magnification: 143x
Description:
Faint, Mostly Round Glow,
Very Low Surface Brightness
Brighter Middle, Fairly
Uniform Halo, But With
Irregularities Using Averted
Vision. Two Stars Toward The
East, And A Line of Stars,
Ending With A Brighter Star
N of The Galaxy. I've Always
Considered M74 To Be The Faintest
of The Messier Catalog!
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Roger Hester

Fred Rayworth: LVAS AL Coordinator and Observer from Nevada

I've observed M74 many times over the years, documenting it ten times according to my database. My earliest observation was recorded in 1984 with my home-built 8-inch f/9.44 Newtonian up to my most recent earlier this month. For the Challenge, I'm using observations made in September and December of this year, 2016, with my commercial 16-inch Dobsonian, from 102X to 131X.

The first observation was on September 2, 2016 from Cathedral Gorge State Park in East-Central Nevada. At 4,800 feet, the night started a bit windier but clearer and a tad cooler than the previous night. I had to put the shirt and then, finally a coat on by 11:00. The skies were much clearer, though transparency was on and off. Maybe a few thick areas drifted by, but for the most part, it was pretty much overall clear.

M74 was a broad, medium-bright glow with a dense core at 102X. It was kind of dim due to being so low on the horizon. Could just make out the hint of something going on around the halo surrounding the core but the view was less than satisfying. The altitude and varying transparency didn't do it any favors.

The second observation was on December 3, 2016 from Redstone Picnic Area on the North Shore Road of Lake Meade Park just east of Las Vegas, Nevada. At 2,100 feet, it was very cool with a mild air movement. It was going to be really chilly soon and true to my prediction, that's exactly what happened! It was very clear and turned out to be a great night except the moon washed everything out until just after 20:00. By then, we had a good hour to get the really deep sky stuff. By 21:15, the breeze started to pick up and things got too uncomfortable so we quit. It was still a productive night.

At first, M74 was just a round blob with a concentrated core. However, the spiral arms came through after careful observing and averted vision, especially at 131X. The drawing is a composite, but mainly at 102X. Also, though I tried to note star positions, I didn't see anything particularly significant about any nearby stars. A few came close to touching the galaxy. In fact, a few seemed to twinkle within the outer reaches of the halo, but that was fleeting and not enough for me to mark their positions.