

Messier Objects

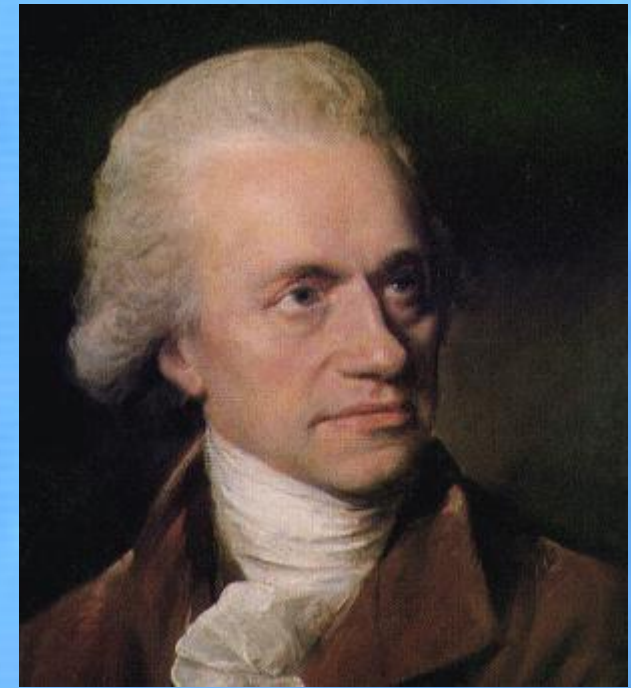
From the Stocker Astroscience Center
at
Florida International University
Miami Florida



The Messier Project

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- All images reduced and combined using MIRA image processing software. (Mirametrics)



Charles Messier

What are Messier Objects?

- Messier objects are a list of astronomical sources compiled by Charles Messier, an 18th and early 19th century astronomer. He created a list of distracting objects to avoid while comet hunting. This list now contains over 110 objects, many of which are the most famous astronomical bodies known. The list contains planetary nebula, star clusters, and other galaxies. - Bobby Martinez

The Telescope

The telescope used to take these images is an *Astronomical Consultants and Equipment (ACE)* 24-inch (0.61-meter) Ritchey-Chretien reflecting telescope. It has a focal ratio of F6.2 and is supported on a structure independent of the building that houses it. It is equipped with a Finger Lakes 1kx1k CCD camera cooled to -30°C at the Cassegrain focus. It is equipped with dual filter wheels, the first containing UBVRI scientific filters and the second RGBL color filters.



Messier 1

Found 6,500 light years away in the constellation of Taurus, the Crab Nebula (known as M1) is a supernova remnant. The original supernova that formed the crab nebula was observed by Chinese, Japanese and Arab astronomers in 1054 AD as an incredibly bright “Guest star” which was visible for over twenty-two months. The supernova that produced the Crab Nebula is thought to have been an evolved star roughly ten times more massive than the Sun. The gaseous nebula you see in this picture are the outer layers of that dying star that were ejected with speeds approaching 1,500 Km/sec. At the very center of the Crab Nebula is a relatively young pulsar, a rapidly rotating neutron star which emits pulses of radio radiation, in this case over 30 times per second.



Messier 2

Messier 2 is a globular cluster of stars which actually orbits the nucleus of our galaxy the Milky Way. It is currently located in the direction of the constellation Aquarius and is over 33,000 light years from Earth. Its brightness in our sky is about +6.3 magnitudes, very nearly visible to the unaided eye in a very dark sky. It probably contains more than 150,000 stars and is over 13 billion years old. It was first discovered in 1746, then rediscovered by Charles Messier in 1760. It is one of the largest globular clusters associated with our galaxy and its core is highly compressed: less than 4 light years in diameter. This image was taken on 8/21/2016 with the 24" telescope at the Stocker Astroscience Center.



Messier 3

M3 is a globular cluster of stars located in the direction of the constellation Canes Venatici. It is about 33,900 light years away from Earth and possibly contains about 450,000 stars. It is about 90 light years across and is thought to be over 11 billion years old. It was observed at the Stocker Astroscience center on 4/24/2016.



Messier 4

Messier 4, also known as NGC 6121 is a globular cluster in the constellation Scorpius. It was first discovered in 1745 by Phillippe Loys de Chesaux, and later catalogued by Charles Messier in 1764. Being one of the easiest globular clusters to find in the night sky, M4 was the first cluster in which individual stars were resolved. It is also notable for having a large amount of white dwarfs.



Messier 5

Messier 5, also denoted NGC 5904, is located 24,500 light years from Earth. It is over 165 light years in diameter and is thought to contain more than 200,000 stars. It is also thought to be an old cluster, over 13 billion years old. It was photographed at the Stocker Astroscience center on 7/7/2016.



Messier 6

Messier 6, or more commonly known as the Butterfly Cluster, is an open cluster of stars, first discovered by Giovanni Battista Hodierna in 1654. It is located about 1600 light years away in the constellation Scorpius.

Messier 6's brightest member, BM Scorpii, is an orange giant star, which contrasts the majority of hot, blue stars in the cluster.



Messier 7

Messier 7 is an open cluster of stars in the constellation Scorpius. It was discovered by Ptolemy in 130, so it is commonly known as Ptolemy's Cluster. The cluster is about 200 million years old, with a combined mass of 735 solar masses. With a declination of -34.8° , it is the southernmost Messier object.



Messier 8

This region, commonly called the Lagoon nebula, is actually a large area of ionized hydrogen. The nebula is thought to lie between 4000 and 6000 light years from Earth and it spans over about 100 light years. It contains many dark “Bok globules”. These globules and very cold regions undergoing gravitational collapse. Thus this is a star formation region. The image to the right was taken on 7/10/2016.



Messier 9

Messier 9 is a globular cluster in the constellation of Ophiuchus. Also known as NGC 6333, this cluster was first discovered by Charles Messier in 1764. It is one of the nearest clusters to the center of the Milky Way Galaxy with a separation of around 5,500 light years from the Galactic Core. It is also known for containing a variety of variable stars.



Messier 10

Messier 10, also designated NGC 6254, is a globular cluster.

Roughly 14,300 light years from the Earth, Messier 10 is located in the constellation Ophiuchus.

This cluster was first discovered by Charles Messier in 1764. M10 is known for having a large concentration of binary stars, especially in the core region.



Messier 11

Messier 11 is an open cluster in the constellation Scutum. It is more commonly known as the Wild Duck Cluster, because its brightest stars form a triangle which could resemble a flying flock of ducks. This cluster is one of the richest and more compact of the known open clusters, containing about 2900 stars.



Messier 12

Messier 12 is a globular cluster, first discovered in 1764 by Charles Messier. It is located in the constellation Ophiuchus, about 15,700 light years away. This cluster is known for having an unusually low number of low-mass stars. It is thought that they were stripped from the cluster by the gravitational influence of the Milky Way.



Messier 13

Messier 13, also called the Hercules globular cluster, is a globular cluster in the direction of the constellation of Hercules. It is located 22,000 light years from earth and it is roughly 145 light-years in diameter. It is composed of about 300,000 stars. This cluster was discovered by Edmond Halley in 1714 and catalogued by Charles Messier in 1764. Messier 13 can be barely seen with the naked eye and is easily viewed with small telescopes.



Messier 14

Messier 14, also known as NGC 6402, is a globular cluster of stars located in Ophiuchus. The total luminosity of the cluster is about 400,000 times that of the Sun. A total of 70 variable stars have been identified in this cluster. In fact, in 1983, a nova appeared, but it was not discovered until 1964, when the photographic plates from that time were studied.



Messier 15

The constellation Pegasus hosts this ancient 13 billion year old globular cluster. It is one of the oldest known globular clusters ever observed. It is 35,000 light years away from Earth and over 175 light years in diameter. The image presented here was taken on 8/21/2015 on the FIU campus. It has a mass of about 560,000 Solar masses. There is an estimated 30,000 distinct stars residing in the inner 22 light years of the cluster, not counting the stars around the edges. It contains 112 variable stars and at least 9 pulsars. M 15 was photographed at the Stocker Astroscience Center on 8/19/2016.



Messier 16

The famous “Eagle Nebula” has graced the pages of many magazines, newspapers, and even tabloids. The eagle nebula is an H II (singly ionized hydrogen) region in the constellation Canis Majoris (Big Dog). Embedded in the H II regions are clouds of cold dense gas where star formation is in progress. The inner most parts, where one sees the Eagle, contain the “pillars of Creation”, which are large fingers of cold gas undergoing gravitational collapse. The ultra high resolution Hubble space telescope image is perhaps the most reproduced astronomical image although many interpretations of what is depicted are incorrect. It is merely a star formation region in our galaxy. The imaged shown here is from the Stocker Astroscience center taken on 11/16/2016.



Messier 17

This star formation region is commonly called the Omega nebula, but has a host of other popular names like the Swan, Checkmark, or Horseshoe nebula. In the direction of the constellation Sagittarius, this nebula is over 5,000 light years away from Earth and contains an imbedded open cluster, NGC 6618, which provides photons to illuminate the surrounding gas. The image shown to the right is a combination of three images taken on 8/20/2016.



Messier 18

Messier 18, also designated as NGC 6613, is an open cluster of stars. Located in the constellation Sagittarius, this cluster is about 4900 light years away. Its age is estimated at 32 million years, making it relatively young. Messier 18 may be a binary cluster, paired with the open cluster NGC 668 which is harbored inside M17.



Messier 19

Messier 19 is a globular cluster of stars located 28700 light years away, in the constellation Ophiuchus. Messier 19 is one of the most oblate known globular clusters. It has a distinctly elongated shape in the north-south direction. However, the oblate appearance may not accurately reflect the cluster's physical shape because of the intervening dust and gas along the eastern edge of M19. The flattening is far less noticeable in infrared images.



Messier 20

Within the constellation of Sagittarius lies the Trifid Nebula, first discovered by Charles Messier on June 5 of 1764. It is 5,200 years away from Earth and spans about 40 light years in diameter. It's name means "divided into three lobes" due to being composed of an emission nebula, a reflection nebula, and a dark nebula. This nebula can easily be viewed with a small telescope, and hence is a favorite target for amateur astronomers.



Messier 26

Messier 26, also known as NGC 6694, is an open cluster in the constellation Scutum. It was discovered by Messier in 1764. M26 spans about 22 light years across and is at a distance of 5,000 light years from the Earth. An interesting feature of M26 is a region of low star density near the nucleus, which does not have a clear explanation yet.



Messier 27

Colorful M27, also called the Dumbbell Nebula, is a planetary nebula in the constellation Vulpecula. Charles Messier was the first to discover the object back in 1764. M27 is 1.36 thousand light years away from Earth. The object's magnitude is around 7.5, making this nebula visible with a low powered telescope during any clear autumn night. In the center of the nebula is a white dwarf star, which is the producer of the gas cloud that surrounds it.



Messier 29

Messier 29 was discovered in 1764 by Charles Messier who catalogued over 100 star clusters, nebulae, and galaxies. M29 is an open star cluster in the constellation Cygnus the swan. With an apparent magnitude of 7.1, the cluster can be seen with binoculars or a low-power telescope. It is considered to be relatively young at an age of only 10 million years old. Located 4,000 light years away, M29 contains eight extremely noticeable stars, five of which are classified as B0. This means that, placed one astronomical unit from the Earth, any of those five stars would be 160,000 times brighter than our Sun!



Messier 30

Messier 30 is a globular cluster of stars within the Milky Way and visible in the constellation of Capricornus. It is 27,000 light-years away from Earth and spans 90 light-years across. M30 is easily visible with a pair of binoculars. Its brightness is a result of a core collapse, which also makes it one of the densest regions in the Milky Way. Strangely, the M30 orbits the Milky Way in the opposite direction compared to other clusters, suggesting that it may have formed in another (relatively) nearby galaxy.



Messier 31

Messier 31 is also known as the Andromeda galaxy. This galaxy is the largest galaxy in our local group and lies just 240 million light years away and can be seen with the unaided eye in the northern sky at a dark site. Measurements of the speed of this galaxy relative to our own Milky Way indicates that it is moving toward us at about 300 km/sec. It is much larger than our own galaxy weighing in at 1.5 trillion Solar masses compared to our measly 850 billion solar masses. By observing variable stars in this galaxy, astronomers first concluded that we live in only one galaxy, and there are untold billions of other galaxies out there. This first revealed the size and expanse of the cosmos to humankind. (photographed on 11/09/2016 by Michael Smith and Dr. Webb).



Messier 32

This small dwarf elliptical galaxy is a companion to M31, the large spiral galaxy in Andromeda. It is actually orbits M 31 and its estimated mass is about 100 million Solar masses with a central black hole of at least 1.5 million Solar masses. Its diameter is thought to be about 6,500 light years at the widest part and contains lots of low mass stars and virtually no gas and dust.



Messier 33

Messier 33 is a spiral galaxy, known as the Triangulum Galaxy, that is located within the constellation Triangulum.

Roughly 3 million light years from Earth, this galaxy spans about 60,000 light-years in diameter and has roughly 40 billion stars. Comparatively, our Milky Way galaxy is about 100,000 light-years in diameter and has about 100-400 billion stars. The Triangulum Galaxy is one of the most distant objects that can be viewed with the naked eye.



Messier 34

Messier 34 is an open star cluster that is located within the Perseus constellation. Charles Messier catalogued this cluster in 1754. It spans roughly 14 light years across and is about 1,500 light years from Earth. It can be viewed very faintly with the naked eye assuming one is far from city lights. Otherwise, binoculars are needed at the very least.



Messier 35

Messier 35 is a loose open cluster of stars that is located in the constellation Gemini. It was first discovered by Phillippe Loys de Cheseaux in 1745 and again, independently, by John Bevis in 1750. It is about 2,800 light years from earth and spans about 11 light-years across.



Messier 36

Messier 36 is an open star cluster located within the Auriga constellation. It was first discovered by Giovanni Batista Hodierna sometime before 1654. It is roughly 4,100 light-years from Earth and spans 14 light-years in diameter.



Messier 37

Messier 37 is an open star cluster that can be located within the constellation of Auriga. It is about 4,500 light years from Earth and spans over 20 light-years in diameter. It's first known discover was by Giovanni Battista Hodierna before 1654 and was independently rediscovered by Charles Messier in September of 1764.



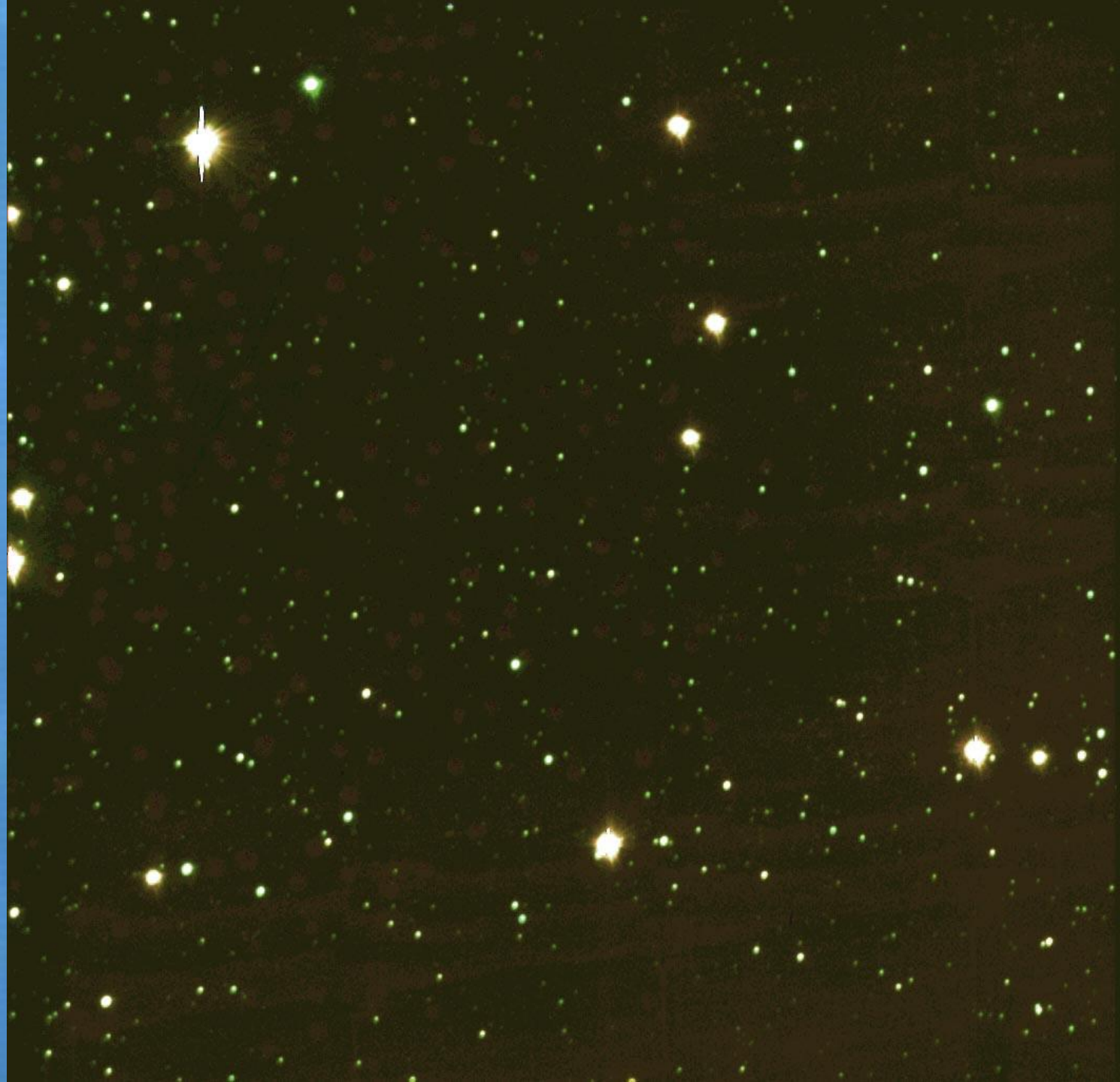
Messier 38

Messier 38 is an open star cluster and one of the three clusters found in the constellation Auriga. It is about 4,200 light years from Earth and spans 26 light years in diameter. Much like Messier 36 and 37, Messier 38 was first discovered by Giovanni Batista Hodierna sometime before 1654.



Messier 39

Messier 39 is a nearby open cluster of stars only 800 light years away. The cluster is thought to be only 200 to 300 million years old. It is in the constellation Cygnus and is much larger on the sky than the image to the right. We photographed just the inner 50% of the extended cluster. The images were taken on 11/06/2016 from the Stocker Astroscience center by Dr. Webb using the ACE 24" telescope and the FLI camera. The RGBL images were reduced in Mira, color combined, then processed in photoshop elements by Dr. Webb.



Messier 40

Messier 40, also known as Winnecke 4, is a double star that is located within the constellation Ursa Major. It was discovered by Charles Messier in 1764 while searching for a nebula supposedly in the area. Unable to locate the supposed nebula, Messier instead documented this double star. The stars are about 510 light-years away from Earth, though measurements over the year between the stars suggest that they are an optical double star rather than an actual binary star system.



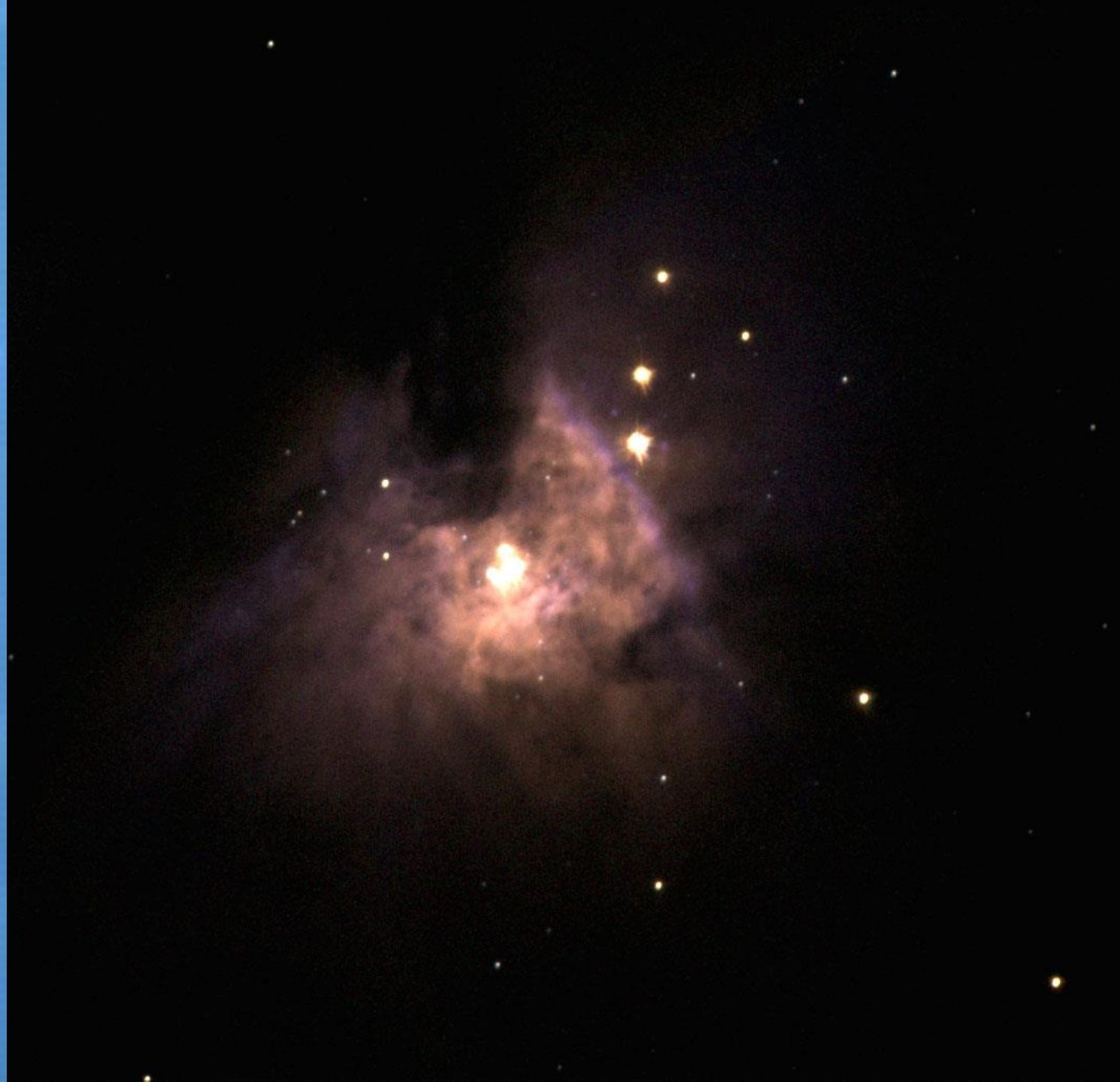
Messier 41

Messier 41 is an open cluster discovered by Giovanni Batista Hodierna before 1654. At a distance of 2300 light years, it is located in the constellation of Canis Major. It contains about 100 stars including several red giants and a number of white dwarfs. It is estimated to be 190 million years old, and cluster properties and dynamics suggest a total life expectancy of 500 million years for this cluster, before it will have disintegrated.



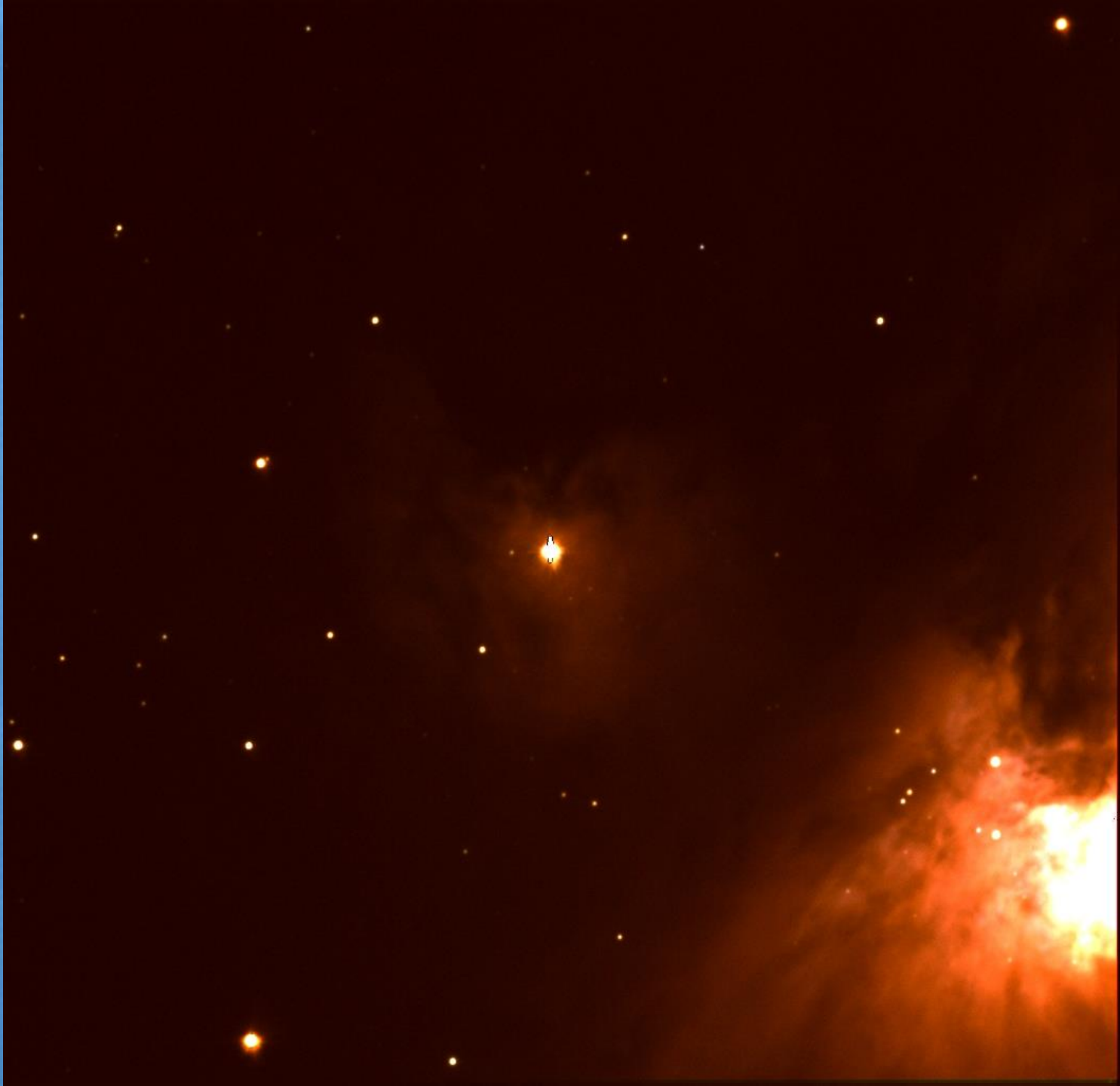
Messier 42

The Orion Nebula, also known as Messier 42, is a diffuse nebula located in the Orion constellation. M42 is 1,600 light years away and is visible to the naked eye on a very dark night with excellent conditions. M42 is a center for star formation and contains a visible open star cluster. The younger and brighter stars are only 30,000 years old, which is very early in the life of a star. The nebula's four brightest stars, all known as "The Trapezium," lie at the center of the cosmic cloud.



Messier 43

M43 is an HII region (ionized hydrogen) associated with the Orion Nebula and separated from the main nebula by a lane of dust. The bright star in the center is NU Orionis. The star is a highly variable, young cool star that lights up the nebula causing it to glow. The images were taken in RGBL filters with the Stocker 24" telescope on 1/25/2016.



Messier 44

Messier 44, more commonly known as the Beehive Cluster, is an open cluster in the constellation Cancer. It is one of the nearest open clusters to the Solar System, at a distance of 577 light years. In 2012, two planets which orbit separate stars were discovered in this cluster. These were the first planets detected orbiting sun-like stars in stellar clusters.



Messier 45

Messier 45, also known as Pleiades or the Seven Sisters, is an open cluster located in the constellation Taurus. This cluster is dominated by hot blue stars, up to 14 of which can be seen with the naked eye. It also contains many brown dwarfs, which may make up about 25% of the total population of the cluster. M45 will take about 250 million years to disperse. The most prominent star in the image is Alcyone, a B-type giant.



Messier 46

Messier 46 is an open cluster discovered by Charles Messier in 1771. Located in the constellation Puppis, it is about 5400 light years away. There are an estimated 500 stars in the cluster, and it is thought to be some 300 million years old. It contains a superimposed planetary nebula, NGC 2438.



Messier 47

Messier 47 is an open star cluster that is located within the constellation Puppis. It is 1,600 light years away from earth and spans about 12 light years in diameter. It was first discovered by Giovanni Batista Hodierna before 1654 and again independently by Charles Messier in 1771. However, Messier's coordinates were slightly incorrect, so this cluster was again independently under the name NGC 2422. Messier's error was not fully understood until 1959, and had been considered a lost Messier Object.



Messier 48

Messier 48 is an open star cluster located in the Hydra constellation. Also known as NGC 2548, this cluster is about 300 million years old. Although Charles Messier first discovered this object in 1771, the declination he gave for the cluster was five degrees off, so credit for discovery is sometimes given to Caroline Herschel in 1783. Under good atmospheric conditions, Messier 48 is visible to the naked eye.



Messier 49

Messier 49 is an elliptical galaxy located about 56 million light years away in the constellation of Virgo. This galaxy was first discovered by Charles Messier in 1771. Although its physical form suggests that it is a radio galaxy, Messier 49 only has the radio emission of a normal galaxy. Also, the nucleus of M49 is emitting x-rays, suggesting the presence of a supermassive black hole in the center of the galaxy.



Messier 50

Messier 50, also known as the Heart-Shaped Cluster, is an open cluster discovered by Cassini around 1710. Located in the constellation of Monoceros, it is about 3200 light years from Earth. The estimated age of M50 is 78 million years, making it a very young cluster. It stretches across 20 light years of space.



Messier 51

The Whirlpool galaxy, more formally referred to as the M51, is a grand-design spiral galaxy in the constellation Canes Venatici. It is one of the most visible galaxies, requiring only binoculars to see, and is roughly 23 million light years away from earth. Its companion (the orange-yellow blob below it) is NGC 5195, a dwarf galaxy, connected to it by a tidal bridge. One of the “stars” on the upper right part of the galaxy is actually a supernova (SN 2011dh), recently discovered in 2011.



Messier 52

Messier 52 is an open cluster of stars located in the constellation Cassiopeia. Open clusters are clusters of stars found in or near the disk of our galaxy, the Milky Way. Astronomers think they were all born at roughly the same time out of the same gas cloud. In the case of M52, there could be as many as 193 members, the brightest as seen from Earth is 11th magnitude. Stellar density estimates indicate there are about 3 stars per cubic parsec in the center of the cluster. Some estimates place its age as only 35 million years old, that's young given the Earth is nearly 4.8 Billion years old! It is about 5,200 (+/- 2000) light years away. This distance is uncertain since there is a fair amount of dust and gas between us and the cluster complicating distance estimates. This image was created by combining RGBL images taken with the FLI CCD camera and the ACE 24" telescope at the Stocker Astroscience center on 11/06/2016 by Dr. Webb. The data reduction and color combination, also by Dr. Webb, left some streaks across the top of the image that are not real and are the result of faulty flat field images.



Messier 53

Messier 53 is a globular cluster located in the constellation Coma Berenices. It was discovered by Johann Elert Bode in 1775. Messier 53 is one of the more outlying globular clusters, being located 58,000 light years from Earth and 60,000 light-years from the Galactic center.



Messier 55

Messier 55 is a globular cluster discovered by Nicolas Louis de Lacaille in 1752. Just like other Milky Way globular clusters, M55 has a low abundance of metals, with an abundance equal to 1.1% of the proportion of these elements in the Sun.



Messier 56

Messier 56, a globular cluster within the Lyra constellation, was first discovered by Charles Messier on January 19, 1779. Messier identified his fifty sixth catalogued astronomical object as a “nebula without stars.” Unbeknownst to him, it was a 13.7 billion-year-old Class X globular cluster of 80,000 stars. The classification X describes the concentration of stars, with X, or ten, denoting a cluster with a generally loose concentration. The cluster is approximately 32,900 light years away, with a diameter of 84 light years, and is moving towards Earth at 145 kilometers per second. M56 cannot be seen with the unaided eye due to its apparent magnitude of 8.3, but some outer stars can be seen with telescopes with aperture 250mm or larger. It is most discernable in the northern hemisphere from June to August.



Messier 57

The Ring nebula, number 57 in Charles Messier's catalog, is a planetary nebula 2,300 light years away from the Earth. The ring of gas was expelled from the central star after the main sequence star used up its supply of hydrogen in the core, expanded into a red giant, and then the core Helium ignited. This catastrophic nuclear explosion sent the hydrogen envelope expanding out into space at speeds of 20-30 km/s. The leftover core is a white dwarf.



Messier 58

Messier 58 is an intermediate barred spiral galaxy located in the constellation of Virgo. It is one of the four barred spiral galaxies in the Messier catalogue. M58 has a low-luminosity active galactic nucleus, where a supermassive black hole may be present. It is one of the very few galaxies known to contain an ultra-compact nuclear ring, which a series of star-forming regions located in a very small ring around the center of a galaxy.



Messier 59

Messier 59 is an elliptical galaxy discovered by Johann Gottfried Koehler in 1779. It is located about 60 million light years away, in the constellation of Virgo. M59's core contains a supermassive black hole, with a mass of 270 million solar masses. This galaxy is known to be rich in globular cluster, with an estimation of about 2200 in the galaxy.



Messier 60

Messier 60 is an elliptical galaxy located in the constellation of Virgo. M60 is extremely close to NGC 4647, a neighboring galaxy. Because of this, the optical disks of the two galaxies overlap, suggesting that the galaxies may have some gravitational interactions. M60 also has several satellite galaxies, including the ultracompact dwarf galaxy M60-UCD1.



Messier 61

Messier 61, also known as NGC 4303, is a barred spiral galaxy in the constellation of Virgo. It is also classified as a starburst galaxy because it is undergoing an extremely high rate of star forming activity. M61 is very rich in gas, which is unusual for a galaxy of this type. It has the most known supernovae amongst the galaxies in the Messier catalogue, with a total of seven discovered so far.



Messier 62

- Messier 62 is a globular cluster discovered in 1771 by Charles Messier. It is located about 22200 light years away, in the constellation of Ophiuchus. M62 contains several x-ray sources, thought to be coming from close binary star systems. It is also known to contain a large amount of RR Lyrae variable stars.



Messier 63

Messier 63, more commonly known as the Sunflower Galaxy, is a spiral galaxy. It is located about 27 million light years away, in the constellation of Canes Venatici. It has a spatial diameter of about 98000 light years, making it roughly the same size as the Milky Way. M63 is the prototype for a group of galaxies known as flocculent galaxies. This means that they appear to have many spiral arms because the arms appear patchy and discontinuous.



Messier 64

Messier 64, or commonly known as the Black Eye Galaxy or the Evil Eye Galaxy, is a spiral galaxy that is located in the Coma Berenices constellation. The “Black Eye” in its name refers to the dark band of dust that obscured the galaxy’s bright central region. In fact the galaxy is actually composed of two counter-rotating disks, the inner disk containing most of the stars and dust, and the outer disk consisting largely of gas. At a distance over 17 million light years from Earth, the galaxy spans over 70,000 light years. Although catalogued by Charles Messier in 1780, its first known discovery is by Edward Pigott in 1779. The galaxy is easily observed and can be seen with small telescopes.



Messier 65

Messier 65 is a spiral galaxy that is located in the constellation Leo. It is about 35 million light-years from Earth and spans about 90,000 light-years in diameter. It was discovered by Charles Messier in 1780. Messier 65 forms part of the Leo Triplet, a group of galaxies of similar distance from Earth, along with Messier 66 and NGC 3628.



Messier 66

Messier 66 is a spiral galaxy that is located within the Leo constellation. It was discovered by Charles Messier in 1789. It spans 95,000 light-years in diameter and is located roughly 36 million light-years from Earth. It forms part of the Leo Triplet with Messier 65 and NGC 3628.



Messier 67

Messier 67, also known as NGC 2682, is an open cluster of stars. It is located in the constellation Cancer, about 2800 light years away. Its estimated age is between 3.2 and 5 billion years, suggesting that the stars in M67 are younger than the Sun. This cluster has more than 100 stars similar to the sun, numerous red giants, and about 150 white dwarfs.



Messier 68

Messier 68 is a globular cluster in the constellation of Hydra. Located about 34000 light years away, M68 was discovered by Charles Messier in 1780. It is one of the most metal-poor clusters, being mainly composed of hydrogen and helium. A total of 50 variable stars have been discovered in this cluster.



Messier 71

Messier 71 is a globular cluster within the constellation Sagitta, which is Latin for “arrow.” It was first discovered by Philippe Loys de Cheseaux in 1746 and was added to the Messier catalogue in 1780. It lies approximately 12,000 light years away and has a diameter of 27 light years. M71 has always been a mystery to astronomers, who have been unable to reach a consensus on the classification of the cluster. It has difficulty fitting into either globular clusters or open clusters, as it is too large, dense, and old (at 9-10 billion years) for open clusters, yet too small, loose, and young for globular clusters. Finally, in the 1970s, during a study of the stars within the cluster, the discovery of the horizontal branch pattern, characteristic of globular clusters, settled the matter.



Messier 72

Messier 72 is a globular cluster located within the Aquarius constellation. It was first discovered by Pierre Mechain on August of 1780 and was later catalogued by Charles Messier. This star cluster has a diameter of over 100 light years and it is over 55,000 light years away from Earth. Due to its distance from Earth it is one of the faintest of Messier's globular clusters, and can barely be seen with smaller telescopes. In fact, when it was first discovered neither Mechain nor Messier could tell what exactly Messier 72 was, thinking it to be a faint nebula.



Messier 73

M73 is an “asterism”, a small group of stars that are physically unrelated and at different distances, but appear close together in the sky. This small asterism is in the constellation Aquarius. Each of the stars are at a different distances and moving in different directions.



Messier 74

A beautiful spiral galaxy in the constellation Pisces, M74 is over 32 million light years away. It is a “grand design” spiral, meaning it has the classical 2 complete, galaxy spanning arms. It is seen from the Earth face-on so we can see clearly the spiral structure. It is thought to contain as many as 100 billion stars and is over 95,000 light years in diameter.



Messier 75

Messier 75 is another globular cluster in the constellation Sagittarius and is a very dense globular cluster hosting more than 400 billion stars. It is on the other side of the Galactic nucleus from us at 67,500 light years from Earth. It was discovered by Messier and Mechain on August 27, 1780. It was originally classified as a “nebula without a star”, but John Herschel using his superior telescope recognized it as a globular cluster.



Messier 76

Messier 76 (M76), also known as the “Little Dumbbell” nebula, is a planetary nebula located around 2,500 light years away from Earth. M76 is located in the constellation Perseus and has a radius of around 0.617 light years. The name for this particular nebula takes its influence from another planetary nebula called the Dumbbell Nebula (M27) due to the shape of the gaseous cloud.



Messier 77

This spiral galaxy in the constellation Cetus contains an active galactic nucleus in its core. These types of nuclei are called Seyfert II AGN. It's distance is only 47 Million light years away, and it glows brightly in the radio region of the spectrum. In addition to the bright nucleus, it has well defined spiral arms in a grand design pattern.



Messier 78

Messier 78 is a reflection nebula located within the Orion constellation. A reflection nebula is one in which clouds of interstellar dust are illuminated by the light of nearby stars, much like fog around a street lamp. It was discovered in 1780 by Pierre Mechain and then documented by Charles Messier. Located over 1600 light years from earth the nebula is roughly 4 light years across. Messier 78 can be spotted even with small telescope or binoculars as a hazy patch near the “belt” of the Orion constellation.



Messier 79

M79 is a globular cluster in the constellation Lepus. This globular lies over 41,000 light years away from Earth and only 60,000 light years from the center of the Milky Way galaxy. It is estimated that this cluster is over 11 Giga years old. Some theories indicate that this as a globular cluster was most likely captured from a nearby dwarf galaxy !



Messier 80

Another Globular cluster, this one located in the constellation Scorpius. M 80 is estimated to be only 32,600 light years away and is thought to be one of the densest globular clusters in the Milky Way galaxy. It contains several hundred thousand stars.



Messier 81

M81, also known as Bode's Galaxy, is a spiral galaxy located around 12 million light years away from Earth. In the night sky, M81 is located in the constellation Ursa Major. M81 has an apparent magnitude of 6.94. M81 was discovered in 1774 by Johann Elert Bode, hence where the name comes from. In 1779, Pierre Mechain and Charles Messier re-identified the object, thus earning its place on the Messier catalog.



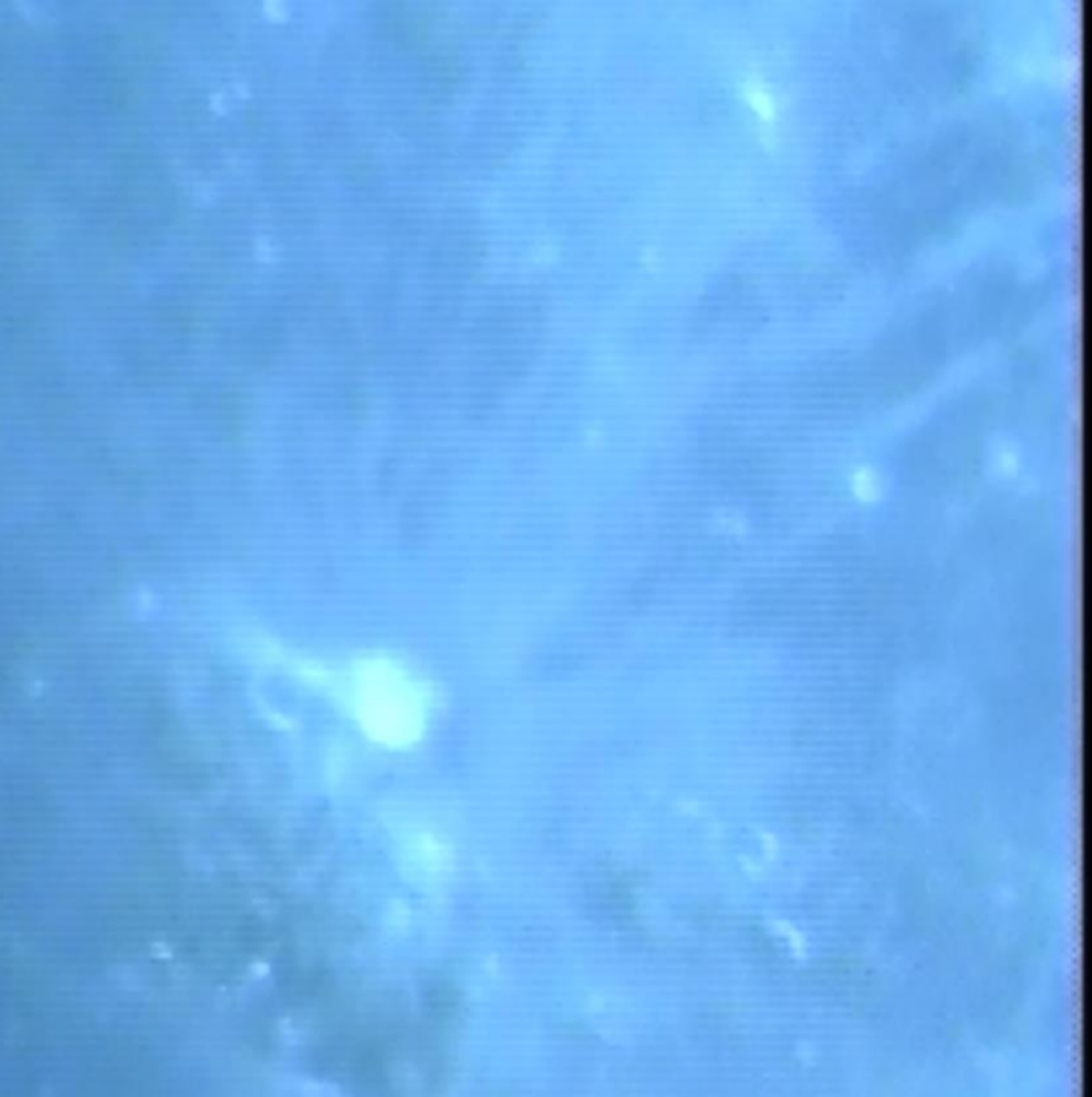
Messier 82

Messier 82, also known as the Cigar Galaxy, is an irregular starburst galaxy that is located within the Ursa Major constellation. The first known discover was by Johann Elert Bode on December 31, 1774, though the galaxy was later rediscovered by Pierre Mechain in 1779 and then recorded by Charles Messier on 1781. Its distinct web of clouds is a result of enormous hydrogen clouds blasting out from its central region of rapid star formation. The Cigar Galaxy is about 12 million light years away from Earth and has a diameter of 37,000 light years. Its brightness allows for it to be visible even with a pair of binoculars as a thin streak of light.



Messier 83

Messier 83, more commonly known as the Southern Pinwheel Galaxy, is a barred spiral galaxy. It is located in the constellation of Hydra, about 15 million light years away. This galaxy is visible in binoculars, because it is one of the closest and brightest of its type in the night sky. It is known to have many identified supernovae, with a total of 6 discovered so far.



Messier 84

Messier 84 is an elliptical galaxy in the constellation of Virgo. Located 60 million light years away, it was discovered by Messier in 1781. Observations from the Hubble Space Telescope have revealed two jets of matter shooting out from the galaxy's center. Radio observations have indicated the presence of a supermassive black hole as well.



Messier 85

Messier 85, also known as NGC 4382, is the galaxy in the lower part of the image. It is 60 million light years from Earth and located in the constellation Coma Berenices. It is thought that the central Black hole in the core of M85 exceeds 100 million solar masses. It has been the home of several Nova and supernovas. It is a member of the Virgo Cluster of galaxies, one of which is located in the top of the image.



Messier 86

Messier 86 is an elliptical galaxy located in the constellation Virgo. It displays the highest blue shift of all Messier objects, as it is approaching the Milky Way at 244 km/s. Because it is moving at high speeds, it is leaving behind a very long trail of x-ray emitting hot gas that has been detected with the help of the Chandra space telescope.



Messier 87

One of the most famous active galaxies, M87 is also known as Virgo A. It is a supergiant elliptical galaxy that contains a very active nucleus. In the radio part of the spectrum, a relativistic jet extends over 5,000 lights years out from the core! Look closely, you can even see the optical jet in our image from the MMC campus! Its radio emission extends over 500,000 light years out! It is only 16 million light years from Earth.



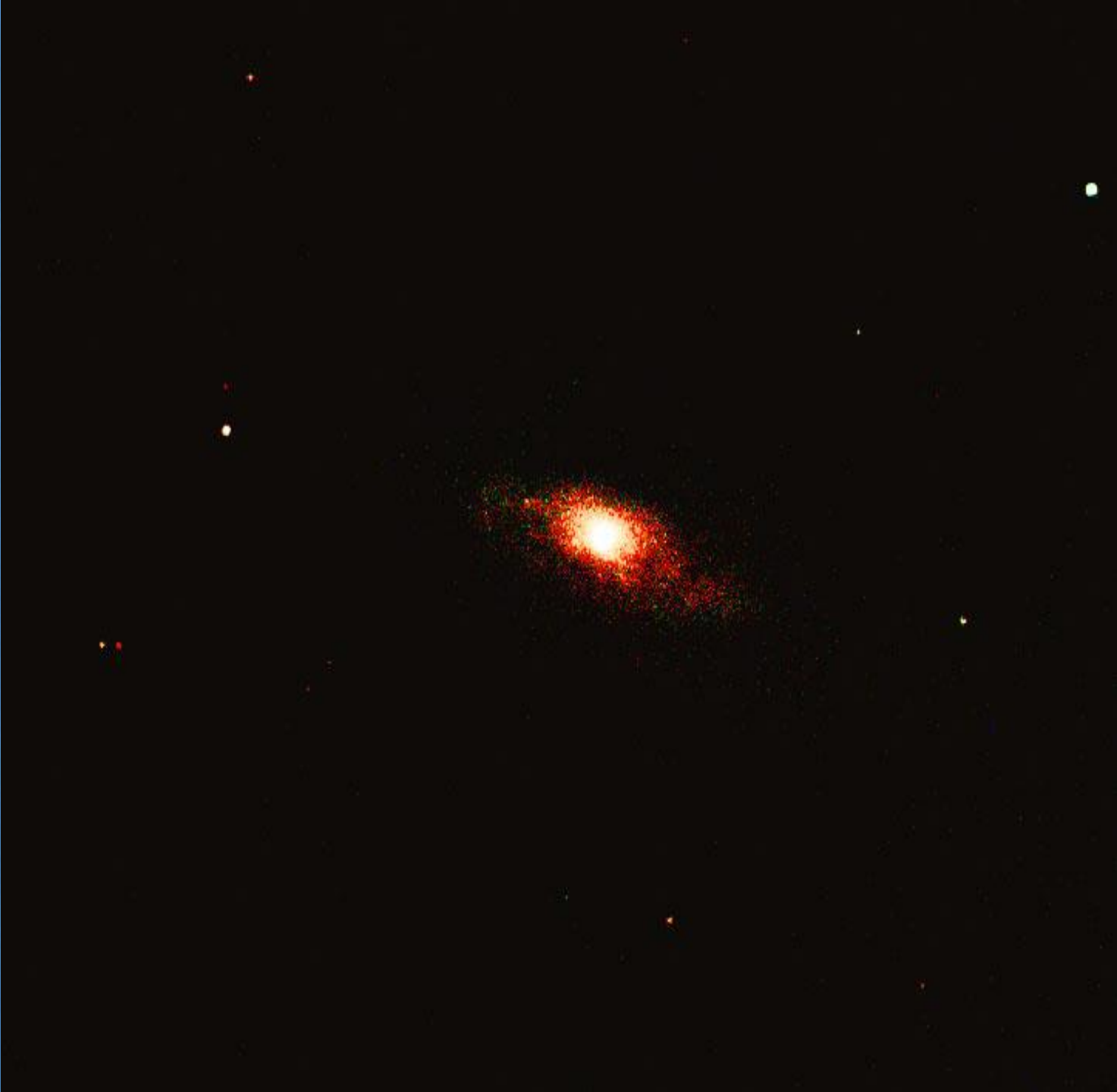
Messier 88

This “Brightly Whirling Galaxy” as it is sometimes called is the 88th object in Charles Messiers list. It is nearly 50 million light years away and is a spiral galaxy seen at a large angle to the line of sight ~ 64 degrees. It has an active core and is classified as a Seyfert II Galaxy, an active galaxy with a bright central core.



Messier 90

Messier 90 is an intermediate spiral galaxy with a weak inner ring structure. Located about 60 million light years away, it is in the constellation of Virgo. It is one of the brightest galaxies, with an absolute magnitude of -22. Unlike most galaxies, the spectrum of M90 is blue shifted, indicating that it is moving towards Earth.



Messier 92

Messier 92 is a globular cluster of stars, discovered by Johann Elert Bode in 1777. Approximately at a distance of 27,000 light years from Earth, this cluster is located in the constellation of Hercules. It is classified as an Oosterhoff type II globular cluster, which means it belongs to the group of metal-poor clusters with a significant amount of RR Lyrae variables.



Messier 93

Located in the constellation Puppis, this open cluster (galactic cluster) is 3,600 light years from Earth and is about 12 million light years across. It is a very young cluster, clocking in at a little over 100 million years old. Its brightest stars can be seen without a telescope in a very dark sky.



Messier 94

M94 is a grand design “barred” spiral galaxy located in the constellation Canes Venatici and is 16 million light years away from Earth. Studies indicate it may not contain any dark matter, unlike most other spirals! Its rich spiral structure and face-on orientation makes it a great galaxy to study the rotation characteristics.



Messier 95

Messier 95 is a barred spiral galaxy located in the constellation of Leo. It is also known as Calopis Leonis, or the “beautiful-eyed” galaxy. M95 is home to around 40 billion stars and has a well-defined spiral structure. In its nucleus, this galaxy contains a ring-like circumnuclear star-forming region.



Messier 96

Messier 96 is an intermediate spiral galaxy discovered by Pierre Mechain in 1781. Located about 35 million light years away, this galaxy is in the constellation of Leo. M96 is a very asymmetric galaxy; its dust and gas are unevenly spread throughout its weak spiral arms, and its core is not exactly at the galactic center. Its arms are also asymmetrical, most likely due to the gravitational pull of other galaxies within the same group as Messier 96.



Messier 97

Messier 97, or more commonly known as the Owl Nebula, is a planetary nebula located in the constellation Ursa Major. M97 was formed from the outflow of material from the stellar wind of the central star as it evolved along the asymptotic giant branch. The owl-like appearance of the nebula was created by an inner shell that forms a barrel-like structure aligned at an angle of 45 degrees to the line of sight.



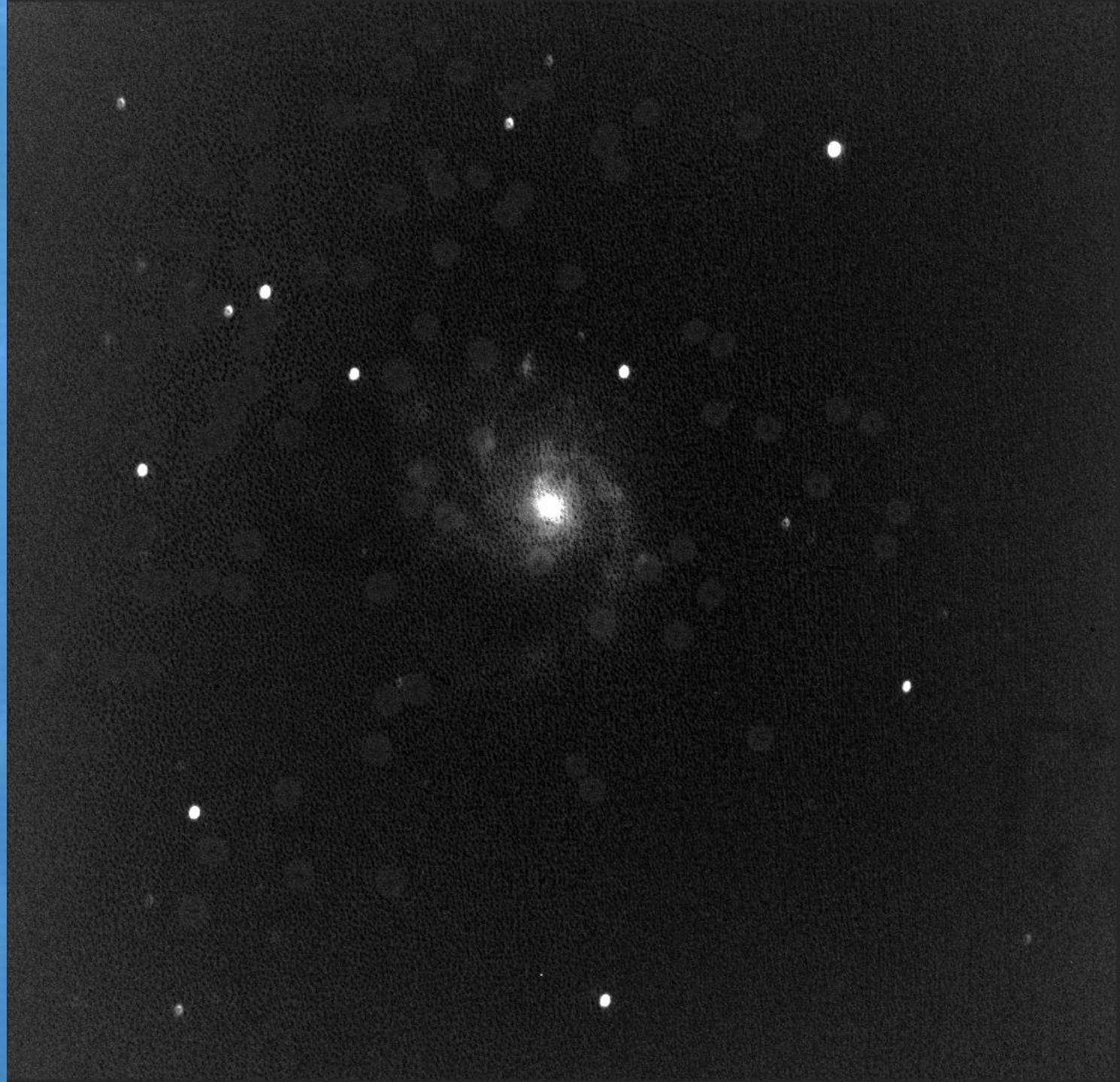
Messier 98

This is a beautiful edge-on spiral galaxy located in the constellation Coma Berenices. It is located some 44 million light years from Earth. Its estimated mass is 76 billion solar masses. This is one of the few galaxies showing a “blueshift” relative to the Earth indicating it is moving toward the Milky Way galaxy!



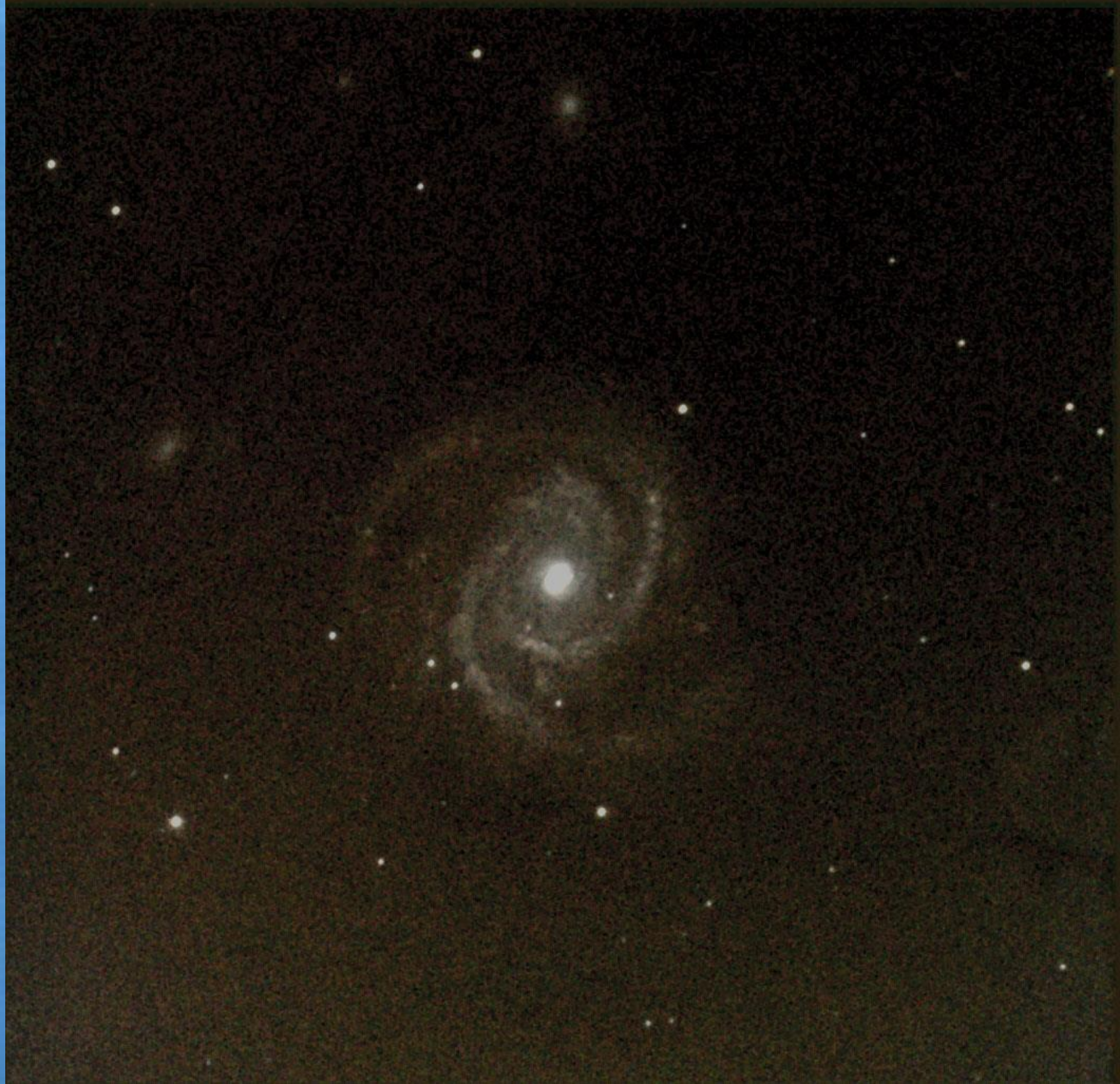
Messier 99

Messier 99 is a spiral galaxy, discovered by Pierre Mechain in 1781. Located 50 million light years away, it is in the constellation Coma Berenices. A bridge of neutral hydrogen gas links M99 with an HI region (and possible dark galaxy) known as VIRGOHI21.



Messier 100

Messier 100, which sadly lacks more creative nickname, is a spiral galaxy that is located within the Coma Berenices constellation. It is approximately 107,000 light years in diameter and is 55 million light years from earth. Messier 100 is also classified as a starburst galaxy, which are galaxies with exceptionally high rate of star formations, with the majority of its star formation concentrated in its bright center. Once again this galaxy is named after Charles Messier for his observation of it in 1781 despite its first known observation being earlier, by Pierre Mechain a month prior.



Messier 101

Messier 101 is a spiral galaxy more commonly known as the “Pinwheel Galaxy” and can be seen within the Ursa Major constellation, otherwise known as the Big Dipper constellation. It was discovered by Pierre Mechain on March 27, 1781 and was then verified by Charles Messier as one of his final entries to his Messier Catalogue. As a spiral galaxy, it is slightly unusual in the sense that it is viewed face-on from Earth. The Pinwheel Galaxy is roughly 170,000 light years in diameter, which is comparable to the diameter of the Milky Way, and is 27 million light years away from Earth. It can be observed using only a 3 inch telescope, and on dark moonless nights it can even be spotted with binoculars.



Messier 102

Messier 102, more commonly known as the Spindle Galaxy, is a lenticular galaxy in the constellation Draco. It has a prominent extended central dust disk that appears almost exactly edge-on from our line of sight from Earth. The galaxy's central dust lane appears slightly "warped" indicating that it may have interacted with another galaxy in the past.



Messier 103

This cluster is one of the most distant open clusters known, at a distance of over 9000 light years away. It is in the constellation Cassiopeia. It is thought to contain over 190 stars. The cluster is probably about 25 million years old and is dominated by a bright star not actually a member of the cluster: **Struve 131.**



Messier 104

Messier 104, also known as the “Sombrero Galaxy”, is a spiral galaxy located within the Virgo constellation. The 50,000 light year-across Sombrero, with a distance of about 29.3 million light years from Earth, is one of the largest galaxies in the Virgo cluster. Messier 104 was first discovered by Pierre Mechain on May 1871 and was written on one of Charles Messier’s personal lists, but was not included on the official published Messier catalogue as M104 until 1921. Our unique view of the Sombrero Galaxy, which is from 6 degrees south of its equatorial plane, as well as its extremely bright core, make this galaxy one of the most popular and distinguishable objects amongst astronomers. Research of Messier 104 indicates that the galaxy’s center may contain a supermassive black hole that is about 1 billion solar masses



Messier 105

Messier 105 is an elliptical galaxy, first discovered by Pierre Mechain in 1781. It is located in the constellation of Leo, about 32 million light years away. Along with its companion galaxy, M105 is surrounded by a ring of neutral hydrogen. This galaxy is known to have a supermassive black hole in its center, with a mass of about 170 million solar masses.



Messier 106

M 106 is another spiral galaxy seen nearly edge on. At a distance of 34 million light years, the spiral structure and the dark dust lanes are quite obvious even through relatively small telescopes. It is thought to have a very active nucleus with a supermassive black hole because of the water vapor mega-maser seen in the galaxy. Over 130,000 light years across, it is sometimes classified as a Seyfert II active galaxy.



Messier 107

A loose globular cluster in the constellation Ophiuchus is 21,000 light years away from Earth and is thought to be about 14 billion years old. There are 25 known variable stars in the cluster and has a mass of over 183,000 solar masses.



Messier 108

This barred spiral in the constellation Ursa Major is seen almost perfectly edge on. It is thought to contain over 125 billion solar masses and contains a number of x-ray sources in its nucleus. It is estimated that the central black hole has a mass on the order of 24 million Solar masses!



Messier 109

This gorgeous barred spiral galaxy lies 83 million light years away from Earth in the direction of the constellation Ursa Majoris. A type Ia supernova was seen in this galaxy in 1956. It is also considered to be an active galaxy, called a LINER. The nucleus is very bright and exhibits broad HII emission lines.



Messier 110

Messier 110, also known as NGC 205, is a dwarf elliptical galaxy and a satellite of the Andromeda galaxy. It is only 2.7 million light years away from Earth. It was first observed by Messier in 1773 and later discovered independently by Caroline Herschel in 1783. This photo was taken from the Stocker Astroscience center on 9/15/2016.

