Telescopic Observations of Star Clusters, Nebulae, and Galaxies

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Observational Methods

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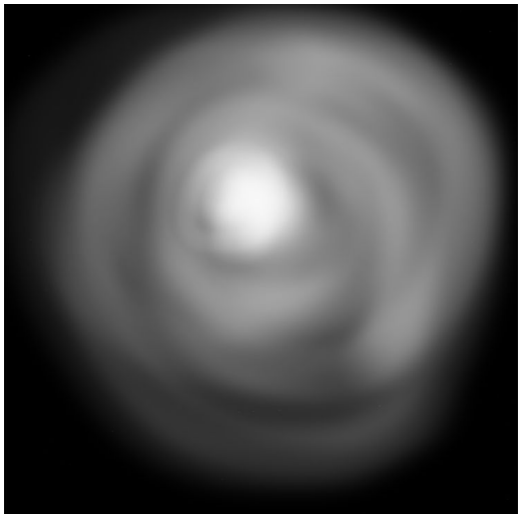
During the Observational Methods class, I worked on the lab titled, “Telescopic Observations of Star Clusters, Nebulae, and Galaxies.” I chose six objects: M31, M45, M11, M15, M27, and M52. All of these items were eventually found and placed in the Messier Catalog by Charles Messier. I observed these items with the 17mm eyepiece on the Orion 8 inch Dobsonian telescope through a span of several nights. My sketches were created through an app on my phone titled “AutoDesk Sketchbook.”

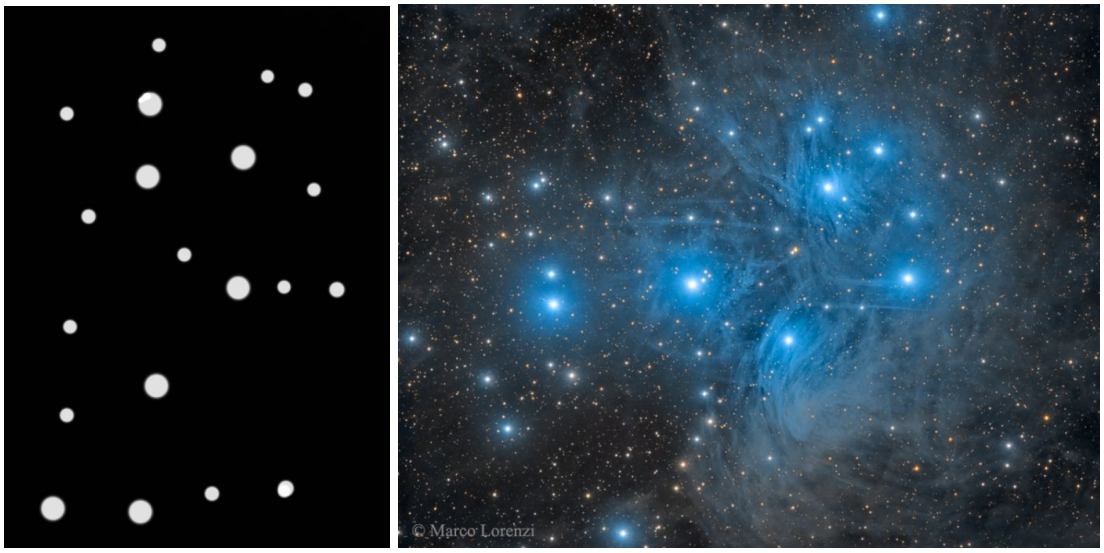
As I searched for these various objects, I used a few techniques to spot these objects. I would avert my eyes slightly, so I could search the sky with my peripheral vision, which is a common technique among astronomers. The reason why I did this is that it is commonly known that peripheral vision is slightly better than gazing at objects straight on. Also, I used the Stellarium app to find where the object was. I would find guide stars through the Reflex Sight, then search near the guide stars with the Finder Scope. Additionally, I would scan the sky with the largest eyepiece I had (which was 32mm) to ensure I had a wider range of view. I would scour the sky in search of a “smudge”, which is how I found most of these items. As soon as I saw a smudge, I switched eyepieces from the largest I had to the 17mm eyepiece, which is the second most magnifying eyepiece I possess. Through all these techniques, I found the six items.

The first item I observed was the object titled “The Andromeda Galaxy” or what is known as M31. My initial classification of this object was a galaxy. However, this object is actually a barreled spiral galaxy. According to NASA, “[the] Persian astronomer Abd al-rahman al-Sufi’s *The Book of Fixed Stars* from the year 964 contains the first known report of the object.” This galaxy is known to have a magnitude of 3.1, and it is over 2 million light-years away. This galaxy consists of “over 100 million stars and thousands of star clusters,” according to NASA. My rendition is below on the left, and the actual rendition of this beautiful galaxy is on the right.



The second item I observed was the object titled “The Pleiades” or what is known as M45. Initially, I guessed the classification of this object to be a cluster. However, I found out that many types of clusters exist, and this object is an example of an open star cluster. According to James Kaler from the University of Illinois’ Astronomy department, an open star cluster is

defined as “a few hundred loosely arranged stars packed within a diameter 10 or so light-years across.” Additionally, these stars are held together by the gravity that each star possesses. M45 has a magnitude of 1.6, and it is 445 light-years away from Earth. The first person to observe this open star cluster was Galileo Galilei. My rendition is below on the left, and the actual rendition of this beautiful cluster is on the right.

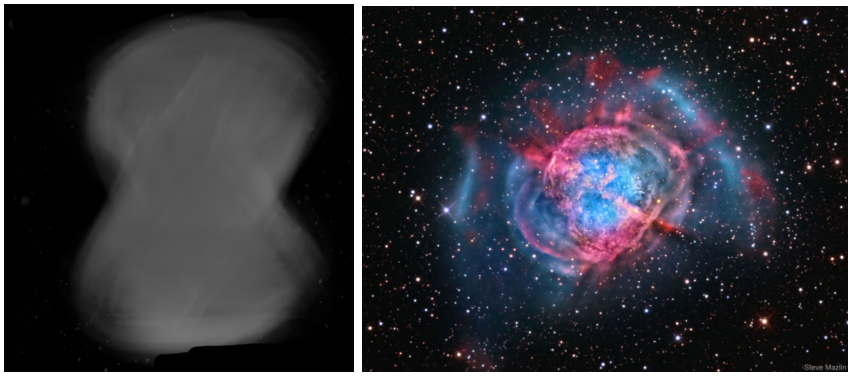


The third item I observed was the object titled “The Wild Duck Cluster” or what is known as M11. When I gazed upon M11, I noticed that this object was in fact a cluster. However, I was not sure what type this cluster is. Upon further investigation, I have discovered ”The Wild Duck Cluster” is an open star cluster like “The Pleiades.” This object is located 6,200 light-years from Earth, and its apparent magnitude is 6.3. M11 was first discovered by Gottfired Kirch in 1681. My rendition is below on the left, and the actual rendition of this wonderous cluster is on the right.

The fourth item I observed was the object titled “The Great Pegasus Cluster” or what is known as M15. I guessed the object to be just a cluster, but further investigation showed that this object is actually a globular cluster. According to James Kaler from the University of Illinois’

Astronomy department, a globular cluster is defined as “compact, closely spherical, and can contain a million stars packed into a volume only a hundred or so light-years across.” According to NASA, M15 has an apparent magnitude of 6.2, is located 33,600 light-years away from Earth, and was discovered by Jean-Dominique Maraldi in 1746. My rendition is below on the left, and the actual rendition of this beautiful cluster is on the right.

The fifth item I observed was the object titled “The Dumbbell Nebula” or what is known as M27. My guess of this object’s classification was a nebula. This object is actually a planetary nebula, which can be described by the following definition provided by James Kaler from the University of Illinois’ Astronomy department. “As a giant star loses almost all of its remaining outer hydrogen envelope, it comes close to revealing its intensely hot core. A fast wind from the core first compresses the inner edge of the old expanding wind. High-energy radiation from the hot core then lights up this inner compressed portion, which is now many times the size of the whole Solar System.” Discovered in 1764 by Charles Messier, this planetary nebula has a distance of 1,200 light-years away from Earth, and it has an apparent magnitude of 7.5. My rendition is below on the left, and the actual rendition of this beautiful nebula is on the right.



The sixth item I observed was the object titled “The Cassiopeia Salt-and-Pepper Cluster” or what is known as M52. After observing the other objects in the sky, I could easily tell that this object is an open star cluster. This cluster was originally discovered by Charles Messier in 1774. M52 has an apparent magnitude of 7.3, and it is 5,000 light-years away from Earth. Also, it has

an apparent distance of 19 light-years. My rendition is below on the left, and the actual rendition of this beautiful cluster is on the right.

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