

To see a galaxy far, far away

By Barry M. Olson for the Sun Times

How far can you see? The answer is 2.5-million light years when you look at the Andromeda Galaxy. This is the most distant object a person, with good eyesight, can see without using binoculars or a telescope.

First of all, what is a light year? It is the distance that light travels in one Earth year. The speed of light is 299,792 kilometres per second (fast!). So in one year, the distance traveled is 9.46 trillion kilometers (946 followed by 10 zeros). Now multiply this distance by 2.5 million and you will be at the Andromeda Galaxy. On the scale of the universe, this is just a stones throw away.

So what is a galaxy? A galaxy is large collection of stars, dust, and gas bound together orbiting a common centre of gravity. The Sun, Earth, and the rest of solar system are residents in a large galaxy we call the Milky Way. We believe the Milky Way is a spiral galaxy with a central bulge with large, spiral arms wrap around the bulge in a flat plane. Just think of a large pinwheel. Galaxies are the largest individual structures in the universe. Some of the top questions in astronomy and cosmology deals with the formation, distribution, and evolution of galaxies.

Since we live inside of the Milky Way, we can not see our galaxy in its entirety. However, we can look out into the universe and observe countless number of other galaxies. Galaxies come in a wide variety of shapes and sizes. The best example of a galaxy visible from our hemisphere is the Andromeda Galaxy. This galaxy is located in the constellation Andromeda (daughter of Queen Cassiopeia in Greek mythology). The Andromeda Galaxy is currently well placed high in the early evening sky. To find the galaxy, first locate the Great Square in the constellation Pegasus; the flying horse (see star map), which appears in the westerly sky in the early evening. It appears tipped up on one of its corners, somewhat like a baseball diamond. Let's say the bottom star (one closest to the horizon) is home plate. Now go to second base (i.e. the top star). This star is called Alpheratz, and it is shared with the constellation Andromeda. From this star there appears to be two diverging lines of stars extending higher into the sky. Just to the right of the second pair of stars along these two lines you will find the galaxy. Under a very dark and clear sky you will be able to see the galaxy as a small, fuzzy patch of light. To help, just look slightly off to one side and your eyes should see it – a mere 2.5-million light years away. Through binoculars or a small telescope you will see a bright, elongated, cloud-like structure. What you see is only the bright, central bulge of the galaxy (see image). The spiral arms are too faint to see.

The Andromeda Galaxy is a larger (1.5 times) version of the Milky Way. It may contain as many as 200 billion stars. When we look at the Andromeda Galaxy, we see it as it appeared 2.5-million years ago, because it takes the light that enter your eyes that long to travel from there to here. Another interesting point is that the Milky Way and Andromeda galaxies, along with a third large spiral galaxy called the Triangulum Galaxy, are the heavy weights in a group (called the Local Group) of about 40 galaxies. The Milky Way and Andromeda galaxies are actually approaching each other and may possibly collide and merge. Not to worry. It will take about 3-billion years before these two giant spirals tangle. Until then, enjoy the view of Andromeda as a distant galactic neighbour.

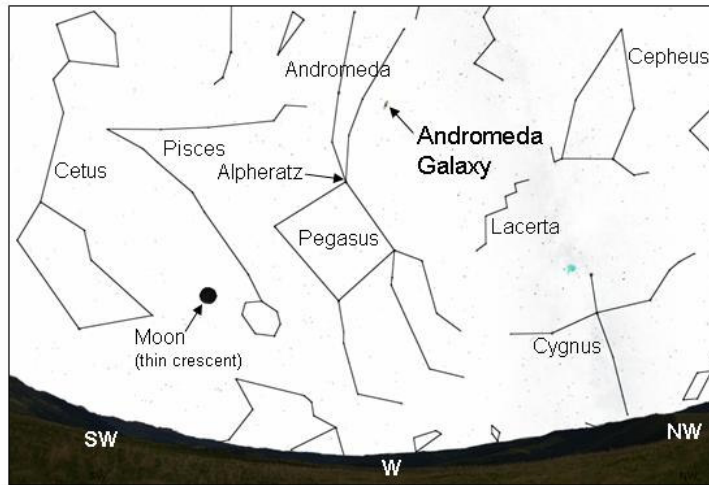


Image 1: The location of the Andromeda Galaxy in the night sky at 7:00 p.m. on February 1, 2006. Produced using Starry Night Pro™/Imaginova Canada Ltd. and Microsoft PowerPoint.



Image 2: Image of the Andromeda Galaxy. Credit and copyright Robert Gendler.