



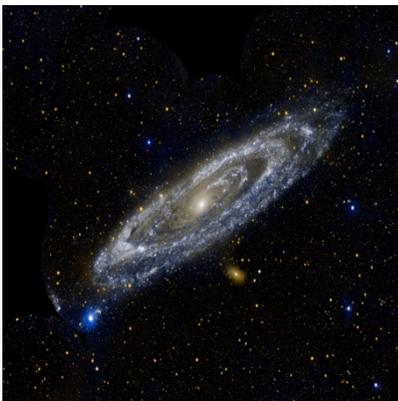
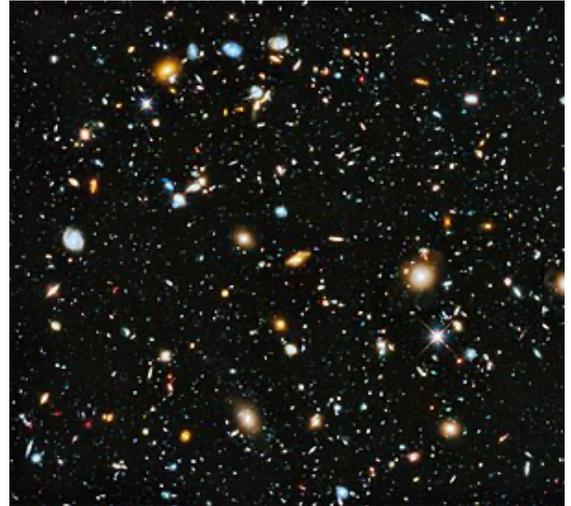
BEYOND THE SOLAR SYSTEM

By Ray Yeager

LIGHT-YEARS

As we consider objects outside of our Solar System, we have to change the way we consider distance and add the term "light-year." Light travels 5,903,000,000,000 miles in a year, or one light-year. The nearest star is Proxima in the constellation Centauri and is 4.2 light-years away; but it is a dim, red star and cannot be seen with the naked eye. The brightest star in the night sky is Sirius, found in the Winter constellation Canis Major and is 8 light-years away

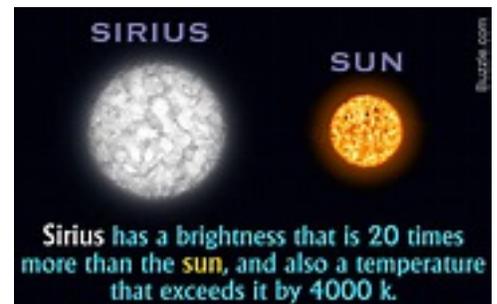
THE UNIVERSE is difficult to describe. It is believed that if you traveled across the universe, you would eventually arrive where you started, just as you would if you traveled it a straight line here on Earth. But this does not necessarily mean it is round. It began with what is called the big bang and instantly expanded or inflated in all directions. It is thought to be 90 billion light-years across and about 14 billion years old. It began almost instantly with tremendous heat with mostly hydrogen and small amounts of helium. As the universe cooled, clumps of hydrogen and helium atoms began to coalesce and the first stars were born, forming the first galaxies.



GALAXIES are the largest objects in the universe. Our galaxy, called the Milky Way, contains over 100,000 billion stars. Galaxies revolve and our solar system is found in one of the outside rotating arms. The closest galaxy is the Andromeda Galaxy (M31), pictured left, that contains over 200 billion stars. It is thought that there may be over 150 billion galaxies in the universe. This galaxy is found in the constellation Andromeda. A medium size telescope (6 inch in diameter) will show a faint glow of stars.

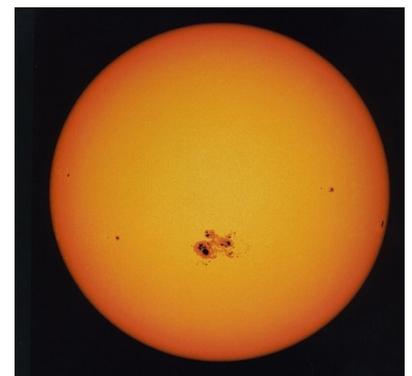
STARS

Looking up at the night sky at a dark location like SKY'S THE LIMIT, you will see an incredible number of stars. Some are brighter than others – which you may think indicates the star is closer to us. Most stars are brighter because they are younger. They appear bluish white. Stars that appear reddish usually are older. Stars that appear yellow like our Sun are considered middle aged. Temperature is another indication of brightness. A white star is the youngest and is about 36,000 degrees F. Yellow stars are about 5,400 degrees, Red 2,700. degrees.



OUR STAR: THE SUN

Our Sun and stars were created from rotating clouds of hot gas in interstellar space. When these collapsing clouds of gas get hot enough, nuclear fusion begins to fuse hydrogen into helium, creating tremendous heat and light. Our Sun is 870,000 miles in diameter and is 93 million miles distant, j

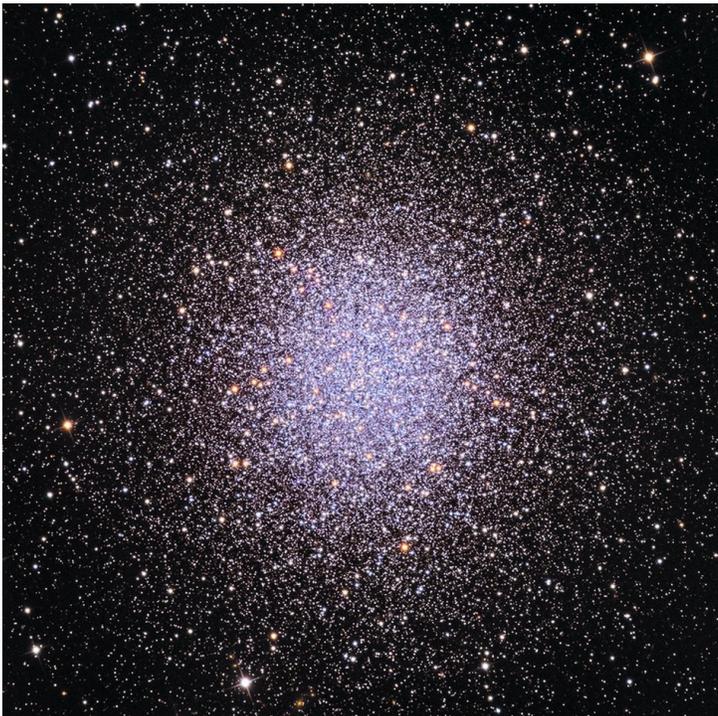




just the right distance for the Earth to develop an atmosphere and gravity that can harbor life as know it. It takes 8 seconds for the Sun's rays to reach Earth.

Our Sun is made up of 75% hydrogen and 25% helium. The surface temperature is about 10,500 degrees F of burning gas.

Of course, never look at the Sun – even through a telescope – without protection. Special glasses are very inexpensive and can be found on the Internet. Special eyepieces are better to see occasional sunspots which are dark, cooler patches of gas that are controlled by the Sun's strong magnetic fields and are larger than our Earth. Also, at times you may see tiny loops of gas and flares.

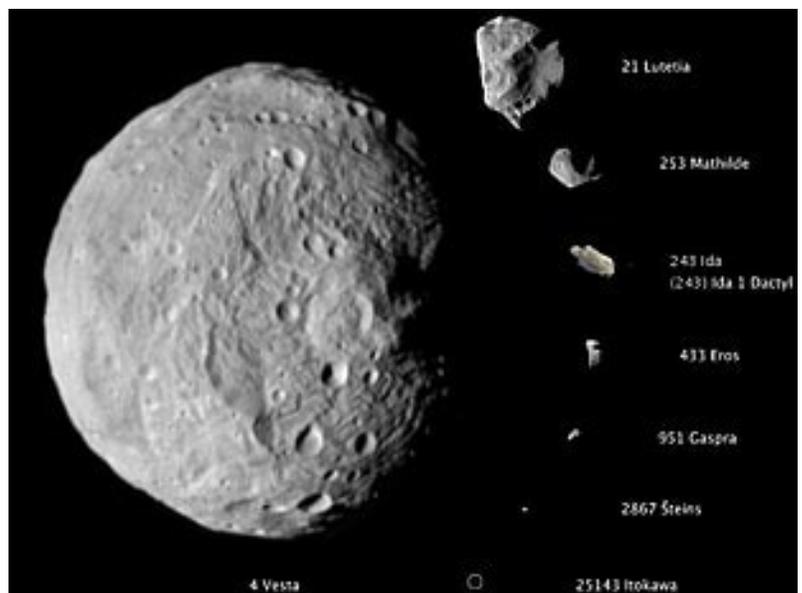


GLOBULAR CLUSTERS are tightly packed stars that are found in the outskirts of our galaxy and contain very old stars. M13, one of the brightest, is found in the summer constellation Hercules. Clusters are easily seen with all types of scopes.

NEBULA (pl. nebulae)

Nebulae, from the Greek word "cloud" mostly consist of gas and dust. Some are remnants of old stars that have exploded such as M1, the Crab nebula. Some are emission nebulae that are lit from behind by new stars and some are dark nebulae where light from stars is being absorbed by light and dust. Most nebulae are faint and difficult to see in much detail, but the Winter constellation Orion nebula, M42, and the Crab nebula can be seen with moderate size scopes.

ASTEROIDS AND METEORS are pieces of rock that were left over after the forming of the planets. Asteroids can be as large as a 10-story building and could destroy a city. Meteors are more basketball-size down to the size of a grain of sand. Hundreds enter our atmosphere every day and a few may hit the ground (meteorite), but most burn up as they strike our atmosphere and appear as beautiful, bright streaks of light. Several meteor showers appear regularly each year as the Earth passes through the tails of comets as they orbit our Sun.





COMETS are huge pieces of rock and frozen water. As they approach the Sun the rocky ice begins evaporating, creating a ball of glowing gas with a tail. It is a marvelous sight, and many can be seen from Earth. A comet that has been captured by the gravity of the Sun will return on a regular basis. Halley's comet returns every 75 years. It last appeared 1986 and should return about 2061. Other comets, depending on their orbit, may not return for thousands of years. One hypothesis is that the dinosaurs were killed off by a comet or a large asteroid that hit the Earth about 65 million years ago. Comets are named after their discoverer.

MESSIER OBJECTS

Many deep sky objects are identified with the letter "M" on star charts. Charles Messier was a comet hunter. Distant comets look like tiny fuzzballs. So, in 1774 he began to number these distant objects so as not to keep mistaking them for comets. His catalog has 110 objects. Later, when larger telescopes were invented, more distant objects began to be identified as NGC, or New General Catalog.

CONSTELLATIONS are groups of stars that early civilizations used in their story telling as far back as 4000 B.C. The Lion, Bull, Scorpion, and Hunter can be found in ancient writings. The first star atlas was published in 1603 and by 1928, 88 constellations were recognized.



Learning which constellations are unique to each season is important in observing. Frequently, constellations are mentioned to help locate deep sky objects, but often the time of year is not noted. Knowing the constellations tells you when certain objects will be visible.

