Glossary for Deep Sky Objects

A

arms - A pinwheel structure, composed of dust, gas and young stars, that winds its way out from the core of a spiral galaxy.

B

barred spiral galaxy - A spiral galaxy with a “bar” of stars and interstellar matter, such as dust and gas, slicing across its center. The Milky Way is thought to be a barred spiral galaxy.

black dwarf – The presumed final state of evolution of a low/medium mass star in which no radiation is emitted. There are none of these in the universe yet – it’s not old enough.

black hole – An invisible region in space, formed from the death of a massive star during a supernova explosion, that has a huge amount of mass compacted into an extremely small volume. A black hole’s gravitational influence is so strong that nothing, not even light, can escape its grasp.

blue giant – Main sequence star that is large and compact; burns fuel quickly at a high temp; live for only 10,000-100,000 years. Very bright, very rare, but they make up many of the stars we see at night. Ends life as supernova, becoming a neutron star or black hole, depending on its mass.

brown dwarf – A “failed star”; a giant ball of gas that is too massive to be a planet but not massive enough to be a star. During formation, the protostar didn’t reach the critical mass required to ignite nuclear fusion. It glows briefly, then its energy dies out and emits only infrared radiation.

C

central bulge - The spherical structure at the center of a spiral galaxy that is made up primarily of old stars, gas, and dust.

D

dark nebula (or absorption nebula) - Dark cloud of dust which is visible only because it absorbs the light of stars behind it.

disk - when talking about a galaxy: A flattened region of gas and young stars in a galaxy that surrounds the bulge in a spiral galaxy.

doppler effect – (Christian Doppler 1803-1853) the apparent change in wavelength of sound or light cased by the motion of the source, observer or both.

E

equilibrium – In stars, the stage in which outward gas pressure is balanced with the inward force of gravity. These are the stars on the 'main sequence' of the Hertzsprung-Russel diagram of star classifications.

emission nebula – Glowing clouds of interstellar gas which has been excited by some nearby energy source, usually a very hot star. The red light seen is from glowing hydrogen.

elliptical galaxy - A galaxy that appears spherical or football-shaped. Elliptical galaxies are comprised mostly of old stars and contain very little dust and “cool” gas that can form new stars.

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**G**

*galaxy* - A collection of stars, gas, and dust bound together by gravity. The smallest galaxies may contain only a few hundred thousand stars, while the largest galaxies have thousands of billions of stars. The Milky Way galaxy contains our solar system. Galaxies are classified or grouped by their shape. Round or oval galaxies are elliptical galaxies and those showing a pinwheel structure are spiral galaxies. All others are called irregular because they do not resemble elliptical or spiral galaxies.

**I**

*irregular galaxy* - A galaxy that appears disorganized and disordered, without a distinct spiral or elliptical shape. Irregular galaxies are usually rich in interstellar matter, such as dust and gas. Because of this, irregular galaxies usually have a high rate of new star formation.

**L**

*Local Group* - The small cluster of the galaxies closest to our own, consisting of about 30 galaxies — (including the Andromeda galaxy, the Magellanic Clouds, and our own Milky Way galaxy).

**M**

*main sequence* – Stable stars during the bulk of their lives. Outward gas pressure is in equilibrium with the inward force of gravity. (See also 'equilibrium')

*Milky Way Galaxy* - The Milky Way, a spiral galaxy, is the home of Earth. The Milky Way contains more than 100 billion stars and has a diameter of about 100,000 light-years.

**N**

*nebula* – Gas and dust clouds typically found around star-forming regions; or debris from a dying or exploding star.

*neutron star* – A very dense, small spinning remnant of a star that is left when a supergiant star has exploded. It is composed almost entirely of neutrons.

*nuclear fusion* – Inside a star, atoms join together to make larger atoms; the process creates huge amounts of heat and light. This is the source of the sun’s energy, therefore ultimately of almost all energy on Earth.

**P**

*planetary nebula* – Outer layers of gas from a dying star, which are puffed into space. Its central star is (or is in the process of becoming) a white dwarf. From a distance, the layers of glowing gas around the dying star make it look like a planet.

*protostar* – A ball of gas and dust that is shrinking due to gravity. The shrinkage causes density and temp to increase, initiating fusion reactions. When the outward pressure generated by the fusion reaction balances the gravitational force, the shrinkage stops, and the cloud of gas has become a star.

*pulsar* – A neutron star that sends out beams of radiation from its magnetic poles which spin around as the star rotates. If we are along the path of the beams of radiation, we see flashes of radiation similar to the flashes of light from a lighthouse. The periods of rotations found for pulsars is from less than 1/100th of a second to several seconds.
**R**

**red dwarf** – Main sequence star that is small and cool; burns fuel very slowly, can live trillions of years. Most of the stars in the universe are this type, but we generally cannot see them because they are so dim.

**red giant** – A star near the end of its life. It has exhausted most of its nuclear fuel and the outer gas layers expand. It has a relatively low surface temperature and its size is many times larger than our Sun.

**reflection nebula** – A cloud of gas and dust that shines by reflecting the light of nearby stars. Generally blue in color.

**S**

**shell** – Outer layers of a star, made of hydrogen and helium; facilitates the transfer of heat from the core to the surface; light and heat energy is released into space from here.

**spiral arms** - A pinwheel structure, composed of dust, gas, and young stars, that winds its way out from the core of a normal spiral galaxy and from the ends of the bar in a barred spiral galaxy.

**spiral galaxy** - A spiral-shaped system of stars, dust, and gas clouds. A typical spiral galaxy has a spherical central bulge of older stars surrounded by a flattened galactic disk that contains a spiral pattern of younger hot stars interspersed with clouds of gas and dust.

**star** – A self-luminous sphere of gas that is converting hydrogen into helium through nuclear fusion. The smallest objects that can become stars are about 1/10th the mass of our Sun.

**supergiant** – A high mass star nearing the end of its lifetime that has burned through most of its nuclear fuel, and is greatly expanded from its original size. They are much larger, more massive, and brighter than 'normal' giant stars.

**supernova** – The explosive death of a massive star whose energy output causes its expanding gases to glow brightly for weeks or months. The star then collapses to form a neutron star, or if the star was very large, a black hole. A main-sequence star must be about six times as massive as the Sun or it will not become a supernova.

**supernova remnant nebula** – An expanding cloud of matter formed when the outer layers of an exploding star (supernova) are blasted away.

**W**

**white dwarf** – The hot compact remains of a low-mass star like our Sun that has exhausted its sources of fuel for fusion and collapsed into a size similar to the Earth, but with a very high density.

**Y**

**yellow star** – Main sequence star that is medium sized and medium temp; burns fuel faster than red dwarf, can live billions of years; end life as a white dwarf surrounded by a planetary nebula, eventually becoming a black dwarf. Earth is a yellow star.