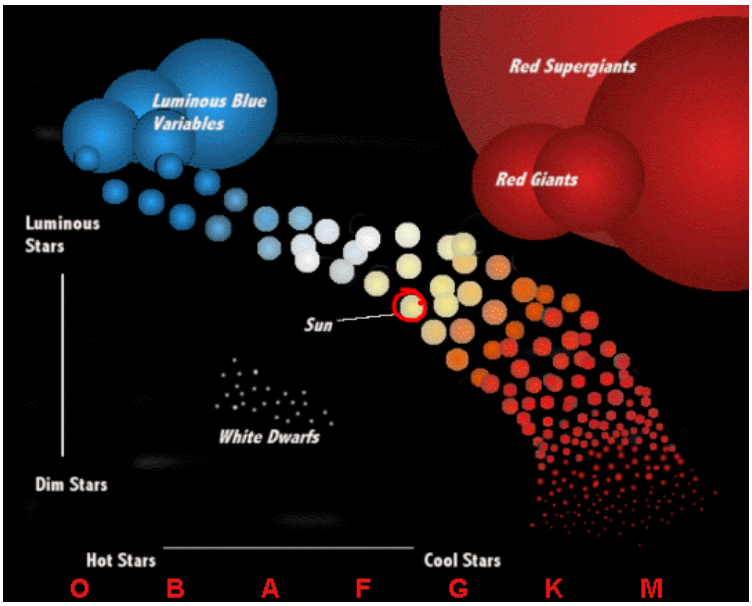

Jun 26-11:30 AM

Main Sequence Stars - Young Stars

Main sequence stars are the central band of stars on the Hertzsprung-Russell Diagram. These stars' energy comes from nuclear fusion <subjects/astronomy/glossary/indexn.shtml>, as they convert Hydrogen to Helium. Most stars (about 90%) are Main Sequence Stars. For these stars, the hotter they are, the brighter they are. The sun is a typical Main Sequence star.

DWARF STARS
Dwarf stars are relatively small stars, up to 20 times larger than our sun and up to 20,000 times brighter. Our sun is a dwarf star.

YELLOW DWARF

Yellow dwarfs are small, main sequence stars. The Sun is a yellow dwarf. 6000K

RED DWARF
A red dwarf is a small, cool, very faint, main sequence star whose surface temperature is under about 4,000 K. Red dwarfs are th most common type of star. Proxima Centauri is a red dwarf.

Giant and Supergiant Stars - Old, Large Stars

RED GIANT

A red giant is a relatively old star whose diameter is about 100 times bigger than it was originally, and had become cooler (the surface temperature is under 6,500 K). They are frequently orange in color. Betelgeuse <subjects/astronomy/glossary/indexb.shtml> is a red giant. It is about 20 times as massive as the Sun <subjects/astronomy/sun/> about 14,000 times brighter than the Sun, and about 600 light-years from Earth.

BLUE GIANT

A blue giant is a huge, very hot, blue star. It is a post-main sequence star that burns helium.

SUPERGIANT
A supergiant is the largest known type of star; some are almost as large as our entire solar system <subjects/astronomy/glossary/indexs.shtml>. Betelgeuse <subjects/astronomy/glossary/indexb.shtml> and Rigel <subjects/astronomy/glossary/indexr.shtml> are supergiants. These stars are rare. When supergiants die they supernova and become black holes <subjects/astronomy/glossary/indexb.shtml>.

Faint, Virtually Dead Stars:

WHITE DWARF
A white dwarf is a small, very dense, hot star that is made mostly of carbon. These faint stars are what remains after a red giant st <subjects/astronomy/glossary/indexr.shtml> loses its outer layers. Their nuclear cores are depleted. They are about the size of the Earth (but tremendously heavier)! They will eventually lose their heat and become a cold, dark black dwarf. Our sun will someday turn into a white dwarf and then a black dwarf. The companion of Sirius <subjects/astronomy/glossary/indexs.shtml> is a white dwarf.

BROWN DWARF
A brown dwarf is a "star" whose mass is too small to have nuclear fusion occur at its core (the temperature and pressure at its cor are insufficient for fusion). A brown dwarf is not very luminous. It is usually regarded as having a mass between 10^{29} kg and 84 x 10^{29}.

NEUTRON STAR
A neutron star is a very small, super-dense star which is composed mostly of tightly-packed neutrons <subjects/astronomy/glossary/indexn.shtml>. It has a thin atmosphere of hydrogen <subjects/astronomy/glossary/indexh.shtml>, has a diameter of about 5-10 miles (5-16 km) and a density of roughly 10^{15} gm/cm³.

PULSAR
A pulsar is a rapidly spinning neutron star <subjects/astronomy/glossary/indexn.shtml> that emits energy in pulses.

Binary Stars:

DOUBLE STAR

A double star is two stars that appear close to one another in the sky. Some are true binaries (two stars that revolve around one another); others just appear together from the Earth because they are both in the same line-of-sight.

BINARY STAR

A binary star is a system of two stars that rotate around a common center of mass (the barycenter). About half of all stars are in a group of at least two stars.

Polaris (the pole star of the Northern Hemisphere of Earth) is part of a binary star system.

Jun 30-6:52 AM

Stars:

As you learn more about the stars, you will run across stars being described as "black dwarfs", "supergiants" and so on. Here is a listing of the more common types of stars as well as a brief description of each. The classification of stars is actually a lot more detailed than this short listing, but these are the most common types of stars you will encounter.

Black Dwarfs

Black dwarf stars are stars that we aren't even positive really exist in the universe, but computer simulations tell us will probably exist many billions of years from now. Black dwarfs are so old that they have burned up all of their hydrogen fuel and as a result are completely dark and cold. Computer simulations have told us that it would take longer for this to happen than the universe has existed.

Brown Dwarfs

Brown dwarf stars are stars in the technical sense, but they have so little mass that nuclear fusion is not occurring at their core. It is a lot like a car that won't quite start. Brown dwarfs can occur either when the cloud that the star came from isn't quite big enough to get nuclear fusion started or they can happen when a star dies </afk/stars/lifecycle/stardeath.html>.

Red Dwarfs

Red dwarf stars are the most common stars in the universe. They are very small, much smaller than the Sun and are very cool relative to other stars. A red dwarf star appear at the lower right of the H-R Diagram </afk/stars/lifecycle/hrdiagram.html>. Since red dwarf stars burn their hydrogen fuel at such a slow rate, they can live for many billions, or even trillions, of years.

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Yellow Dwarfs

Yellow dwarfs are moderately bright, medium-sized main sequence </afk/stars/lifecycle/hrdiagram.html> stars that are very common in the universe. Our Sun is a yellow dwarf star. Yellow dwarf stars live for about ten billion years and then die by swelling up into red giants and then collapsing into white dwarfs.

White Dwarfs

White dwarf stars are formed when a star dies </afk/stars/lifecycle/stardeath.html>. They are what is left over after a star has collapsed onto itself. They are much hotter than the other dwarf stars. Our Sun will become a white dwarf when it dies billions of years from now.

Red Giants

Red giant stars are very large, but relatively cool, stars that are created when a medium-sized star, like our Sun dies </afk/stars/lifecycle/stardeath.html>. When a mid-sized star dies, it swells up tremendously in size and cools off before it finally collapses into a white dwarf star.

Red Supergiants

Red supergiant stars, like Antares in the constellation Scorpius </afk/constellations/scorpius/> are the most massive stars in the universe. They are many hundreds of time larger than our Sun and are formed when a very massive star begins to die. Red supergiant stars die in a very spectacular explosion called a supernova and then finally collapse into a neutron star or a black hole.

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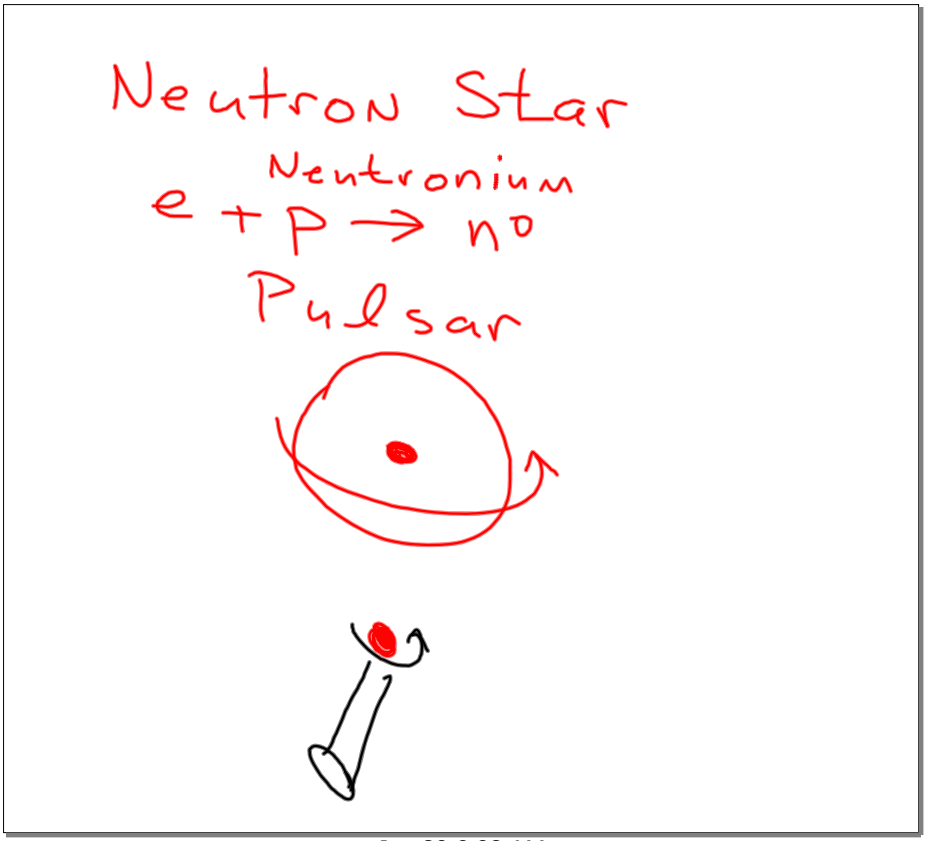
A **black hole** is a region of space in which the gravitational field is so powerful that nothing, not even light , can escape its pull after having fallen past its event horizon . The term "Black Hole" comes from the fact that, at a certain point, even electromagnetic radiation (e.g. visible light) is unable to break away from the attraction of these massive objects. This renders the hole's interior invisible or, rather, black like the appearance of space itself.

Smallest black holes result from stars about 10 solar masses collapsing. If the sun were able to form a black hole it would have a diameter of about 3km (usually 700,000km).

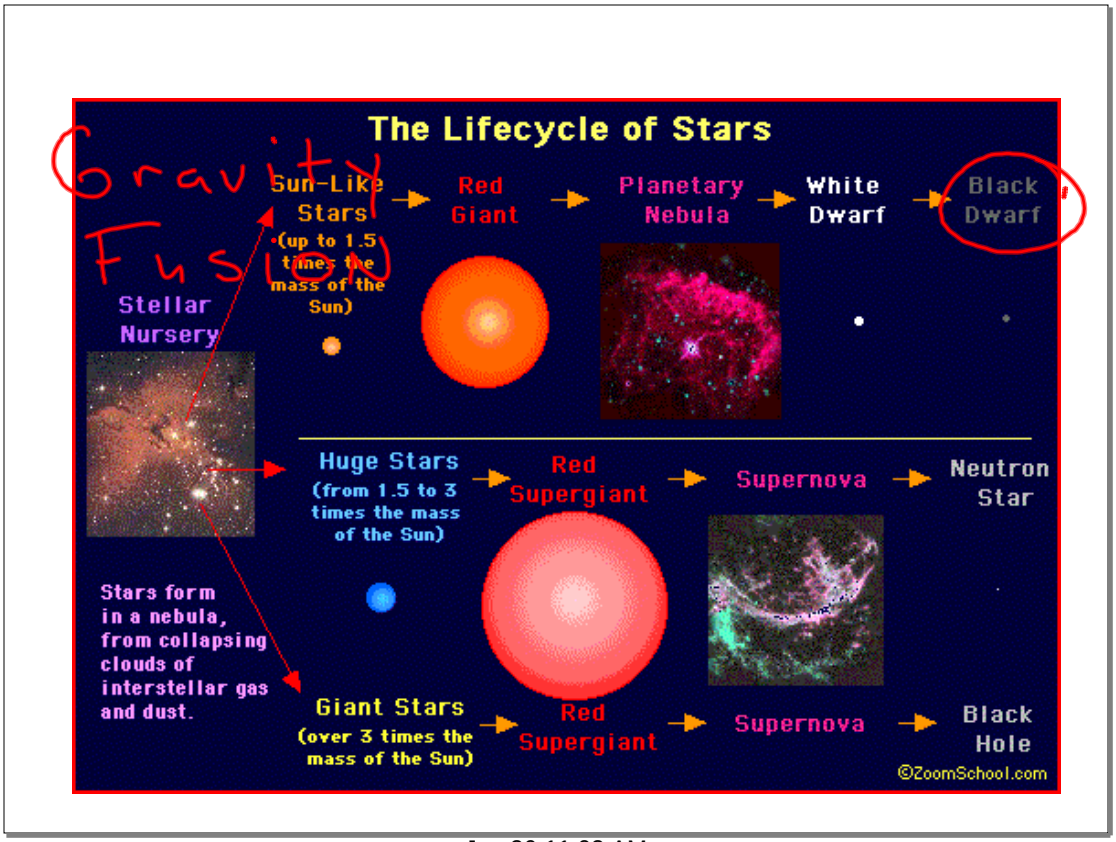
It shrinks by a factor of .000004x.

Jun 30-6:59 AM

Jun 30-9:01 AM



Jun 30-9:02 AM



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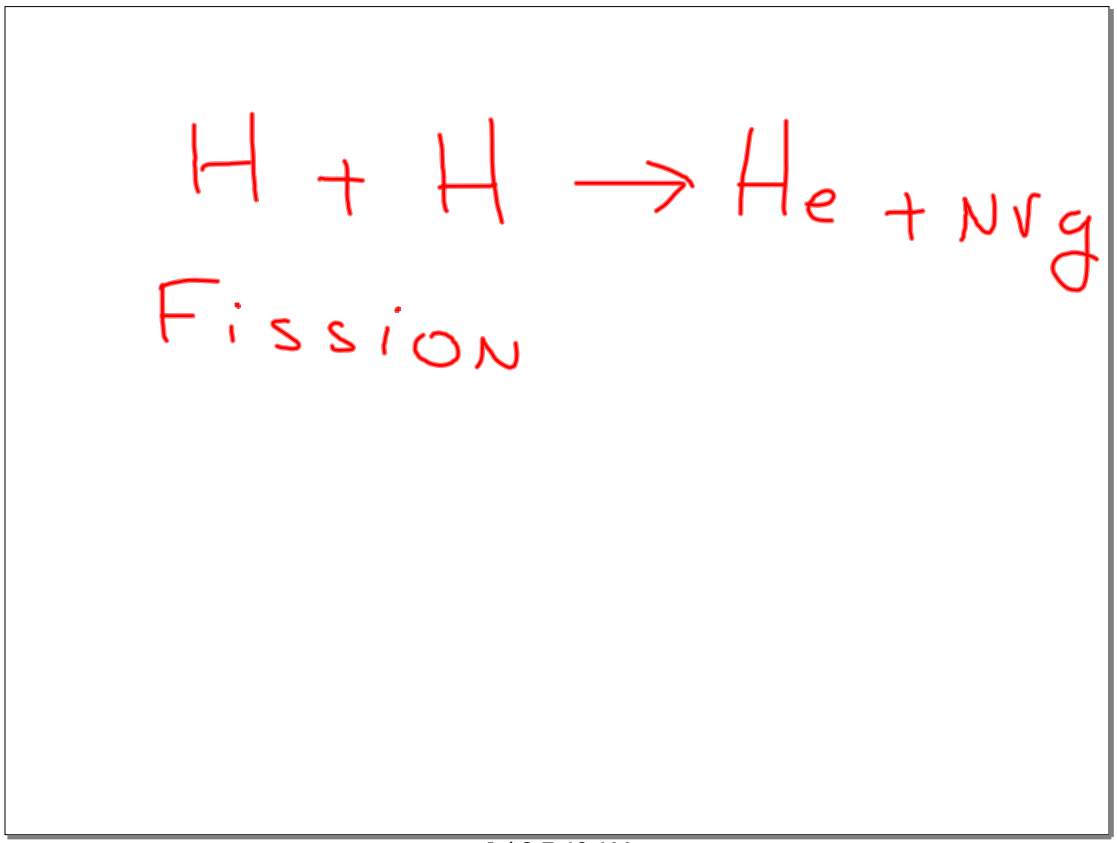


Jul 2-7:46 AM

Stars Book Work:

Read Pages: 805-812; 815-825
Questions: pp830-831: 1-5, 8-12, 15, 19

Terms to Define or know:

Suns Mass-

Photosphere-

Chromosphere-

Corona-

Solar Wind-

Sunspot-

Fusion-

Fission-

Magnitude-

HR Diagram-

White Dwarf-

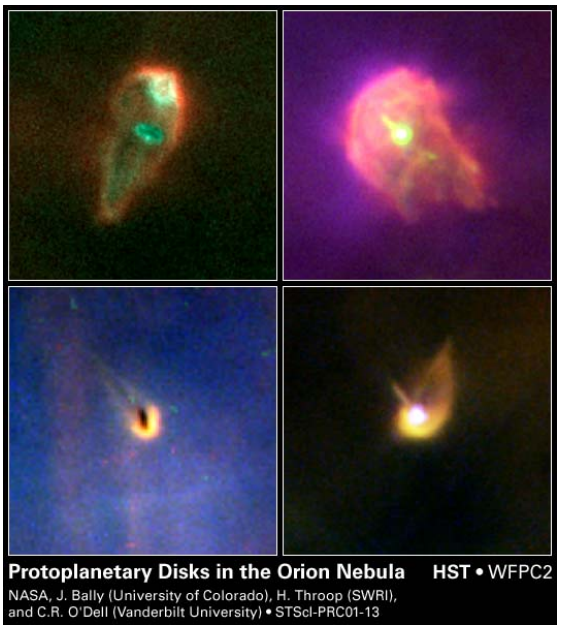
Black Hole-

Jun 26-10:08 AM

Star composition and construction

- Stars come in many different shapes, sizes, and colors, each of which signifies a different type and life cycle.
- All stars are born in the same manner - they begin as **nebulae**, clouds of dust, hydrogen, and helium. These clouds slowly condense as they age, forming small hot areas of gas called **protostars.** The temperature of these protostars increases until **nuclear fusion** begins in the cores. At that point, a young star is born.
- The stars' sizes and eventual fates are determined by the heat, size, shape, and location of the original protostars. Stars formed in this manner generally begin their lives in clusters, but then are influenced by other objects around them and slowly drift apart. Mature stars are classified and their origins revealed by their masses, sizes, temperatures, colors, and magnitudes.

Jun 30-9:07 AM



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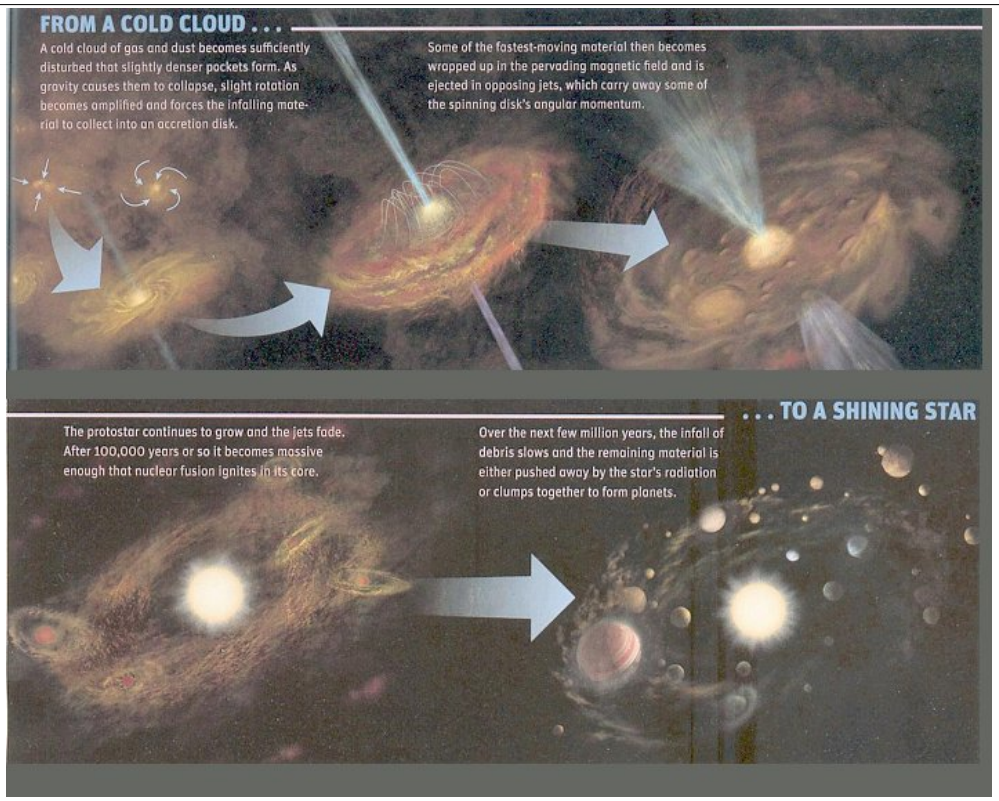
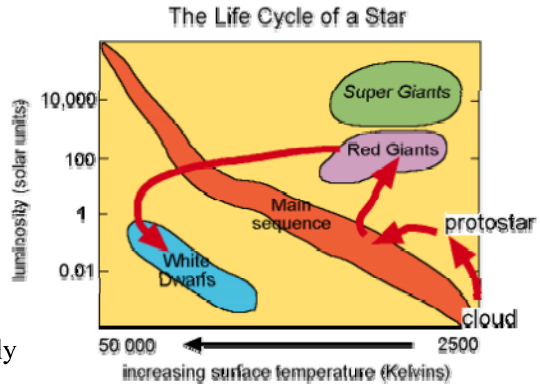


Jul 1-7:52 AM

All stars start in Nebula

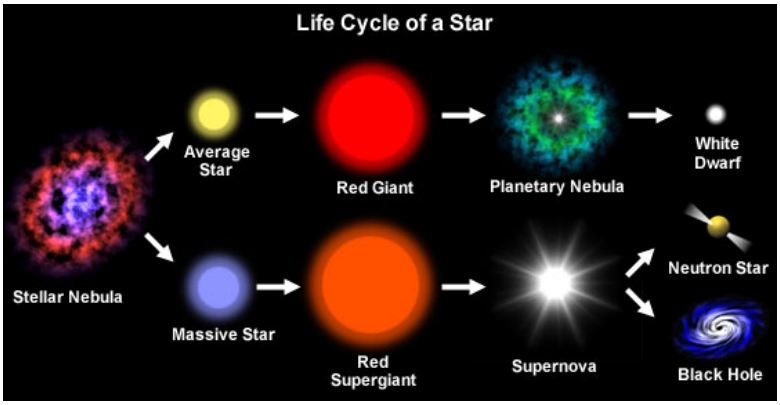
- Gases slowly accumulate. When there is enough, the gas collapses on itself and the temperature raises if there is enough gas for nuclear fusion to begin you get a star. If not you get a gas giant planet like Jupiter.



- The proto star is born. Gas may continue to add mass to the star. Once all readily available H is used up the stars mass stays relatively constant for millions or billions of years.

- Planets may also form at this time. If there is enough matter available.

Jul 1-7:53 AM



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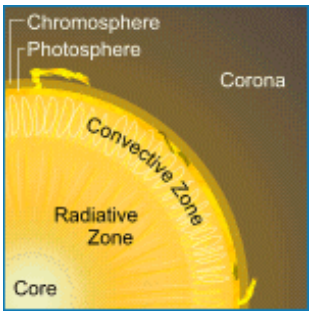
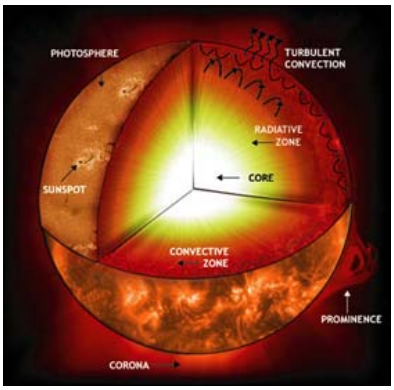
Interior of a star





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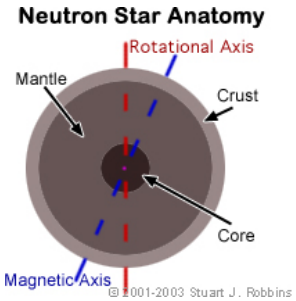

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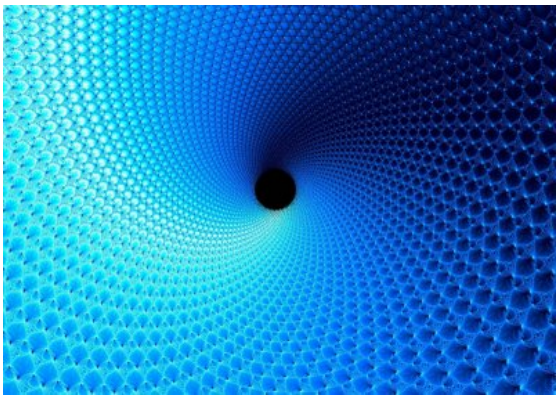
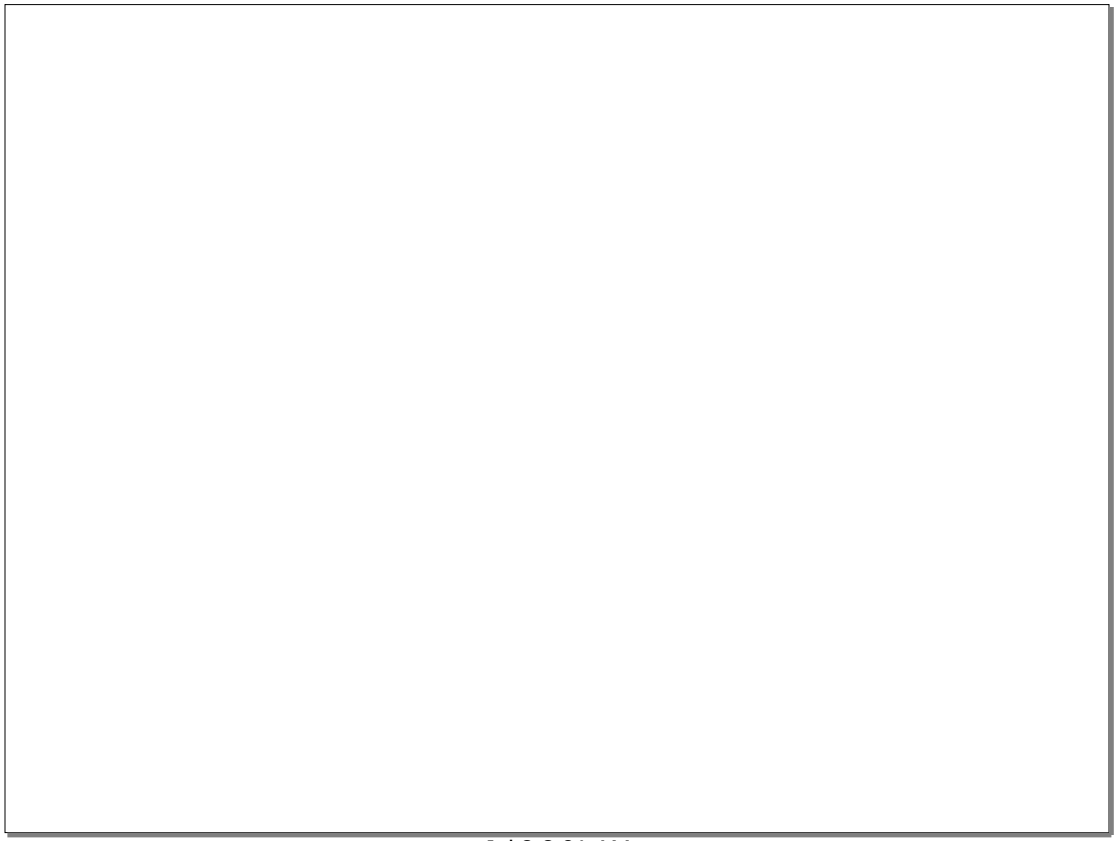


Black Hole Web Site

Jul 2-6:47 AM



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