Nebular Model

(how the solar system formed)

1. Rotating cloud of dust and gas (nebula) contracted due to gravity

2. Friction between the particles caused the temperature to rise, eventually fusion reactions occurred = sun \( \uparrow \) (\(4 \text{H} \rightarrow \text{He}\))

3. Most of the material (99.99\%) became the sun; the remaining material condensed to form the planets (denser ones closer to the sun)

4. Planets continue to revolve around the sun in the same direction the nebula was rotating (counter-clockwise)

This is where we are now...

... What next? ...

Summary for the Evolution of a Star

A. Low Mass (less than 4x (or <1.4x)) the mass of
A. Low Mass (less than 4x (or <1.4x) the mass of our sun)

1. Cloud of dust and gas (nebula) contracts due to gravity

2. Friction causes Temp to rise, then fusion, H to He, ... etc

3. When fuel inside star is used up an envelope of H expands outward = red giant

4. H envelope disperses leaving a core called a white dwarf

5. Eventually white dwarf burns out leaving a hunk of dirt (black dwarf) where the star used to be in space

Note: our sun is a low mass star. We are in the H joining to form He stage.

B. Medium Mass (btwn 4 and 10x mass of sun)

1. 7 same as low mass

2. 

3. 

4. When fuel used up, the star explodes
5. Half mass flies away to become nebula.
6. Remaining mass becomes a very dense neutron star.

\[ \text{e}^- \text{e}^+ \text{p} \rightarrow \text{n} \]

in a neutron star the "e" and "p" join to become a "n" and the empty space is gone = very dense

C. High mass (greater than \( 10 \times \text{mass of our sun} \))

1. 
2. } same as medium mass
3. 
4. 
5. 
6. Remaining mass becomes a very, VERY dense black hole
   - have so much gravity that even light can't escape
   - is a dense object/point, not a hole!