What is the evidence supporting the **nebula theory** of Solar System formation?

**The standard model for formation of the Solar System is that it formed from a giant interstellar cloud. What is the evidence to support this theory?**

Perhaps the most convincing line of evidence supporting this theory are observations of the same process currently happening elsewhere in our Galaxy. It would be strange if our Solar System formed in a different way to every other system in the Galaxy, since physics is supposed to work the same way everywhere. We see stars forming in the depths of giant clouds of gas and dust, and we even see young stars with disks of debris around them, which look just like the debris disk we think the planets formed from.

Other lines of evidence come from simulations of the process. Many astronomers spend most of their time constructing detailed simulations of physical processes in computers. You can put into the simulation details of how the physics should happen and then run it to see what the result is. Current simulations of the formation of a solar system from a cloud of gas work quite well.

Observations of the solar system itself support the theory too. In fact it was these observations which lead to the proposal of the theory in the first place.

1. All the planets orbit the Sun in the same direction. Most of their moons also orbit in that direction, and the planets (and the Sun) rotate in the same direction. This would be expected if they all formed from a disk of debris around the proto-Sun.

2. The planets also have the right characteristics to have formed from a disk of mainly hydrogen around a young, hot Sun. Those planets near the Sun have very little hydrogen in them as the disk would have been too hot for it to condense when they formed. Planets further out are mostly hydrogen, (since that was what was mostly in the disk), and are much more massive because there was so much more material they could be made from.

Finally in this model the Sun is mostly composed of hydrogen. This can also be tested. Observations of the Sun agree incredibly well with what would be expected of a giant ball of mostly hydrogen generating heat by nuclear fusion in the core. The composition can also be measured using helioseismology (the study of 'Sunquakes') and agrees with the theory.