Jovian Planets Essay, Research Paper

The view on how astronomers once thought that the planets in universe formed is beginning to change. Astronomers once thought the guest giant plants formed slowly. Gravity pulled debris together to form rocky cores several times a mass of the Earth, the largest of these sweeping up vast amounts of gas becoming huge giants. It is thought that roughly one billion years was needed to make these planets by the core-accretion process. Recent computer modeling in discoveries of extra solar planets suggest differently.

Recent discoveries in modeling suggest that Jupiter size planets are lucky survivors of a much faster process. Survival is almost rare as these would be Jupiter’s and Saturn’s have only a few million years to grab all they can and many Jupiter like planets either bounce out of the solar system or plunge into the parents sons because of complex gravitational interactions. The startling shift in thinking began when Lawrence Livermore national laboratory physicist Bill Nellis fired a laser beam at a quarter size disk of liquid hydrogen.

This laser crunch created metallic hydrogen, which is believed to fill the cores of the giant planets such as Jupiter and Saturn. Nellis’s computer model results are “consistent with a rocky core mass of zero” says scientist Bill Hubbard. With no or a little rocky core, core-accretion is difficult to explain. Carne institution of Washington astrophysicist Alan Boss suggest Jupiter may have formed with a clump of gas collapsed under its own weight, similar to store formation. Ts disk instability model is actually updated version of the 29-year-old theory.

This theory, created in 1951 by Gerard Kuiper, and refined by Al Cameron in 1970, suggested gas in a merely uniformed disk would abruptly become unstable and contract rapidly compressing into clumps forming spheres. “The disk-instability model fell into complete disrepute,” says Boss as no one could reconcile rocky cores with a collapsing clump of gases. In the mid-80s astronomers found that young stars lose their discs after only a few million years. In its simplest form core-accretion could take billions of years.

New models a solar system dynamics suggest gravitational kicks could cause planets to be pushed into new orbits or spiral into the star in one million years. Princeton University astrophysicist Scott Tremain asks, “Why did Jupiter spiral into the sun and take the earth with it?” If Jupiter formed by the slow accretion of gas gravitational forces could have slowly drag Jupiter into small and faster orbits. However, astronomers agree Jupiter stayed put. One possible explanation Jupiter formed to rapidly to be decelerated and it may not have a rocky core or at least a significant one. Blood because scientists cannot accurately measure gravitational field they must rely on computer simulations. Now by firing a light-gas gun that compresses liquid hydrogen by imploding it with laser beams Nellis can create metallic hydrogen lasting as long as 100ns. By comparing these calculations with Galileo probe measurements Jupiter is found to be less than 10 Earth masses supporting disk instability models.

These findings prompted many astronomers to think that core accretion might not be the correct way to go. However, disk instability models cannot rule out core accretion. Neither is mutually exclusive and one or both could be true. The one thing everyone does agree on is there is a need for more data and surveys of clusters of young stars. There’s still much uncertainty surrounding planet formation. It will be very interesting with upcoming technological advances that make aid inn proving such theories.