THE BILLIARD BALL HYPOTHESIS

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Written December 13, 2012

This work is the description of an alternate hypothesis for the process that led to the arrangement of the planets of the inner solar system from Mercury to Mars. The current proposed belief is that the solar system was created by an accretion process from a ring of dust and rock, and this hypothesis is widely accepted. The billiard ball hypothesis does not dispute this proposition, but adds an additional phase to it that starts with an inner solar system that was not populated by four planets, but by one single planet with two moons. This was, possibly, a super-earth in the habitable zone.

The Billiard Ball Hypothesis proposes that the four planet inner solar system was created from this super planet by a side-swiping collision with the inner moon- a moon that spiraled into the planet through an unstable orbit. The moon then became the planet Venus. The outer moon of the super planet was ejected into its own orbit around the Sun and became the planet Mercury. The super planet itself was split into two planets that became the Earth and Mars. Some of the debris from the event, that could have also accreted into the planet Mars, was drawn away by the pull of the gas giants Jupiter and Saturn to form the asteroid belt.

This hypothesis can explain a few facts about the solar system. Why Venus has a retrograde rotation; why Mars is smaller than expected of a planet in its place in the inner solar system; and where the material in the asteroid belt came from. The best supporting evidence for this hypothesis is the asteroid belt material, a debris field that could be the remnants of the explosion of the super planet. Another piece of supporting evidence, the retrograde motion of Venus, is a possible clue to how the explosion was initiated. A side swipe collision that would occur from a spiraling decaying orbit would accomplish the splitting of the main planet in two and explain how the change in angular momentum needed to reverse the rotation of Venus was provided. As the moon spiraled in it would likely become mode-locked with the planet and have a synchronous rotation. It would also start to accrete atmosphere from the planet. The collision would then occur at a magnitude that would not destroy the moon, and only split the planet into two main pieces. When the planet split, the outer moon escapes into a solar orbit to become Mercury.

To prove this hypothesis the celestial dynamics would have to support that it could have happened. Could a simulation of the event described that would not violate the rules of dynamics be created, and accomplish the proposed results? This possibility can be tested using various initial positions of the super planet's orbit, at locations between Jupiter and the sun. The analysis could start by computing the total mass and total orbital energy in the bodies involved in the hypothetical event. That is the sum of the mass and energy in the orbits of Mercury, Venus, Earth and Moon, Mars and its moons, and the asteroid belt. Then compile this mass and orbital energy into a system with three bodies- a super planet, a moon the size of Venus, and a moon the size of Mercury. From this point determine if the new system can produce the inner solar system in the event of collision described, and conserve the relevant properties- energy, momentum, and angular momentum. It would help to next find out what perturbations can be applied to alter the results, and discover their relevance to the hypothesis' truth or failure. The gravity of the gas giants is already considered a part of the process of creating the asteroid belt. Could this effect have affected the other parts of the process also?

The Billiard Ball hypothesis uses an analogy between the collision of balls in a pool game to describe a hypothetical event that could have created the inner solar system, from a collision of a planet and one of its moons. It was suggested by the preliminary findings of exoplanet research, that super planets in the inner system of stars are prevalent, and that systems of smaller planets in the inner orbits of stars like our own seem to be rare. Because this hypothesis explains some of the oddities of our inner solar system it is a useful hypothesis to consider for describing the creation of the inner worlds. Because it does not refute the accretion model, but adds to it, the infusion of its ideas into the current beliefs on the subject can be described as gentle.

As the creator of this hypothesis, I do not necessarily believe that it is true, but I do think that it is an interesting possibility, that is worth consideration, and, if someone has the time and resources, hypothesis testing through computer models and simulations.