On possibility of binary companion of the Sun: A serendipity finding and comparison with UVS model of Solar System

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Abstract

While we completely understood that a binary dwarf companion of the Sun has not been accepted by majority of astronomers, allow us to present some new arguments, along with our own serendipitous encounter with such a binary companion of the Sun. We hope that the present note will be found useful for further investigations, in relation to Planet Nine and such a dwarf star companion of the Sun (sometimes dubbed as Nemesis). Nonetheless, this article is not an exhaustive review of such dwarf companion star theories.

Keywords: planet nine, dwarf star, binary star formation, Solar system, Batygin & Brown

Introduction

The existence of a dwarf star as binary companion of the Sun has been debated for long time, although its existence has not been found yet. Some argues that no evidence at all supports such a dwarf star companion, or sometimes dubbed as Nemesis.

Nemesis is a theoretical dwarf star thought to be a companion to our sun. The theory was postulated to explain a perceived cycle of mass extinctions in Earth's history. Scientists speculated that such a star could affect the orbit of objects in the far outer solar system, sending them on a collision course with Earth. While recent astronomical surveys failed to find any evidence that such a star exists, a 2017 study suggests there could have been a "Nemesis" in the very ancient past. [1]

A number of arguments supporting possible existence of Nemesis

Among arguments supporting possible existence of Nemesis, one of the most popular is the past extinction record.

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In the early 1980s, scientists noticed that extinctions on Earth seemed to fall in a cyclical pattern. Mass extinctions seem to occur more frequently every 27 million years. The long span of time caused them to turn to astronomical events for an explanation.

In 1984, Richard Muller of the University of California Berkeley suggested that a red dwarf star 1.5 light-years away could be the cause of the mass extinctions. Later theories have suggested that Nemesis could be a brown or white dwarf, or a low-mass star only a few times as massive as Jupiter. All would cast dim light, making them difficult to spot.[1]

Scientists speculated that Nemesis may affect the Oort cloud, which is made up of icy rocks surrounding the sun beyond the range of Pluto. Many of these chunks travel around the sun in a long-term, elliptical orbit. As they draw closer to the star, their ice begins to melt and stream behind them, making them recognizable as comets.

If Nemesis traveled through the Oort cloud every 27 million years, some argue, it could kick extra comets out of the sphere and send them hurling toward the inner solar system — and Earth. Impact rates would increase, and mass extinctions would be more common.

Another theory is there is a huge ice giant, nicknamed "Planet Nine," that is at the edge of our solar system. Researchers Konstantin Batygin and Mike Brown (both from the California Institute of Technology) suggested in 2016 that such a body might be stirring up smaller icy bodies in the Kuiper Belt.

More recent discoveries from the Chilean observatories of Sedna have only confirmed the existence of a massive “perturber” (to use the old language) or a “shepherd” (to use newer lingo). This article from *The Smithsonian’s Air & Space* publication makes it clear that the Caltech astronomers Mike Brown and Konstantin Batygin used a March 2014 issue of *Nature* to guide them to their discovery of Planet 9:

> “When the two astronomers published the announcement, in the journal *Nature* in March 2014, they noted something odd about 2012VP, Sedna, and 10 other super-distant objects. They were all clustered in an unexpected way; their orbits all crossed the ecliptic plane—

> the conceptual flat disk around which the eight planets orbit the sun—very close to the spot where they came closest to the sun. So odd was the uniformity that the pair suspected something was causing it; they wrote, *'[A]n unknown massive perturbing body may be shepherding these objects into these similar orbital configurations.'*"[2]

A search for Planet Nine is ongoing. Notably, Brown was part of the research team that found Sedna and several other icy bodies in the Kuiper Belt, and he was one of the lead advocates for reclassifying Pluto (once considered a planet) to a dwarf planet in 2006.[1]

While the above two chief arguments: the past record of mass extinction and Planet Nine are quite interesting, they are not conclusive yet, because there are other possibilities to explain the data.

A third view, suggests that it is possible that all stars were formed in pairs, according to Berkeley news.

The new assertion is based on a radio survey of a giant molecular cloud filled with recently formed stars in the constellation Perseus, and a mathematical model that can explain the Perseus observations only if all sunlike stars are born with a companion.

> "We are saying, yes, there probably was a Nemesis, a long time ago," said co-author Steven Stahler, a UC Berkeley research astronomer. "We ran a series of statistical models to see if we could account for the relative populations of young single stars and binaries of all separations in the Perseus molecular cloud, and the only model that could reproduce the data was one in which all stars form initially as wide binaries. These systems then either shrink or break apart within a million years."[4]

Provided such a statistical survey is correct, then it would mean that all stars including our Solar system may have dwarf companion, albeit its existence is undetected yet.

Now, allow us to retell our own serendipity finding of its possible existence. It began around 15 years ago, while one of us (VC) investigating planetary orbits in Solar system. It came to him an idea that given the chemistry composition of Jovian planets are different from inner planets, therefore it is likely both series of planets have different origin. Initially, he read paper suggesting that our Solar system can be modelled as "*two fluid model*" of superfluidity. But he sought a simpler explanation to explain the orbits of Jovian planets.

By assuming inner planets orbits have different quantum number from Jovian planets, he tried to use "*least square difference*" method in order to seek the most optimal straight line for Jovian planets orbits in a different quantum number. Then it came out that such a straight line can only be modelled if we assume that the Jovian planets were originated from a twin star system: the Sun and its companion. Although his study was based on statistical optimization [6][7], it yields new prediction of 3 planetoids in the outer orbits beyond Pluto, which were discovered later by Mike Brown et al.

Is it possible to directly detect a dwarf companion of the Sun?

For observational purpose, we submit three possible ways to model the Solar system as binary star system:

a. Dipole magnetic view (Whitmire et al.):

   We found a compelling dipole magnetic view of our Solar System including Oort Cloud by D. Whitmire, whose view seems to support hypothesis of dwarf star as part of such a dipole system.

b. Statistical model of turbulence:

   A paper published in Turkish Physics Journal proves that Planck distribution of black-body radiation can be derived by assuming pairs of positive-negative mass. Considering that Planck blackbody law can be connected to statistical mechanics of turbulence (see Sohrab), then it seems plausible to come up with similar hypothesis with Sadavoy and Stahler, that all stars were once born in pairs [5].

c. Hydrogen-antihydrogen pairs model:

   Apart from two-fluid model of Solar System as we mention above, since we prefer a quantum-hydrodynamics model of Solar System. Then it seems quite palatable to extend the Bohr-quantization of Solar System, by assuming it was not composed from large-scale hydrogen structure (check also Hydor model by ancient Greek philosopher), but to extend it by assuming a large scale "*hydrogen-antihydrogen pair*". Nonetheless, how we can model such hydrogen-antihydrogen system remain an open question.

Comparison with UVS model of solar system [10]

Vincent Wee-Hoo is a developer of UVS model of solar system and galaxies (UVS stands for: unified vortice singularity). Based on UVS model, he is able to come up with barycenter drivers of solar cycle. He wrote [10]:

"Despite the gas giants when aligned directly with the Sun-SSB alignment were observed to have their pulsing effects for sunspot number, the ISN proposed solar minima or maxima in many cases were not dominantly modulated by any direct alignment of the gas giants. These cases assert that these solar cycles were dominantly driven by the more effective planetary barycenters that had aligned with the Sun-SSB alignment. This case study asserts solar cycle is dominantly driven by the oscillating alignments of the Sun, the barycenters, or their alignments with the gas giants that optimize the alignments of the barycenters. … There are 19 cases (2 Min, 10 Min, 10 Max, 11 Min, 11 Max, 12 Max, 13 Min, 13 Max, 14 Min, 14 Max, 16 Max, 17 Min, 17 Max, 18 Min, 18 Max, 19 Min, 20 Max, 21 Max, and 23 Max) on the ISN proposed solar minima or maxima that were apparently driven by the alignments of Sun-SSB and the effective planetary barycenters, and they were not modulated by any alignment of gas giants that aligns with the Sun at all. These peaks and troughs of the sunspots apparently were subliminally driven by the alignment of nonmaterial objects that periodically aligns with the Sun. In 31 of the 48 total cases, they demonstrated the ISN proposed solar minima or solar maxima, were dominantly driven by the alignments of Sun-SSB that have had periodically aligned with the more effective planetary barycenters. The rest of the cases were having other assortment of effective alignments. …As empirically observed, the magnetic field reversal of the Sun was not caused by the SSB is furthermost or being nearest to the center of the Sun in the solar cycles, nor were they consistently caused by any conjunction of the gas giants. The hypothesized spin mechanism that specifically drives the solar minima or solar maxima also could not be verified in this case study. It is still a work in progress on this case study and its extended case studies for some cases of solar minima and maxima."

Comments: Although his model is lacking quantitative method, yet he is able to predict solar cycle fluctuations. Moreover, his UVS model seems related to one of us (VC)'s model as proposed long time ago in *Apeiron Journal*, January 2004, called CSV model (Cantorian Superfluid vortex); see [9][10].

Concluding remarks

Nemesis is a theoretical dwarf star thought to be a companion to our sun. The theory was postulated to explain a perceived cycle of mass extinctions in Earth's history. Scientists speculated that such a star could affect the orbit of objects in the far outer solar system, sending them on a collision course with Earth. While recent astronomical surveys failed to find any evidence that such a star exists, in this article we outline some theoretical findings including our own serendipity finding, suggesting that such a dwarf star companion of the Sun remains a possibility. We also discuss possible theoretical framework to advance further this line of thought.

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