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500 word article: Caltech researchers find potential evidence of undiscovered planet

In a far-off section of the solar system, where the light of the sun is 18,000 times dimmer than it is on Earth, an undiscovered planet might exist. Michael Brown and Konstantin Batygin, professors of planetary astronomy and planetary science at the California Institute of Technology, recently published a paper in the *Astronomical Journal* claiming that they found evidence of a large planet located about 250 times as far from the sun as Earth.

Brown and Batygin were originally trying to find out why a group of small, icy objects in a region of the solar system known as the Kuiper Belt shared similar elongated and elliptical orbital patterns. “All the orbits point the same way. They all are tilted in the same direction,” Batygin said. “And that’s an anomaly.” According to the paper that Batygin and Brown published, there’s only a one in 10,000 chance that these orbits are a random occurrence.

While orbiting the sun, the objects pass close to Neptune, but the observed orbits seem to be affected by a gravitational force other than Neptune’s. Using mathematical modeling, the researchers created simulations of the solar system allowing them to input different variables, including gravitational forces, that could have caused the orbits to cluster. Batygin said that he and Brown tried almost every possible solution to replicate the observed patterns.

“In the end, I have to say, the planet hypothesis was not the first one we came to,” Batygin said. “It was a last resort, and the data began to work beautifully thereafter.”

Michael Zevin, a doctoral candidate in astronomy and physics at Northwestern University who wasn’t involved in the research, cautions that there’s not necessarily a high probability the planet exists. “There’s evidence that could point to a planet being there, but correlation doesn’t mean causation,” he said. “Even though the simulations can reproduce what we see pretty well when we have the planet orbiting in a particular way, there might be other unexplained mechanisms.”

The most concrete way to prove the planet’s existence would be to spot it in space using a telescope, and Batygin said there is one telescope that could be powerful enough to do that–the Subaru Telescope in Hawaii.

“The paper we’ve published is a road map,” Batygin said. “It shows where, theoretically, to look for the planet.” Trying to find the planet, however, could be like trying to find a lightbulb on the moon, he said, since it is so far away and what little sunlight reaches it has to be reflected back to Earth in order for a telescope to detect it. “The hunt for Planet Nine is on,” he said.

Although Zevin thinks the study is more promising than others that have proposed evidence of a new planet, he is a bit skeptical. Further studies must be conducted to test Batygin and Brown’s hypothesis. “Space is really big. Even in our solar system, space is big,” Zevin said. “I think they’d have to get lucky to catch the planet.”