“It Was Totally Planet Nine” Transcript

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IRA FLATOW: Back in August, astronomer Konstantin Batygin was on the show talking about Niku, the newly discovered Kuiper Belt object with a really strange orbit that moves backwards at a 110-degree tilt to the rest of the solar system. Really strange. And Konstantin is an expert on Planet Nine, another mysterious planet body that we know next to nothing about and we don't even know where it is. So I asked him in that interview if these two objects could be related. Could Planet Nine have something to do with the weirdness of Niku's orbit?

[AUDIO PLAYBACK] -I want to say-- I'm not saying it was Planet Nine, but between you and me, it was totally Planet Nine. [END PLAYBACK]

FLATOW: Well now everything is Planet Nine with this guy, and he didn't have any evidence at the time to link the two, but he told us this week that he finally has proof. So joining us again for a brief update on the relationship between Niku and Planet Nine is Konstantin Batygin, assistant professor of planetary science at Caltech. Welcome back.

KONSTANTIN BATYGIN: It's great to be back. Thanks for having me.

FLATOW: I'm told you were inspired by our conversation about Niku a few months back to find that proof.

BATYGIN: Yeah, indeed. You know I sort of joked around about it on the show, but I went downstairs back to my office and I thought this sounds, of course, like a long shot, but I might as well do some numerical experiments. So that's what I did. Then we looked into it deeper with my friend, Mike Brown, and we're like, wow, this actually generates not only Niku-type orbits. We have one simulated particle that becomes truly an analog of this 110-degree tilted body is quite remarkable.

FLATOW: Wow. I'm Ira Flatow. This is Science Friday from PRI, Public Radio International, talking with Konstantin Batygin. But right now Niku is too far away from Planet Nine to be affected by it. How does this happen?

BATYGIN: That's right. And that was one of the things that initially led us to think that this would be a long shot. But what we discovered is a dynamical pathway. We discovered that through something called the Kozai-Lidov Effect, what Planet Nine does is it can take a very distant orbits twist them on their side while they're still in the very distant parts of the solar system that are directly affected by the Planet Nine's gravity.

And then subsequently these orbits can intersect the orbit of Neptune and then close encounters with Neptune can subsequently shrink their orbits-- kind of pull them into the inner solar system. So they get produced far away and then they get shrunk and kind of frozen in these highly inclined retrograde very weird states. But the dynamical pathway involves the action of Planet Nine.

FLATOW: So do you feel vindicated now?

BATYGIN: I guess. I do so on a daily basis.

FLATOW: Do your colleagues believe you when you say it?

BATYGIN: I think in this case the proof is in the calculation. I didn't make this up. There's the numerical experiments still the ingredient they have is gravity, and we know how that works pretty well in the solar system. So I think there is no question that such a pathway exists, provided the existence of Planet Nine.

FLATOW: So I understand in the meantime that you found out that it may have an effect on our solar system that makes our sun look tilted. Is that right?

BATYGIN: That's right. That's right. One of the great mysteries of the solar system dating back probably 150 years has been the fact that the sun is oblique with respect to the plane of the solar system by six degrees. Now of course among friends six degrees is not very many degrees. But six degrees is big compared to the mutual inclination between the planetary orbits.

So the planetary orbits are flat with respect to one another to less than a degree. And the sun kind of stands out as a strange outlier. So as we go through the solar system and try and look for puzzles that could be tied to Planet Nine, we recognize that this could be one of them.

Over the course of the solar system's lifetime, over 4 and 1/2 billion years, Planet Nine, because it resides on a somewhat tilted orbit, can torque the entire solar system, meaning the planetary orbits, by some number of degrees, which depends on the orbit of Planet Nine and the planet. And that number, if you plug in the numbers that we've calculated from the distant Kuiper Belt, turns out to be exactly six degrees into the correct direction.

FLATOW: I have to interrupt you. That's great. We need a new movie Planet Nine from Outer Space, Konstantin.

BATYGIN: That's right. Yeah. I'm working on the script right now. Konstantin Batygin, assistant professor of planetary science at Caltech.