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Citizen scientists catch cloud of comets orbiting distant star

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5-6 minutes

(Image: NASA)

A crowdsourced group of planetary detectives may have spotted a massive cloud of comets orbiting a distant star.

NASA's exoplanet-hunting Kepler space telescope spent four years carefully watching the same patch of sky, looking for any stars that dipped in brightness. These dips happen when an

orbiting planet crosses in front of the star, and measuring their size and timing provides astronomers with data about the planet.

Most Kepler data is processed automatically by algorithms looking for repeating patterns, but a website called Planet Hunters lets citizen scientists inspect the data by eye in an effort to spot anything unusual.

Data from one star, known as KIC 8462852, was so strange that people started labelling it “bizarre” and “curious”. Orbiting planets block their stars’ light for a few hours or days at regular intervals that correspond to the duration of their orbit. But this star seemed to have two small dips in 2009, a large, weirdly asymmetric dip lasting a week in 2011 and a series of many dips during three months in 2013, some reducing the brightness of the star by as much as 20 per cent.

Explaining the signal

“It was kind of unbelievable that it was real data,” says Tabetha Boyajian of Yale University, who led a team of astronomers investigating the signal. But after checking and double checking for anything that could have gone wrong with the telescope, they decided the signal must be real – and were forced to come up with an explanation. “We were scratching our heads. For any idea that came up there was always something that would argue against it.”

With the aid of ground-based observations, the team ruled out variability from the star itself or interference from other nearby stars. Instead they decided the star was being covered by clumps

of dust. But where did the dust come from?

Collisions within an asteroid belt around the star, or a smash-up between two larger bodies like the one thought to have produced the Earth and moon in our solar system, wouldn't produce all of the dips in starlight.

Having worked through the other possibilities, the team concluded the most likely explanation is a family of exocomets that veered close to the star and were broken up by its gravity, producing huge amounts of dust and gas in the process. If the comets are on an eccentric orbit passing in front of the star every 700 days or so, further breaking up and spreading out as they go, that could explain all the dips in the data.

Cosmic-scale fireworks

KIC 8462852 is about 50 per cent larger than our sun, so if this comet explanation is correct, the dust cloud would be pretty big. It would be an impressive sight up close, says Boyajian. Something that size in our solar system would blot out a significant amount of sunlight. When Earth passes through the debris clouds left in interplanetary space by passing comets, we get meteor showers. There's no evidence of a planet in the KIC 8462852 system, but someone standing on such a world as it passed through the dust cloud would see quite a light show, says Boyajian. "The scale of the meteor shower would be huge, like cosmic-scale fireworks."

More data will help pin down the true nature of this strange signal. Kepler stopped working properly in 2013, so the team haven't been able to track the star as well as they would like. There were no observations of the star in April 2015, when the next dipping

events might have occurred, but the team are planning to keep an eye out in May 2017. “It’s really frustrating that the light curve got really, really exciting right before the Kepler mission died,” Boyajian says.

Still, the team says Planet Hunters was instrumental in finding this signal in the first place. There could be more oddities hiding in the data we already have.

“Planet Hunters have gone through maybe about half of the Kepler light curves, so there is still a whole lot to be viewed and classified,” Boyajian says.

Reference: http://arxiv.org/abs/1509.03622

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