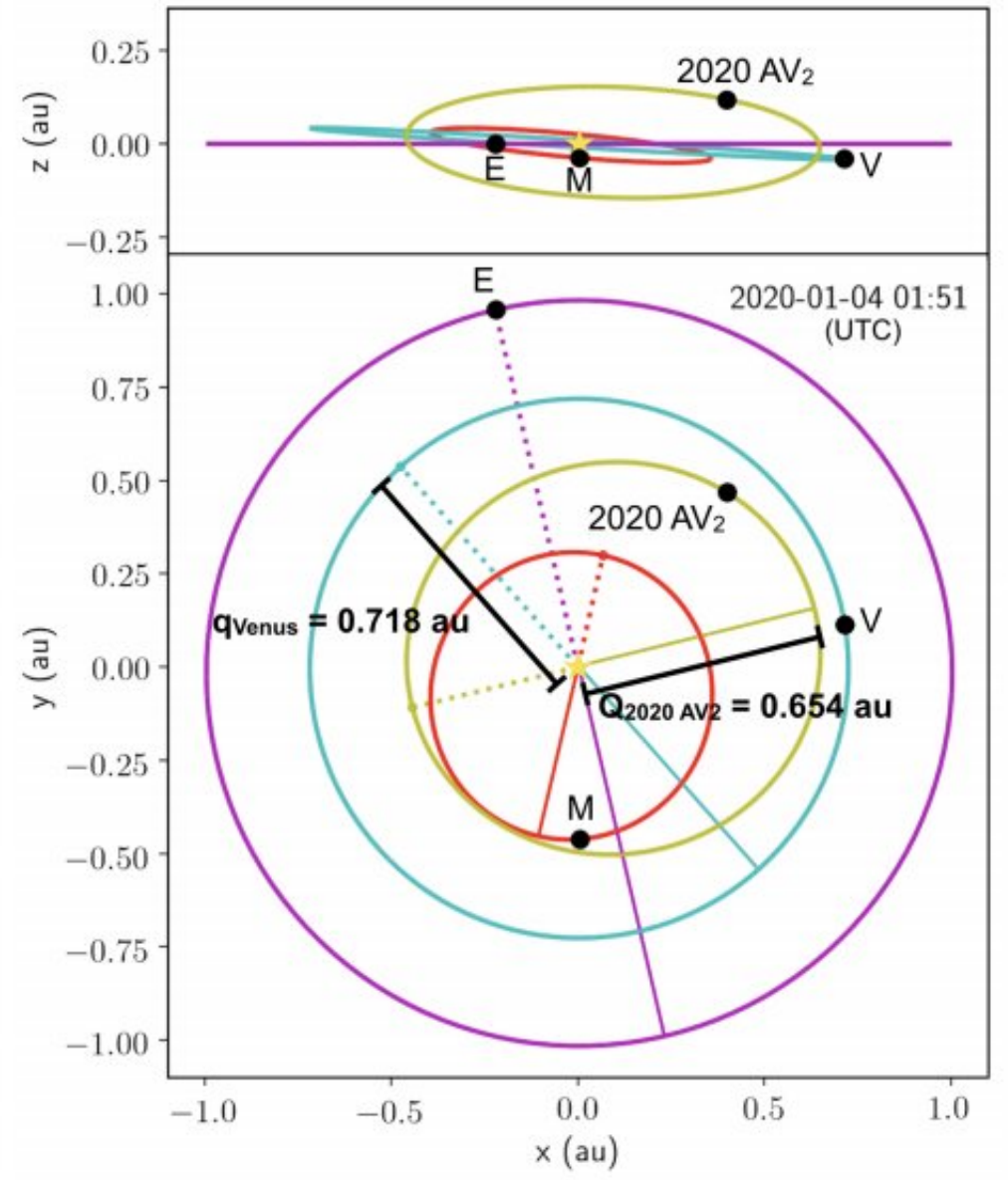
Astronomers discover a 2-km asteroid orbiting closer to the sun than Venus

September 16 2020, by Evan Gough



This image from the study shows 2020 AV2's orbit. It also shows the orbits of

Earth, Mercury and Venus. Perihelions are dotted lines, and aphelions are solid lines. Credit: Credit: Ip et al, 2020

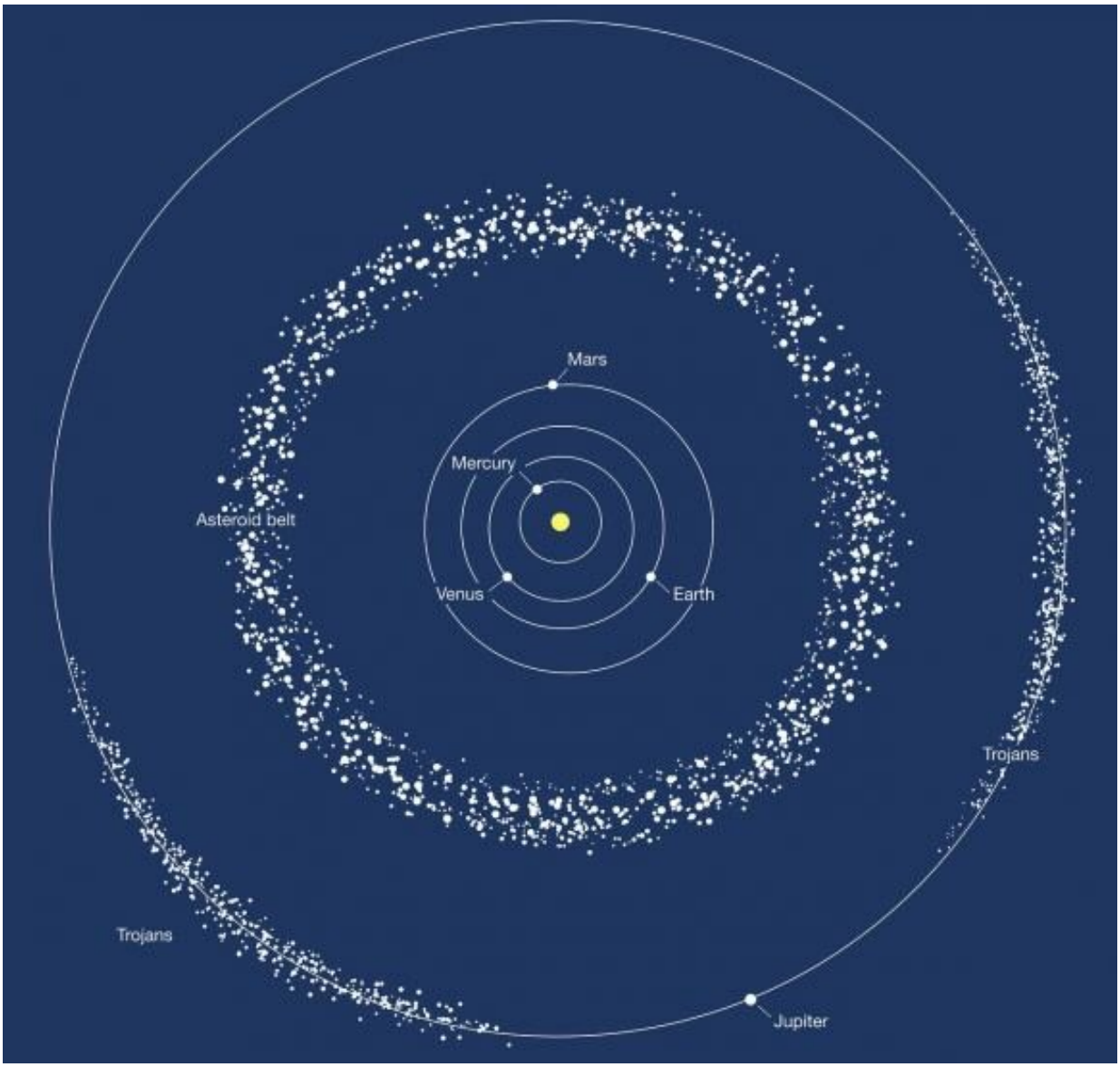
Astronomers have painstakingly built models of the asteroid population, and those models predict that there will be ~1 km-sized asteroids that orbit closer to the sun than Venus does. The problem is, nobody's been able to find one—until now.

Astronomers working with the Zwicky Transient Facility say they've finally found one. But this one's bigger than predictions, at about 2 km. If its existence can be confirmed, then asteroid population models may have to be updated.

A new paper presenting this result is up on arxiv.org, a pre-press publication site. It's titled "A kilometer-scale asteroid inside Venus's orbit." The lead author is Dr. Wing-Huen Ip, a professor of astronomy at the Institute of Astronomy, National Central University, Taiwan.

The newly discovered asteroid is named 2020 AV2. It has an aphelion distance of only 0.65 astronomical units, and is about 2 km in diameter. Its discovery is surprising since models predict no asteroids this large inside Venus' orbit. It could be evidence of a new population of asteroids, or it could just be the largest of its population.

The authors write, "If this discovery is not a statistical fluke, then 2020 AV2 may come from a yet undiscovered source population of asteroids interior to Venus, and currently favored asteroid population models may need to be adjusted."



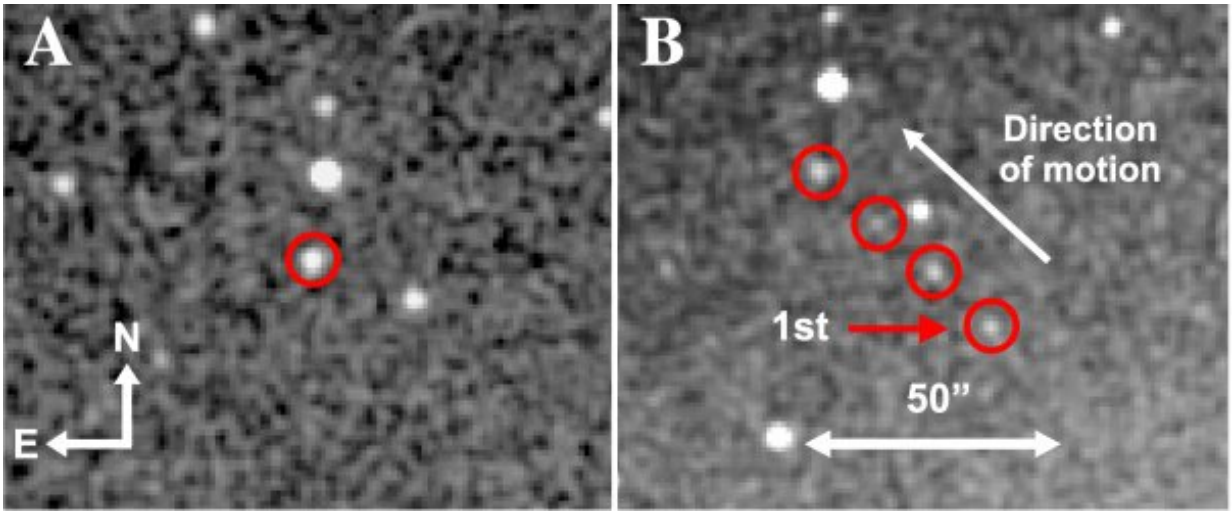
This image depicts the two areas where most of the asteroids in the Solar System are found: the asteroid belt between Mars and Jupiter, and the trojans, two groups of asteroids moving ahead of and following Jupiter in its orbit around the Sun. Image Credit: NASA

There are about 1 million known asteroids, and the vast majority of them are well outside Earth's orbit. There are only a tiny fraction located with

their entire orbits inside Earth's. Models predict that an even smaller number of asteroids should be inside Venus' orbit. Those asteroids are called Vatiras.

2020 AV2 was first spotted by the Zwicky Transient Facility (ZTF) on January 4, 2020. Follow-up observations with the Palomar 60-inch telescope and the Kitt Peak 84-inch telescope gathered more data.

Near the end of January, astronomers used the Keck Telescope for spectroscopic observations of the rock. That data shows that the asteroid came from the inner region of the main asteroid belt, between Mars and Jupiter. "These data favor a silicate S-type asteroid-like composition consistent with an origin from the inner Main Belt where S-type asteroids are the most plentiful." They add that it agrees with Near Earth Asteroid (NEA) models that "…predict asteroids with the orbital elements of 2020 AV2 should originate from the inner Main Belt."



This figure from the study shows some of the images of 2020 AV2. (A) Discovery 30 s r-band image of 2020 AV2 taken on 2020 January 4 UTC where 2020 AV2 is the detection located in the circle. (B) Composite image containing the four discovery 30 s r-band exposures covering 2020 AV2 made by stack on

the rest frame of the background stars over a 22 minute time interval. The first detection has been labeled. The asteroid was moving ~1 degree per day in the northeast direction while these images were being taken resulting in a ~15 arcseconds spacing between the detections of 2020 AV2. Credit: Ip et al, 2020

2020 AV2 is either a model buster or a model confirmer. "NEA population models predict