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A white dwarf (blue star at upper left) hotter than the sun's surface blasts an asteroid. MARK A. GARLICK

## Dying sun caught tearing apart its own asteroids

By Ken Croswell | Oct. 21, 2015 , 1:00 PM

The Kepler Space Telescope has detected disintegrating asteroids orbiting a white dwarf, **the type of burned-out star our sun will become about 8 billion years from now**. The discovery explains why

A typical white dwarf is nearly as massive as the sun but only slightly larger than Earth, so the star exerts a strong gravitational pull at its surface: Drop a rock from a height of 1 meter and it would hit the star at thousands of kilometers per hour. The strong gravitational force should also yank all elements heavier than helium beneath the star's surface, yet **the surfaces of many white dwarfs nevertheless possess heavy elements**, suggesting that asteroids deposit elements such as silicon and iron.

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Now, for the first time, researchers have seen this scenario unfold. Andrew Vanderburg, an astronomer at the Harvard-Smithsonian Center for Astrophysics, was analyzing data from Kepler, which detects planets when they block the light of their sun. "One of the white dwarfs suddenly popped up with this really intriguing signature," Vanderburg says. As his team reports online today in *Nature*, **the white dwarf, located in the constellation Virgo and named WD 1145+017, has at least one, and probably several, asteroids that are disintegrating**. As a debris cloud from each asteroid passes between us and the star, Kepler detects a dimming of the star's light.

"It's fascinating," says astronomer Michael Jura of the University of California, Los Angeles, who was not part of the discovery team. "They've actually caught in the act the process of some asteroid breaking into pieces, being disrupted by the white dwarf host star."

Indeed, the star itself is the asteroids' enemy. Its gravity has torn them asunder, and its light is vaporizing their rock. The asteroids are so close to the star that they revolve in just 4.5 to 4.9 hours; Vanderburg estimates they are roughly the size of Ceres, the largest asteroid between the orbits of Mars and Jupiter.

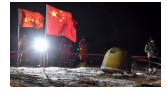
Billions of years from now, our sun will expand into a red giant, engulfing and incinerating Mercury and possibly Venus and Earth. Then the red sun will eject its outer layers and expose its hot core, which will contract into a white dwarf. Even if the sun never engulfs Earth, the drama may destabilize orbits in the solar system so that asteroids crash into our world and grind it up. Thus, the newly discovered asteroids could conceivably be the wreckage of a planet that once resembled our own.

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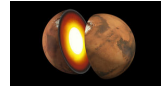
doi:10.1126/science.aad4743

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