Rocks around the clock: asteroids pound tiny star

February 19 2014

An artist's impression of an asteroid breaking up. Credit: NASA/JPL-Caltech

(Phys.org) —Scientists using CSIRO's Parkes telescope and another telescope in South Africa have found evidence that a tiny star called PSR J0738-4042 is being pounded by asteroids—large lumps of rock from space.

"One of these rocks seems to have had a mass of about a billion tonnes," CSIRO astronomer and member of the research team Dr Ryan Shannon said.

PSR J0738-4042 lies 37,000 light-years from Earth in the constellation of Puppis.

The environment around this star is especially harsh, full of radiation and violent winds of particles.

"If a large rocky object can form here, planets could form around any star. That's exciting," Dr Shannon said.

The star is a special one, a 'pulsar' that emits a beam of radio waves.

As the star spins, its radio beam flashes over Earth again and again with the regularity of a clock.

In 2008 Dr Shannon and a colleague predicted how an infalling asteroid would affect a pulsar. It would, they said, alter the slowing of the pulsar's spin rate and the shape of the radio pulse that we see on Earth.

"That is exactly what we see in this case," Dr Shannon said.

"We think the pulsar's radio beam zaps the asteroid, vaporising it. But the vaporised particles are electrically charged and they slightly alter the process that creates the pulsar's beam."

Asteroids around a pulsar could be created by the exploding star that formed the pulsar itself, the scientists say.

The material blasted out from the explosion could fall back towards the forming pulsar, forming a disk of debris.

Astronomers have found a dust disk around another pulsar called J0146+61.

"This sort of dust disk could provide the 'seeds' that grow into larger asteroids," said Mr Paul Brook, a PhD student co-supervised by the University of Oxford and CSIRO who led the study of PSR J0738-4042.

In 1992 two planet-sized objects were found around a pulsar called PSR 1257+12. But these were probably formed by a different mechanism, the astronomers say.

The new study has been published as a paper in The *Astrophysical Journal Letters*, a leading journal of astronomical research: Evidence of an asteroid encountering a pulsar.

More information: "Evidence of an Asteroid Encountering a Pulsar," P. R. Brook et al., 2014 *ApJ*, 780, L31. dx.doi.org/10.1088/2041-8205/780/2/L31

Provided by CSIRO

Citation: Rocks around the clock: asteroids pound tiny star (2014, February 19) retrieved 6 February 2026 from https://phys.org/news/2014-02-clock-asteroids-pound-tiny-star.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.