

Watery, rocky planets may be common in the Milky Way

April 13 2010



An artist's impression of a massive asteroid belt in orbit around a star. Credit: NASA-JPL / Caltech / T. Pyle (SSC)

(PhysOrg.com) -- An international team of astronomers have discovered compelling evidence that rocky planets are commonplace in our Galaxy. Leicester University scientist and lead researcher Dr Jay Farihi surveyed white dwarfs, the compact remnants of stars that were once like our Sun, and found that many show signs of contamination by heavier elements and possibly even water, improving the prospects for extraterrestrial life. On Tuesday 13th April Dr Farihi presented his results at the RAS National Astronomy Meeting (NAM 2010) in Glasgow.

White dwarf stars are the endpoint of [stellar evolution](#) for the vast

majority (>90%) of all stars in the [Milky Way](#), including our Sun. Because they should have essentially pure hydrogen or pure helium atmospheres, if heavier elements (in astronomy described as ‘metals’, examples including calcium, magnesium and iron) are found then these must be external pollutants. For decades, it was believed that the [interstellar medium](#), the tenuous gas between the stars, was the source of metals in these polluted [white dwarfs](#).

Farihi and his team used data from the Sloan Digital Sky Survey (SDSS), a project that aims to survey the sky in infrared light, imaging more than 100 million objects and following up 1 million of these by obtaining their spectrum (dispersing the light by colour).

By examining the positions, motions and spectra of the white dwarfs identified in the SDSS, Farihi and his team show that this is no longer a viable theory. Instead, rocky planetary debris is almost certainly the culprit in most or all cases.

The new work indicates that at least 3% and perhaps as much as 20% of all white dwarfs are contaminated in this way, with the debris most likely in the form of rocky minor planets with a total mass of about that of a 140 km diameter asteroid.

This implies that a similar proportion of stars like our Sun, as well as stars that are a little more massive like Vega and Fomalhaut, build terrestrial planetary systems. Astronomers are thus playing the role of celestial archaeologists by studying the 'ruins' of [rocky planets](#) and or their building blocks.

The scientists also measured the composition of the contaminating planetary debris through its chemical signature which stands out in the otherwise pure atmosphere of the white dwarfs.

Excitingly, it appears a significant fraction of these stars are polluted with material that contained water, with important implications for the frequency of habitable planets around other stars. If internal water is present in a substantial fraction of asteroids around other stars, like those that contaminated the white dwarfs, it is conceivable that at least simple life may be common throughout the Galaxy.

Dr Farihi comments: “In our own Solar System with at least one watery, habitable planet, the asteroid belt - the leftover building blocks of the terrestrial planets - is several percent water by mass. From our study of white dwarfs, it appears there are basic similarities found among asteroid-like objects around other [stars](#); hence it is likely a fraction of these white dwarfs once harbored watery planets, and possibly life.”

More information: SDSS home page www.sdss.org

Provided by Royal Astronomical Society

Citation: Watery, rocky planets may be common in the Milky Way (2010, April 13) retrieved 3 May 2024 from <https://phys.org/news/2010-04-watery-rocky-planets-common-milky.html>

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