



Astrophysics > Earth and Planetary Astrophysics

# Evidence for Terrestrial Planetary System Remnants at White Dwarfs

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The last several years have brought about a dynamic shift in the view of exoplanetary systems in the post-main sequence, perhaps epitomized by the evidence for surviving rocky planetary bodies at white dwarfs. Coinciding with the launch of the Spitzer Space Telescope, both space- and ground-based data have supported a picture whereby asteroid analogs persist at a significant fraction of cool white dwarfs, and are prone to tidal disruption when passing close to the compact stellar remnant. The ensuing debris can produce a detectable infrared excess, and the material gradually falls onto the star, polluting the atmosphere with heavy elements that can be used to determine the bulk composition of the destroyed planetary body. Based on the observations to date, the parent bodies inferred at white dwarfs are best described as asteroids, and have a distinctly rocky composition similar to material found in the inner Solar System. Their minimum masses are typical of large asteroids, and can approach or exceed the mass of Vesta and Ceres, the two largest asteroids in the Solar System. From the number of stars surveyed in various studies, the fraction of white dwarfs that host terrestrial planetary system remnants is at least a few percent, but likely to be in the range 20% to 30%. Therefore, A- and F-type stars form terrestrial planets efficiently, with a frequency at least as high as the remnants detected at their white dwarf descendants.

Comments: Invited Review at Planetary Systems Beyond the Main Sequence held in Bamberg, Germany; 18 AIP book pages, with 8 figures and 1 table  
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