
Extrasolar Cosmochemistry

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Abstract

Cosmochemistry within the solar system is mostly performed through analyzing the chemical compositions of meteorites, which can shed light upon the formation and evolution of the solar system. We have a program that uniquely measures the chemical compositions of extrasolar rocky objects, which brings us into a new area of extrasolar cosmochemistry. Specifically, we perform high-resolution spectroscopic observations on some white dwarfs, whose atmospheres were enriched with heavy elements by accreting from their own asteroids. Highlights of the field includes: (i) to zeroth order, the compositions of extrasolar planetesimals resemble rocky solar system objects. In almost all cases, O, Mg, Si and Fe make up more than 85% of the total mass. (ii) There is strong evidence that extrasolar asteroids have gone through additional processing, such as differentiation, collisions and meltings. Looking into the future, we have initiated a pilot search for evidence of Earth-analog plate tectonics in extrasolar planetesimals.

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