Compositions of Extrasolar Minor Planets from Polluted White Dwarf Studies

S. XU*[1], P. DUFOUR[2], N. N. MONSON[3], B. KLEIN[4], B. ZUCKERMAN[4], E. D. YOUNG[3]

[1]Gemini Observatory, 670 N. A'ohoku Place, Hilo, Hawaii, 96720, USA, *correspondence: sxu@gemini.edu
[2]Institut de Recherche sur les Exoplanètes (iREx) and Département de physique, Université de Montréal, Montréal, QC H3C 3J7, Canada
[3]Department of Earth, Planetary, and Space Sciences, University of California, Los Angeles, CA 90095, USA
[4]Department of Physics and Astronomy, University of California, Los Angeles, CA 90095, USA

The bulk composition of an extrasolar minor planet is a fundamental property that is difficult to extract from observations. Recently, it has been estabilished that some white dwarfs are actively accreting from planetary debris. White dwarf atmospheres are either hydrogen or helium dominated and accretion from even a single asteroid would create observable signatures. This provides a unique way to directly measure the chemical compositions of extrasolar minor planets and compare and contrast with solar system objects.

In this study, we will present results from observations obtained with the Keck Telescope of 18 white dwarfs, which host circumstellar dust disks and are among the most heavily polluted white dwarfs. We constrain the abundances of the major rock forming elements, including Ca, Mg, Si, and Fe. We will discuss how the measured compositions compare with those of rocky material in the solar system and also discuss the general properties of minor planets in extrasolar planetary systems.