CIPS Planetary Lunch

Apr. 16 , 2008

544 Campbell Hall, Noon - 1:00pm

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"Detecting extraterrestrial organic compounds in aerogel-capture hypervelocity particles"

On January 15th, 2006 the NASA Stardust Mission returned from its seven year trip through the Solar System, bringing with it the first samples to return on a space mission since the Apollo years. These captured cometary coma grains, from the comet 81P/Wild 2, and interplanetary dust particles offer the opportunity to analyze pristine material that might provide clues about the prebiotic chemical evolution of our Solar System as well as about chemistry that occurred during the formative period of our galaxy. During the Stardust Mission, particle collection was carried out using low-density, nanoporous silica aerogel. This material was developed in the 1980s to capture hypervelocity particles with minimal destruction.

Some of the captured 81P/Wild 2 particles left a significant amount of "debris" along their aerogel tracks. We used two-step laser mass spectrometry to perform in situ characterization of polycyclic aromatic hydrocarbons (PAHs) in this shed cometary material. At this seminar I will discuss the challenges associated with the in situ characterization of fragile organic compounds that have experienced the stress of hypervelocity capture. This work emphasizes the importance of extensive control testing and impact-simulations when analyzing low concentrations of organic compounds in exogenous samples collected using low-density silica aerogel.