

Studying Nebular Processes and Stellar (Solar) Wind Via Genesis Mission Samples

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Date: TODAY, Thursday, December 6, 2018

Time: 1:00 pm - 2:00 pm

Location: CNLS Conference Room (03-1690-102)

Host: Karen is local, email her at kdrieck@lanl.gov if you'd like to chat with her

Abstract:

NASA's Genesis mission collected solar wind at the L1 point for > 2 years and returned the samples to Earth for analysis. These samples have yielded the nitrogen, oxygen, and noble gas isotopic composition of the Sun as well as provided higher-accuracy solar elemental composition. The solar N and O isotopic compositions revealed an active process of CO and N₂ photochemical self shielding in the inner solar system prior to formation of planetesimals that rendered the terrestrial planets enriched in heavy isotopes. Similar processes appear to occur in other stellar systems too.

Genesis is also providing new insights into solar (and stellar) wind acceleration processes, which for the Sun are dominated by first-ionization potential fractionation of the elements. A key piece of information is that the different types, or regimes, of solar wind differ in their fractionation. The fast solar wind is less fractionated than other wind regimes and may be close to the actual solar composition. Genesis provided samples of each of the three solar-wind regimes. Elements of intermediate FIP—C, N, and O—are critically important, as they bound the transition between low-FIP and high-FIP fractionations—a key piece of evidence to match to solar-wind fractionation theory. In this talk I will summarize the background of the Genesis mission and discuss my analysis of these elemental abundances in regime-specific samples using secondary ion mass spectrometry.