The World Year of Physics is a worldwide celebration of physics and its importance in our everyday lives. The World Year of Physics aims to highlight the excitement of physics and inspire a new generation of scientists.

The Genesis Mission: Using the Sun as a key to understanding inhomogeneities in the solar system.

Peter Mao (Department of Earth and Space Sciences, UCLA)

Science Auditorium, CSUCI
December 8th, 2005: 3.30 pm
(Come at 3.10 pm for light refreshments!!)

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Inhomogeneities exist in our solar system at all size scales. At the largest scales, we see that silicate-rich (rocky) planets and asteroids occupy the inner part of the solar system (out to 5 AU) and gas-giant planets dominate the outer part (5-30 AU). At the smallest scale, we see evidence of isotopic fractionation in the micron-sized chondrules of common meteorites. Chondrules are the oldest solids in the solar system, thus their composition record the solar system's earliest planetesimal formation processes. Interpretation of the chondrule record has been stymied by the lack of a precise baseline from which we can compare the compositional variations.

The Genesis Mission seeks to establish a baseline from which we may interpret the chondrule record. The Genesis spacecraft spent 23 months collecting solar wind and returned to Earth with the samples in September, 2004. At UCLA, we are nearing completion of the construction of a mass spectrometer that was specifically designed to measure the oxygen isotopic composition of the Sun using a subset of the Genesis samples. We expect that by mid-2006, we will be able to improve the precision on the Sun's oxygen isotopic composition by a factor of 100. This measurement will allow us to evaluate theories of planetesimal formation in the early solar system.

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Peter Mao is a research scientist at UCLA in the Department of Earth and Space Sciences. Presently, he is building and testing MegaSIMS, a new mass spectrometer intended to measure isotopic abundances in the Genesis samples. Peter earned his Ph.D. degree from Caltech in 2002. As a graduate student, he developed an algorithm to optimize reflective x-ray coatings for arbitrary mirror geometries and undertook a survey of extra-galactic x-ray sources using the Palomar and Keck Observatories and the Chandra X-ray Observatory. The opportunity to build exciting, new laboratory instrumentation for the Genesis Mission prompted his transition from measuring photons to measuring ions.