

The Center for In Situ Exploration and Sample Return (CISSR)
Speaker Series

presents

Speaker: Stephen Fuerstenau

Topic: A Field-Portable Particle Charge Spectrometer (PCS)

Date: Friday, October 26, 2001

Time: 1:30 - 3:00 p.m.

Location: JPL Bldg. 306-302

Abstract:

Electrostatic charging of particles influences their agglomeration, transport, and adhesion in the environment. It is the cause of large electric fields associated with dust storms and dust devils on Earth and is a phenomenon that may be prevalent on Mars. Charge on small droplets and ice crystals plays a critical role in the electrification of thunder storms and Earth's global electric cycle. Because of its transient nature, charge is a property of particles that must be measured in-situ. Measuring charges of less than 0.01 pico-Coulombs on individual particles under these conditions has traditionally been a challenge. In addition to maximal charge sensitivity, a useful instrument should also yield some information about the particle size and provide this information for a large number of particles in a matter of seconds. At JPL we have developed a field portable Particle Charge Spectrometer (PCS) that measures the charge and size of individual particles from 1 to 100 micrometers in diameter. The precision of charge measurement is +/- 100 electrons which should make this measurement useful in a number of industrial applications. This talk will focus on the principle of charge measurement on particles and the operation of the PCS and will include a demonstration of the instrument.

Biography:

Stephen Fuerstenau is a senior engineer in the In-situ Instruments Group (Sec. 384). He holds a B.S. in Chemical Engineering from the University of California, San Diego and a Ph.D. from the Mechanical Engineering Dept. at Yale University. As a graduate student he investigated the dynamics of aerosol particles in high-speed flows and use of electrostatic sprays for the analysis of bio-molecules by mass spectrometry. Prior to joining JPL he spent two years as a post-doctoral researcher at the Lawrence Berkeley Laboratory's (LBL) Human Genome Center. While at LBL he pioneered the technique of charge detection mass spectrometry and made the first direct mass measurement of an intact virus. At JPL his research has been focused on the development of advanced detectors for mass spectrometry and, more recently, on new methods for characterizing particles in dust devils.

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