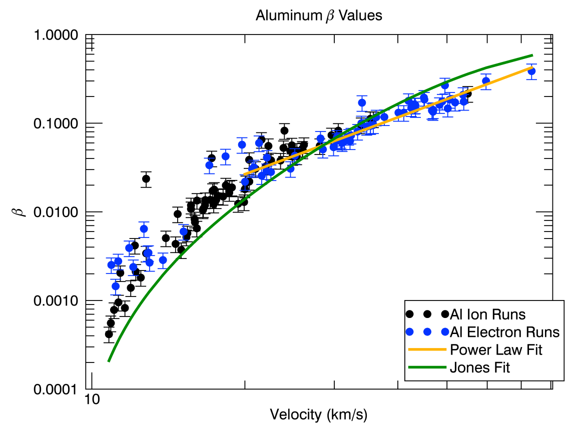
LABORATORY SIMULATIONS OF ALUMINUM MICROMETEOROIDS. Michael DeLuca[1,2,3], Evan Thomas[3,4], Tobin Munsat[3,4], Robert Marshall[2], and Zoltan Sternovsky[1,2,3], [1]Laboratory for Atmospheric and Space Physics, University of Colorado, Boulder, CO (michael.deluca@colorado.edu), [2]Aerospace Engineering Sciences, University of Colorado, Boulder, CO, [3]Institute for Modeling Plasma, Atmospheres, and Cosmic Dust, University of Colorado, Boulder, CO, [4]Physics, University of Colorado, Boulder, CO

Introduction: Laboratory simulations of micrometeoroids entering planetary atmospheres have been conducted at the Institute for Modeling Plasma, Atmospheres, and Cosmic Dust (IMPACT) at the University of Colorado. These experiments utilize the 3 MV hypervelocity dust accelerator at IMPACT to shoot submicron-size dust particles into an air chamber. The air chamber is filled with gas held at a constant pressure, typically around 0.1 Torr. When dust particles enter the chamber, they heat up and ablate. The ablated atoms can be ionized through collisions with the molecules in the background gas, producing electron-ion pairs that are collected by a series of 16 biased charge collectors along the inside of the air chamber. In addition to the charge collection, photomultiplier tubes (PMT's) observe the light produced by the particle as it ablates. The dust ablation experiments at IMPACT have studied both iron and aluminum particles entering air.

Aluminum Experiments: In this presentation we focus on the results from recent ablation experiments using aluminum dust particles. The aluminum dust particles were shot into the air chamber at speeds between 10 and 70 km/s. The air chamber was filled with air held at pressures between 13 and 220 mTorr. By adjusting the pressure such that the dust particles completely ablated, the ionization coefficient β is measured as a function of velocity, see figure below. The β values are fit to a curve described by Jones [1]. The ionization coefficient β is the probability that an ablated atom will ionize, and it is important for the determination of meteor mass from radar observations of meteors. An accurate determination of the meteoric mass input has implications for models of interplanetary dust in the inner Solar System and for atmospheric models [2]. By tracking the charge production of the particles as they travel through the air chamber, the ablation profile of the particle can be spatially resolved and compared to models of meteoric ablation [3]. The PMT's observe photon production by the dust particle as it travels through the chamber, allowing the particle itself to be tracked as it travels through the chamber and its change in velocity to be calculated. A new pickup tube detector is also under development to observe the slowdown of the dust particles as they travel through the chamber.



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