METEROITE ABLATION STUDIES AT THE CCLDAS DUST ACCELERATOR Evan Thomas[1], Mihály Horányi[1,2], Tobin Munsat[1] [1]University of Colorado, Department of Physics, [2]Laboratory for Atmospheric and Space Physics (LASP).

Introduction: Meteor theory provides framework for which ground-based observations can determine important physical characteristics of the meteor such as mass and density. Certain critical parameters of the theory, such as the ionization coefficient and luminous efficiency, have been under study since the 1960s [1][2], but remain unknown in various regimes [3][4]. The Colorado Center for Lunar Dust and Atmospheric Studies (CCLDAS) dust accelerator facility allows for a reexamination of these parameters in a controlled, laboratory environment [5].

The CCLDAS dust accelerator allows for precise control of velocity and charge of micron-sized dust particles at meteoric speeds. When launched into a pressured ionization chamber, the particles heat up and rapidly ablate, as seen in Figure 1. The proposed set of experiments will measure the degree of ionization and luminosity of ablated meteorite atoms.

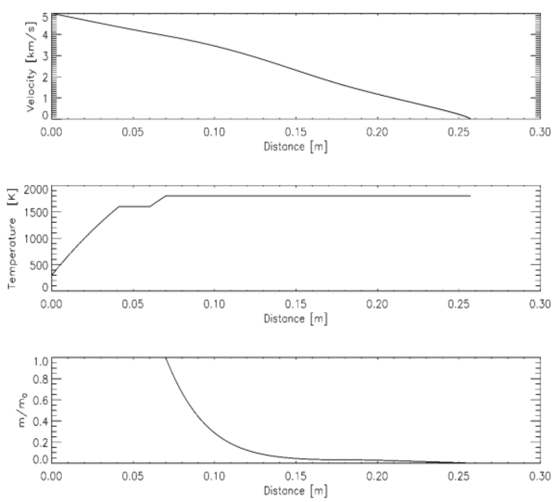

Figure 1: A thermodynamic code used to simulated the ablation of a 1 micrometer silica grain in 0.7 torr pressurized chamber.

A 30 cm parallel-plate ionization chamber will be pressurized with two stages of differential pumping (main beamline at 10^{-7} torr) to ~0.1 torr, such that the particle completely ablates in the chamber. With the mass of the particle known, and the charge on the ionization plates measured, one can find the ionization efficiency, $\beta = N_{ions}/N_{atoms}$. The luminous efficiency, τ, is defined as $\tau = E_l/E_0$, with E_l being the radiant intensity of the meteor trail and E_0 being the incident kinetic energy. The measurement of the luminous efficiency is determined through the use of photomultiplier tubes (PMTs) measuring the light intensity, as well as the length of the meteor trail.

References: [1] J.C. Slattery and J.F. Friichetenicht (1967) *ApJ, 147*, 235-244. [2] J.F. Friichetnicht, J.C. Slattery, and E. Tagliaferri (1968) *ApJ* 151 747-757. [3] W. Jones (1997) *Mon. Not. R. Astron. Soc.*, 288, 995-1003. [4] W. Jones and I. Halliday (1999) *Mon. Not. R. Astron. Soc.*, *320*, 417-423. [5] A. Shu et al. (2012) *Rev. Sci. Instr.*, *83*, 7.