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Multi-Parameter Characterization of Laser Ablation Plasmas[1]
JEREMY IRATCABAL, TIMOTHY DARLING, PAUL NEILL, AARON COVINGTON, University of Nevada, Reno — The laser ablation of solid targets results in the formation of complex plasma plumes. The theoretical description of these plumes is challenging and requires multi-physics simulations bounded by accurate data on all aspects of ablation phenomena. To meet this challenge, a new experimental platform has been developed to characterize the spatial and temporal evolution of laser ablation plumes. This system records a variety of diagnostics that can be synchronized to a common master-clock. The common clock allows each ablation plume to be described in event-mode, where a careful examination of energy and momentum partitioning can be made for each ablation plume. The experimental system has been designed to survey a wide variety of target materials and geometries using laser intensities ranging from 10^6 to 10^{19} W/cm^2. Physical parameters of the plumes are being measured with a powerful array of spectroscopic instruments, optical laser probes, charged particle analyzers, and nuclear instruments. A careful and accurate characterization of laser ablation plumes containing neutral and ionized atomic and molecular species provides measurements useful in high energy density physics, astrophysics, and technological fields.

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