TARGET STEERING AND ELECTROSTATIC ACCELERATION FOR IFE

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We have demonstrated that in-flight electrostatic steering can substantially improve target placement accuracy. We optically track the motion of a charged target and feed back appropriate steering voltage to four steering electrodes. Target placement accuracy of falling ~1.8 mg shells with 0.5 m stand off from steering electrodes is improved from ~500 to 10 µm standard deviation in each transverse direction. It might be possible to replace current-day positioning systems for target shots with a system such as this, resulting in substantial debris reduction.

We also completed fabrication and started testing an electrostatic accelerator that advances the electric field each time the charged target passes one of the 96 accelerating electrodes. Many of the accelerating electrodes are segmented to allow transverse position correction based on transverse position measurements during the acceleration process. The accelerator operation has now transitioned to vacuum acceleration of 1.8 mg hollow shells. Calculations indicate that this “first step” accelerator could achieve 10–15 m/s target velocity in 0.9 m with ~0.5 nC target charge and ±4 kV accelerating voltage. Demonstrating this capability is still underway. Additional experimental work and updated acceleration results will be presented.

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