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Formation of One-Dimensional Reverse Shocks in Collisionless Magnetized Plasma Flows Driven by Inverse Wire Array Z Pinches¹ LEE SUTTLE, SERGEY LEBEDEV, MATTHEW BENNETT, GUY BURDIAK, GARETH HALL, NADINE KALMONI, FRANCISCO SUZUKI-VIDAL, GEORGE SWADLING, ROLAND SMITH, SIDDHARTH PATANKAR, Imperial College London, ADAM FRANK, University of Rochester, ANDREA CIARDI, Ecole Normale Superieure — Experiments presented here utilize ablation plasma flow from an inverse wire array z pinch at the MAGPIE facility, as a platform for studying reverse radiative shocks in well-defined and diagnosable 1D geometry. A supersonic and super-Alfvenic plasma flow $(M, M_A \approx 6)$ of parallel and uniform trajectory is directed towards planar surface obstacles. The plasma stream contains frozen-in magnetic field $(R_{em} \approx 50, B \approx 2T)$ orientated perpendicular to the flow. This is shown to affect the interaction region via the formation of a thin-layer ($\ll \lambda_{ii}$) magnetic precursor shock-like formation at a distance from the obstacle comparable with the ion inertial length, and mediated by the build-up of field diffusing from the downstream stagnated plasma. Measurement of the plasma velocity and temperature is made by Thomson Scattering in the upstream flow and across the shock, with simultaneous measurement of electron density distribution with laser interferometery (532 & 355nm). A 12-frame fast optical camera was used to measure dynamics of the shock formation while miniature inductive probes were used to diagnose the advected magnetic field.

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