

## **Radiography of gas-gun impact experiments using an X-pinch**

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A broadband point-projection x-ray backlighter has been commissioned at First Light Fusion Ltd for radiographing impact experiments driven by a two-stage light gas gun. X-ray energies of 10 - 20 keV are produced by a miniature electron beam diode which forms during the explosion of a tungsten X-pinch. The X-pinch source emits a 20 ns x-ray pulse from a 200 - 300  $\mu\text{m}$  diameter spot, and the imaging setup achieves a spatial resolution of 50 - 100  $\mu\text{m}$  at a magnification of 2.3, over a 29 mm field of view.

The X-pinch load is made from 4 x 7.5  $\mu\text{m}$  tungsten wires, which are driven by the 70 kA, 70 ns rise-time current pulse from a high impedance pulsed-power machine. A 4 Ohm water-filled pulse-forming line drives a high inductance magnetically insulated transmission line, which delivers the current to the X-pinch load within the gas-gun experimental chamber.

The backlighter is used to image density structures within cm-scale plastic targets during impact with a 6 km/s projectile. Here, we present radiographs from preliminary experiments together with details of the experimental setup and characterisation of the x-ray source. We demonstrate the ability of the diagnostic to image forward and reverse shocks, release waves, projectile deformation and jet density profiles.