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5P04 - An ultra-portable X-pinch driver for hard X-ray diagnostics

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High energy density physics experiments often require the use of short pulses of hard X-ray probing radiation to make measurements of the conditions produced - for instance using X-ray diffraction to examine phase changes in a material subject to multi-Mbar pressures. Whilst there are several methods of producing such bursts of radiation, the use of a pulsed power driven X-pinch is highly appealing, given their relatively low cost and the potential high yields available.

In an X-pinch two or more crossed fine metallic wires are driven by a ˜100kA 100ns current, and the magnetically driven implosion at the crossing point of the wires causes the formation of a micro-diode that can emit ˜100mJ of >10KeV radiation on ns timescales. X-pinches have been studied for ˜25years in the pulsed power community but have rarely seen use outside of the area, due to the perceived complexity of the drivers required and their lack of portability.

In this poster we report on a new X-pinch driver designed and built at Imperial College London. Based on LTD technology, we have been able to significantly reduce the size and weight of the driver, whilst maintaining the required currents and rise times for successful X-pinch operation. Now entering a second stage of development, we are turning our attention to the LTD bricks that make up the driver, incorporating built in charging, safety and triggering. This negates the need for bulky external support equipment and could provide an interesting route scaling to larger facilities.

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