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4P66 - Initial Conditions & Plasma Evolution in the Hawk Dense Plasma Focus

Thursday 27 June 2019 16:00 (1h 30m)

The 650 kA Hawk pulsed power generator at NRL has been configured as a fast (1.2 μs), high inductance (607 nH) driver for a dynamic dense plasma focus load. The current pulse is initiated in a deuterium plasma that is injected radially by three Marshall guns. This plasma is accelerated through a coaxial region, and pinches onto neutral deuterium injected axially by a gas-puff valve. Promising experimental results along with recent tweaks to the Marshall gun design have prompted efforts to better characterize the density profiles produced by the guns. A multi-channel heterodyne interferometer focused into a ribbon beam is used to provide time-resolved measurements of the Marshall gun plasma density in a separate test chamber, allowing parameters to be varied and mass distributions to be established for a wide range of initial conditions. The same instrument is fielded in situ during Hawk DPF shots, with the ribbon beam probing the plasma as a function of radial position across the A-K gap, measuring the density pileup as the plasma is driven downstream. These density measurements are presented alongside electrical data and radiation measurements, to infer the time-evolution of the plasma through the pinch.

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