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4P50 - Optimizing Micropinches Produced by Hybrid X-pinches for High Time Resolution X-ray Spectroscopy

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We are planning detailed spectroscopic studies of the X-ray bursts produced by hybrid X-pinches using ~20 ps time resolution X-ray streak cameras. The purpose is to investigate whether radiative collapse occurs in the micropinches that produce the X-ray bursts. In order to do that, we want 1 strong X-ray burst from the hybrid X-pinch at a time that is reproducible within ± 1 ns. As a first step, we have optimized Hybrid X-Pinches made of Al, Ag, Mo, and Ti by changing the gap distance between the two conical electrodes, keeping the mass per unit length constant across all the different materials. For all materials, 0.5-1.5 mm gap appears to be satisfactory to assure a single micropinch from a 250-300 kA, 50 ns rise time current pulse on the XP pulsed power generator. In addition, time resolved, and time-integrated X-ray spectroscopy was carried out on molybdenum wires coated with aluminum. General parameters were obtained such as; hotspot source size, radiated energy, x-rays energy spectrum and plasma density and temperature.

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