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HIGH VOLTAGE COAXIAL VACUUM GAP BREAKDOWN FOR PULSED POWER LINERS

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The dynamics of Magnetized Liner Inertial Fusion (MagLIF)1, a new and promising approach to pulsed power fusion, are presently under detailed study at Sandia National Laboratories. Alongside this, a comprehensive analysis of the influence of the specific liner design geometry in the MagLIF system on liner initiation is underway in the academic community.
Recent work utilizing high voltage pulsed systems at UC San Diego (30kV, 150ns, 0.3Hz) and Cornell University (1MA, 100ns) to analyze the vacuum breakdown stage of liner implosion. Such experimental analyses are geared towards determining how the azimuthal symmetry of coaxial gap breakdown affect plasma initiation and current distribution within the liner for the duration of the current pulse. The final aim of the experimental analysis is to assess to what scale symmetry remains important at very high (MV) voltages, and how breakdown voltage and timing are effected by gap size. An analysis of the above will utilize plasma self-emission from an optical MCP (PI-576G) for signal amplification and ns time resolution, current measurements via Pearson coil (model 6585, 1.5ns rise time), voltage measurements near the gap via voltage probe (AHVP39, 220Mhz), exact location of breakdown via two dimensional b-dot probe triangulation, as well as measuring the evolution of the magnetic field along the length of the liner via b-dot probe array. Results will be discussed along with analytical calculations of the breakdown mechanism across the vacuum gap.

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