Magneto Inertial Confinement: A High-Gain Approach to Pulsed-Power Fusion

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Summary

A new class of high-gain hybrid fusion concepts, combining magnetic and inertial confinement in a cylindrically symmetric configuration, is being proposed and investigated [1]. A large current is discharged through a cryogenic fiber forming a confined Z-pinch [2]. Surrounding the fiber pinch is a thin cylindrical shell of solid DT fuel which is imploded onto the pinch by a uniform distribution of x-rays emitted by a "dynamic" gold holhraum." The holhraum is being irradiated from the outside by x-rays from an outer array of tungsten wires carrying high currents, ~10 MA, as in the new PBFA-Z configuration. The physics of the concept is well matched to the engineering strides made in pulsed power capability, such as higher currents delivered to the load, and more uniform plasma hohlraum sources [3]. Experiments on PBFA-Z could inexpensively explore the ignition regime, and find optimal parameters. The paper accents preliminary theoretical calculations [1] and predicts nominal fiber-shell target designs in preparation for potential experiments on PBFA-Z.