Demonstrating Fuel Magnetization and Laser Heating Technology for Low-Cost Fusion Energy

This paper describes objective technical results and analysis. Any subjective views or opinions that might be expressed in the paper do not necessarily represent the views of the U.S. Department of Energy or the United States Government.

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Project Overview

- *Develop and demonstrate the essential elements of MIF*
- *Validate simulation tools and models **at fusion conditions** with **driver scales differing** by **two orders of magnitude***
- *Mature scientific platforms and understanding enables rapid development of technology*

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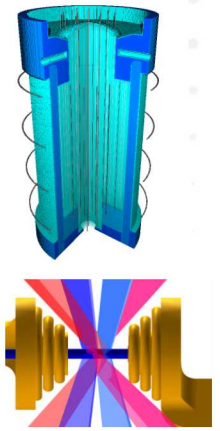
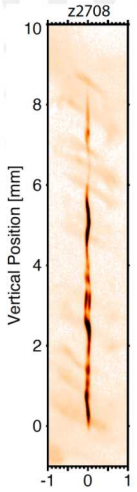
Key Insights and Innovations

- *Potential to demonstrate fuel gain >1 (50-100 kJ DT) on Z facility*
- *Provides **strong** MIF credibility and motivates investments in MIF concepts as alternative to MCF and ICF*





Accomplishments and ARPA-E Impact

- *Developed a laser driven MagLIF platform (OMEGA) and successfully tested scaling at **1000x** lower energy*
- *Significantly improved laser energy coupling to the fuel on Z from ~300J to 1.4kJ and developed a validated modeling capability*
- *Demonstrated **6X improvement** in fusion performance on Z (2.5kJ DT equivalent)*
- *11 publications in peer reviewed scientific journals*

Future Plans

- *Develop enhanced platform for testing scaling predictions on Z (22 MA, 20-25T, 6kJ) by 2020. Demonstrate >50 kJ DT yield equivalent on a time scale commensurate with funding*
- *Perform detailed physics and scaling tests with laser driven MagLIF platform, validate codes*
- *Develop science based scaling to support investment in a future facility capable of large fusion yields and gain*
- *Evaluate alternative magnetization and preheat schemes that are more suited to fusion energy*

CHANGING WHAT'S POSSIBLE

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