Progress in Preconditioning MagLIF fuel and its Impact on Performance

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The initial results of the magnetized liner inertial fusion (MagLIF) concept [1] at Sandia National Laboratories were successful at demonstrating key principles of magneto-inertial fusion: fuel pre-heating, pre-magnetization, and compression can work in concert to produce interesting thermonuclear stagnation conditions [2]. While, these results have been promising, significant challenges remain to test and determine realistic estimates of scaled performance. One of these challenges is a determining the initial conditions of the laser heated plasma and the evolution of those plasma conditions throughout the magnetically driven implosion. Empirical evidence suggests that only a small fraction of the delivered laser energy coupled to the fusion fuel in our initial experiments. Over the past year, significant experimental and computational work has been done to develop a new laser preheating platform with a goal of creating well understood and reproducible initial plasma conditions as well as to provide a baseline for increasing the coupled laser energy for future scaling tests. This talk will give an overview of the work that has been done to develop this platform and report on the performance results of using this new platform on integrated MagLIF experiments performed on the Z machine.

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References

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