**Overview of Sandia’s Z-Backlighter facility and its recent upgrades in order to accommodate new requirements for Magnetic Liner Inertial Fusion on the Z-Machine**

The Z-Backlighter laser facility primarily consists of two high energy, high power laser systems. Z-Beamlet (ZBL) is a multi-kJ class, nanosecond laser operating at 1054nm which is frequency doubled to 527nm in order to provide x-ray backlighting of high energy density events on the Z-Machine. Z-Petawatt (ZPW) is a petawatt-class system operating at 1054nm delivering up to 500J in 1ps for backlighting and various short pulse laser experiments.

With the development of the Magnetic Liner Inertial Fusion (MagLIF) concept on the Z-Machine, the primary backlighting missions of Z-Beamlet and Z-Petawatt have been adjusted accordingly. As a result, we have focused our recent efforts on increasing the output energy of Z-Beamlet from 2 to 4 kJ at 527nm by modifying the fiber front end to now include extra bandwidth (for SBS suppression). The MagLIF concept requires a well-defined/behaved beam for interaction with the pressurized fuel. Hence we have made great efforts to implement an adaptive optics system on Z-Beamlet and have explored the use of phase plates as well as other novel beam smoothing techniques.

We are also exploring concepts to use Z-Petawatt as a backlighter for Z-Beamlet driven MagLIF experiments. Alternatively, Z-Petawatt could be used as an additional fusion fuel pre-heater or as a temporally flexible high energy pre-pulse. All of these concepts require the ability to operate the Petawatt laser in a ns long-pulse mode (which requires a substantial modification of the front end), in which the beam can co-propagate with Z-Beamlet and can also be focused with a lens. Some of the proposed modifications are complete and most of them are well on their way. This talk will give a detailed summary of these efforts.