COMMISSIONING THE ADVANCED RADIOGRAPHIC CAPABILITY SHORT PULSE HIGH ENERGY LASER SYSTEM ON THE NATIONAL IGNITION FACILITY

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The commissioning of the Advanced Radiographic Capability (ARC) laser system in the National Ignition Facility (NIF) is currently in progress. ARC is designed to ultimately provide eight beamlets with pulse duration adjustable from 1 to 50 ps, and energies up to 1.7 kJ per beamlet. The beamlets will be used to create x-ray point sources for dynamic, multi-frame high-energy x-ray radiographs of the imploded cores of ignition targets. They are critical for creating precision x-ray backlighters needed for NIF experiments studying complex hydrodynamics and material strength at extreme high energy density regimes. ARC can also produce MeV protons and electrons for future experiments in advanced fusion, TeV acceleration and proton radiography.

The ARC laser is integrated into the NIF laser system utilizing four of the NIF beams (1 quad) to produce 8 beamlets. The quad of beams can either be configured for NIF 3ω operation or for high energy ps pulses, using hardware controlled during the automated shot cycle. Commissioning of 4 of the 8 beamlets is currently underway. In this talk we will provide an overview of the ARC system and report on the commissioning progress of ARC, including wavefront optimization, beam pointing to target chamber, main laser system shots, system shots to the ARC short pulse diagnostics table, and target shots.

Figure 1. ARC compressor vessel uses 16 one meter-scale gratings to compress 4 ARC beamlets

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