

100 J UV LASER FOR THE DYNAMIC COMPRESSION SECTOR

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A 100 J, 351 nm laser has been designed and is under construction for the Dynamic Compression Sector located at the Advanced Photon Source. This laser will drive shocks in solid-state materials which will be probed by picosecond x-ray pulses available from the synchrotron source. The laser is being designed for ease of use and reliability. A state-of-the-art fiber front end provides pulse lengths up to 20 ns with pulse shapes tailored to optimize shock trajectories. A diode-pumped Nd:glass regenerative amplifier followed by a four-pass, flash-lamp-pumped rod amplifier boosts the energy before injection into a multi-pass power amplifier employing a 15-cm Nd:glass disk amplifier based on an OMEGA laser design. A KDP Type II/Type II frequency tripler configuration converts the 1053-nm laser output to a wavelength of 351 nm and the ultraviolet beam is image relayed to the target chamber. Smoothing by Spectral Dispersion and polarization smoothing have been optimized to produce uniform shocks in the materials to be tested. Modeling shows that we will be able to achieve better than 6% RMS uniformity in the far field spot. The layout of the laser is shown in Figure 1.

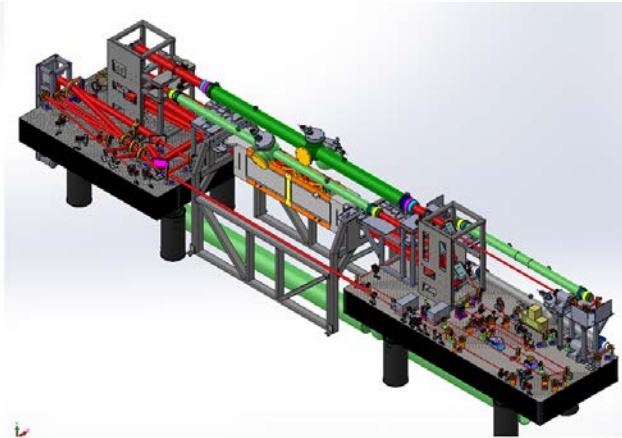


Figure 1 Layout of 100 J UV laser

We will discuss the overall design of the laser system, the current status, and further applications of this laser including High Energy Density Plasma research.