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High Intensity Laser Interaction Studies at BELLA

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High intensity laser interaction studies with the BELLA laser at LBNL are summarized. The BELLA laser is a state-of-the-art Ti:sapphire laser system that delivers ~1 PW (40 J in 35 fs) laser pulses at 1 Hz. The BELLA laser has been used primarily for electron acceleration experiments in underdense plasma using a long focal length beamline that delivers laser pulses with a spot size of 53 micron and an intensity of several ~10^19 W/cm2. With the addition of a short focal length beamline and double-plasma mirror technology, BELLA can deliver tightly focused pulses with intensities up to 10^22 W/cm2, allowing a wide range of studies in high energy density science. These studies include novel processes in nonlinear QED, x-ray generation using flying mirrors, and laser-ion acceleration. Several ion acceleration mechanisms will be discussed as well as limits to the maximum ion energies, required targetry and diagnostics in order to utilize the capabilities of PW laser operation (and ion beam generation) at 1Hz.

Summary

- Non-conventional Ion Acceleration Techniques
- New generation Ion Acceleration Beam-lines
- Targetry, Diagnostics and Dosimetry

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