

Abstract Submitted
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Development of a kHz-repetition rate TW ultrafast amplifier¹

CHARLES DURFEE, THOMAS PLANCHON, SUDIPTA BERA, JEFF FIELD, DANIEL ADAMS, COLBY CHILDRESS, JEFF SQUIER, Dept. of Physics, Colorado School of Mines — We have developed a 2 stage amplifier for ultrafast that will deliver 20mJ, 20fs laser pulses at a repetition rate of 1kHz. The novel power amplifier is pumped by up to 100W from 4 pump lasers, necessitating cryogenic cooling of the amplifier crystal. In collaboration with Abbess Instruments, we have designed a liquid nitrogen cooled cryostat that gives a temperature rise of less than 2K with a 100W thermal load. We have also developed a high resolution, high efficiency, temporal pulse shaper that will be integrated in the system. We will present our results on using the third-harmonic signal from a glass slide in the focus to optimize the wavefront from a deformable mirror and to fully characterize the temporal profile of the output pulse. This system is already being used for micromachining studies. In the near future it will be used for the generation of high flux hard x-rays for imaging and ultrafast x-ray diffraction.

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