

Abstract Submitted
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Ultrahigh intensities and contrast using an ellipsoidal plasma mirror with the Z-Backlighter Laser LUCAS HURD¹, UW-Madison, MOTOAKI NAKATSUTSUMI, PATRICK AUDEBERT, SEBASTIEN BUFFECHOUX, LULI, AKIRA KON, RYOSUKE KODAMA, Osaka U., JULIEN FUCHS, LULI — Plasma-based focusing optics have been proven to increase the peak intensity of ultrahigh intensity lasers without significantly distorting the beam spatial profile or modifying the laser system itself [1]. In this experiment we will make use of an ellipsoidal plasma mirror (EPM) to increase the contrast and decrease the focal size of the ultrashort pulses provided by the Z-Backlighter Laser at Sandia National Laboratories. We predict the EPM setup to reduce the effective numerical aperture from $f/3$ to $f/0.6$, which could lead to a 25-fold intensity enhancement compared to flat plasma mirrors. These increased intensities will be demonstrated by observing protons accelerated from laser-plasma interactions via the target normal sheath acceleration mechanism. We expect protons with energies of more than 50 MeV to be generated. [1] Nakatsutsumi *et al.* Fast focusing of short-pulse lasers by innovative plasma optics toward extreme intensity. *Optics Lett.* **35**, 2314 (2010).

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