Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

High Throughput and Contrast Enhancement from Ultrathin Liquid Crystal Films in a Double Plasma Mirror Configuration.[1] NICHOLAS CZAPLA, DEREK NASIR, ANTHONY ZINGALE, DOUGLASS SCHUMACHER, Ohio State Univ - Columbus, LIESELOTTE OBST-HUEBL, JIANHUI BIN, SVEN STEINKE, KEI NAKAMURA, ANTHONY GONSALVES, CAMERON GEDDES, CARL SCHROEDER, ERIC ESAREY, THOMAS SCHENKEL, Lawrence Berkeley National Laboratory — High temporal pulse contrast is critical for experiments using ultraintense laser pulses. Prepulses or a slowly rising pulse pedestal can impair experiments using solid density targets. One method to improve the contrast is the implementation of a self-triggering plasma mirror (PM). A PM typically consists of a low reflectance substrate that is precisely placed such that only the main peak of the pulse will ionize it and is reflected, resulting in a higher contrast pulse. Here we report the use of ultrathin, free standing liquid crystal (LC) films formed *in-situ* to implement a double plasma mirror (DPM) configuration at the BELLA PW facility. We characterize the DPM system including nanosecond and picosecond contrast enhancement, total reflection, far-field wavefront quality, focal spot mode, and beam pointing using 7 J p-polarized pulses. Notably, we observed ˜80% reflection and negligible deterioration of the focus. We also describe a new analytical model that predicts the total reflection as a function of intensity incident on each PM. This model was also validated against a previous PM experiment using LC.

[1]This work was supported by the Department of Energy (DOE) under DE-SC0018192, DE-AC02-05CH11231, and DE-SC0019283: the LaserNetUS initiative at the BELLA PW Laser Facility.

Nicholas Czapla
Ohio State Univ - Columbus

Date submitted: 29 Jun 2020 Electronic form version 1.4