Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Experiments and PIC simulations on liquid crystal plasma mirrors for pulse contrast enhancement[1] G. E. COCHRAN, P.L. POOLE, The Ohio State University, A. KRYGIER, IMPMC, University Pierre et Marie Curie, P.S. FOSTER, G.G. SCOTT, L.A. WILSON, J. BAILEY, N. BOURGEOIS, C. HERNANDEZ-GOMEZ, Central Laser Facility, STFC, R. HEERY, J. PURCELL, The Ohio State University, D. NEELY, P.P. RAJEEV, Central Laser Facility, STFC, R.R. FREEMAN, D.W. SCHUMACHER, The Ohio State University — High pulse contrast is crucial for performing many experiments on high intensity lasers in order to minimize modification of the target surface by pre-pulse. This is often achieved through the use of solid dielectric plasma mirrors which can limit laser shot rates. Liquid crystal films, originally developed as variable thickness ion acceleration targets (P. L. Poole *et al.*, PoP **21**, 063109 (2014)), have been demonstrated as effective plasma mirrors for pulse cleaning, reaching peak reflectivities over 70%. These films were used as plasma mirrors in an ion acceleration experiment on the Scarlet laser and the resultant increase in peak proton energy and change in acceleration direction will be discussed. Also presented here are novel 2D3V, LSP particle-in-cell simulations of dielectric plasma mirror operation. By including multiphoton ionization and dimensionality corrections, an excellent match to experiment is obtained over 4 decades in intensity. Analysis of pulse shortening and plasma critical surface behavior in these simulations will be discussed. Formation of thin films at 1.5 Hz will also be presented.

[1]Performed with support from the DARPA PULSE program through AMRDEC, from NNSA, and from OSC.

Ginevra Cochran
Ohio State Univ - Columbus

Date submitted: 15 Jul 2016 Electronic form version 1.4