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Progress toward a practical laser driven ion source using variable thickness liquid crystal targets[1] PATRICK POOLE, GINEVRA COCHRAN, Ohio State Univ - Columbus, KARL ZEIL, JOSEPHINE METZKES, LIESELOTTE OBST, THOMAS KLUGE, HANS-PETER SCHLENVOIGT, IRENE PRENCIPE, TOM COWAN, ULI SCHRAMM, Helmholtz Zentrum Dresden Rossendorf, DOUGLASS SCHUMACHER, Ohio State Univ - Columbus — Ion acceleration from ultra-intense laser interaction has been long investigated in pursuit of requisite energies and spectral distributions for applications like proton cancer therapy. However, the details of ion acceleration mechanisms and their laser intensity scaling are not fully understood, especially the complete role of pulse contrast and target thickness. Additionally, target delivery and alignment at appropriate rates for study and subsequent treatment pose significant challenges. We present results from a campaign on the Draco laser using liquid crystal targets that have on-demand, in-situ thickness tunability over more than three orders of magnitude, enabling rapid data collection due to <1 minute, automatically aligned target formation. Diagnostics include spectral and spatial measurement of ions, electrons, and reflected and transmitted light, all with thickness, laser focus, and pulse contrast variations. In particular we discuss optimal thickness vs. contrast and details of ultra-thin target normal ion acceleration, along with supporting particle-in-cell studies.

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