

Abstract Submitted
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Laser pulse shaping due to self-induced relativistic transparency in laser – nanofoil interactions SASIKUMAR PALANIYAPPAN, Los Alamos National Laboratory, Los Alamos, NM 87544, USA, RAHUL SHAH, HUI-CHUN WU, RANDALL JOHNSON, TSUTOMO SHIMADA, DANIEL JUNG, DONALD GAUTIER, SAMUEL LETZRING, Los Alamos National Laboratory, RAINER HOERLEIN, Ludwig-Maximillan-Universitat, Germany, MANUEL HEGELICH, JUAN FERNANDEZ, Los Alamos National Laboratory, LOS ALAMOS NATIONAL LABORATORY TEAM, LUDWIG-MAXIMILLIAN-UNIVERSITAT, GERMANY COLLABORATION — Shapes of the laser pulses transmitted through thin nanofoils due to self-induced relativistic transparency in intense, high contrast laser (80J, ~ 600 fs, $> 10^{20}$ W/cm² and 10^{-10} contrast) – nanofoil interactions were measured using a single shot second harmonic frequency resolved optical gating (FROG) system [Palaniyappan, et al., RSI, 81, 1 (2010)]. The FROG measurements show asymmetric pulse shapes, pulse shortening up to a factor of 2 and faster rise times on the leading edge than the falling edge. Part of the incident pulse is reflected/absorbed by the over dense plasma until it becomes relativistically under dense and transparent to the rest of the pulse. The measurements are qualitatively in agreement with a 1-D PIC simulation. Transmitted laser pulse shapes through 3 nm thick foil show large variations due to early target expansion.

Sasikumar Palaniyappan
Los Alamos National Laboratory

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