

Abstract Submitted
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Origin and control of the picosecond pedestal in femtosecond laser systems and its effect on laser wakefield acceleration of electrons¹ DMITRI KAGANOVICH, JOSEPH PENANO, DANIEL GORDON, MIKE HELLE, BAHMAN HAFIZI, ANTONIO TING, Naval Research Laboratory — The picosecond time scale pedestal of a multi-terawatt femtosecond laser pulse is investigated experimentally and analytically. The origin of the pedestal is related to the finite bandwidth of the laser system. Using a simple pulse splitter and delay line, we have produced significant (order of magnitude) improvement of sub-picosecond-scale laser contrast. We interpret this contrast enhancement as a result of linear interference among two chirped input pulses producing a modulated laser spectrum that is matched to the bandwidth of the optical system. Because we can work near points of constructive interference and the amplifier is run to saturation, the energy in the amplified pulse is preserved. This contrast enhancement is shown to increase the energy of laser wakefield accelerated electrons by creating favorable conditions for the accelerating plasma bubble.

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