

Abstract Submitted
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A carrier-envelope-phase stabilized terawatt class laser at 1 kHz with a wavelength tunable option¹ C.A. TRALLERO, Kansas State University, B. LANGDON, Crunchtec Technologies, J. GARLICK, KM Labs, X. REN², D.J. WILSON, A.M. SUMMERS, S. ZIGO, Kansas State University, M.F. KLING, Ludwig-Maximilians-Universität, S. LEI, Kansas State University, C.G. ELLES, University of Kansas, E.D. POLIAKOFF, Louisiana State University, K.D. CARNES, V. KUMARAPPAN, I. BEN-ITZHAK, Kansas State University — We demonstrate a chirped-pulse-amplified Ti:Sapphire laser system operating at 1 kHz, with 20 mJ pulse energy, 26 femtosecond pulse duration (0.77 terawatt), and excellent long term carrier-envelope-phase (CEP) stability. A new vibrational damping technique is implemented to significantly reduce vibrational noise on both the laser stretcher and compressor, thus enabling a single-shot CEP noise value of 250 mrad RMS over 1 hour and 300 mrad RMS over 9 hours. This is, to the best of our knowledge, the best long term CEP noise ever reported for any terawatt class laser. This laser is also used to pump a white-light-seeded optical parametric amplifier, producing 6 mJ of total energy in the signal and idler. Due to preservation of the CEP in the white-light generated signal and passive CEP stability in the idler, this laser system promises synthesized laser pulses spanning multi-octaves of bandwidth at an unprecedented energy scale.

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