

Single-cycle and Exawatt X-ray Pulse

G rard Mourou¹, Jonathan Wheeler¹ and Toshiki Tajima²

¹ IZEST-DER,  cole Polytechnique, Route de Saclay, 91128 Palaiseau, France

² Dept. of Physics and Astronomy, University of California at Irvine, CA 92697,
USA

Efficient multistage compression toward the single-cycle regime of petawatt laser pulses, such as those becoming available at laser facilities around the world, holds the promise to open up an entirely new realm of fundamental and applied physics both directly and by driving exawatt, X-ray pulses. A shorter route to the generation of Schwinger intensities with current day technology is now envisioned with the capability of producing high energy radiation and particle beams of extremely short, sub-attosecond timescales. The energies and timescales involved are far from traditional laser regimes and offer a new intersection of laser technology with the study of the structure of vacuum and numerous applications to subatomic physics. With this vision in mind, a plan for petawatt pulse compression shall be presented and the potential applications for such pulses discussed.