Beitrag ID: **38** Typ: **Talk**

Impact of Near-time Contrast on Coherent Synchrotron Emission from Thin Foils

Donnerstag, 29. Januar 2026 11:20 (20 Minuten)

Precise control over the temporal profile of the incident laser radiation in ultra-relativistic plasma interactions is crucial for many applications. While the effects of laser contrast on longer timescales have been studied and methods of control are well known, here we investigate the impact of the rising edge within a few picoseconds of the peak intensity of the pulse. As laser powers enter the multi-petawatt regime, contrast ratios of even 10^{-4} on the leading shoulder will be at relativistic intensities and can have a significant impact on the plasma conditions.

Here we present an experimental study of the generation of coherent, attosecond scale extreme ultraviolet (XUV) radiation from short dense bunches of electrons generated during interactions with thin foils. This Coherent Synchrotron Emission [1,2] is observed in the transmitted direction as high order harmonics in the spectral domain. Here, they serve as a witness to the evolving plasma conditions as the few-ps contrast is varied on the 80J, 500fs TRIDENT laser. A single-shot frequency resolved optical gating (FROG) diagnostic [3] recorded the pulse shape corresponding to each measured XUV spectrum. Particle-in-cell simulations link the observed degradation in the harmonic structure and efficiency to the impact of the pulse shoulder on the plasma surface conditions.

1. B. Dromey et al. Nature Physics, 8, 804 (2012)
2. D. an der Brügge and A. Pukhov, Physics of Plasmas 17, 033110 (2010)
3. S. Palaniyappan et al. Review of Scientific Instruments, 81, 10 (2010)

Autor: YEUNG, Mark (Queen's University Belfast)

Co-Autoren: HEGELICH, Björn (University of Texas); DROMEY, Brendan; FITZPATRICK, Colm (Queen's University Belfast); GAUTIER, Donald (Los Alamos National Laboratory); HUDDLESTON, Holly (Queen's University Belfast); KENNEDY, Jonathan (Queen's University Belfast); FERNANDEZ, Juan (Los Alamos National Laboratory); ZEPF, Matthew (Helmholtz Institute Jena); SHAH, Rahul (Los Alamos National Laboratory); PALANIYAPPAN, Sasi (Los Alamos National Laboratory)

Vortragende(r): YEUNG, Mark (Queen's University Belfast)

Sitzung Einordnung: Session 9 - Short Pulse 2