Contribution ID: **98** Type: **Poster (participant)**

High-Energy OPCPA at Lund Laser Centre and its Application to LWFA

Monday, 14 April 2025 17:10 (1h 30m)

A state-of-the-art high-energy short-pulse laser system was commissioned last year at Lund Laser Centre. This dual-output Optical Parametric Chirped Pulse Amplification (OPCPA) system delivers sub-10 fs pulses at 10 Hz and 100 Hz repetition rates, generating independent output channels of up to 30 TW and 6 TW, respectively. Operating at a central wavelength of 850 nm with a broad bandwidth of 300 nm, the system features both passive and active feedback stabilization of the carrier-envelope phase (CEP), achieving a CEP stability of 250 mrad, as measured using an f-2f interferometer.

Spectral phase errors are precisely managed using a Dazzler in combination with dispersion scan (D-scan) measurements. The 10 Hz beamline undergoes pulse compression via 16 broadband chirped mirrors, achieving a Fourier-limited 9 fs pulse, verified through D-scan diagnostics. Spatio-temporal couplings (STC) are minimal, enabling near-ideal focusing, as characterized using INSIGHT and IMPALA techniques. To correct wavefront distortions, an adaptive feedback loop integrates a deformable mirror and a wavefront sensor.

The laser attains focused intensities exceeding 10^{19} W/cm^2, driving plasma wakefields with field gradients reaching hundreds of GV/m. Recently, the system successfully demonstrated laser wakefield acceleration (LWFA) of electrons up to 100 MeV, showing its potential for advanced plasma-based acceleration research.

Primary author: ANGELLA, Andrea

Co-authors: Dr PERSSON, Anders (Lund University); Dr GUO, Chen (Lund University); WAHLSTRÖM, Claes-Göran (Lund University); GUSTAFSSON, Cornelia (Lund University); LÖFQUIST, Erik (Lund University, Sweden); DSOUZA, Flanish (Lund University); LUNDH, Olle (Lund University)

Presenter: ANGELLA, Andrea

Session Classification: Poster Session

Track Classification: Electron acceleration