

SYLOS Experiment Alignment

The SYLOS Experiment Alignment laser provides 3.5 TW peak power pulses with 12 fs duration at 10 Hz repetition rate. The laser system engineered by EKSPILA Ltd. resembles the SYLOS laser [1]. It starts with a common oscillator feeding both the 80ps picosecond Nd:YAG pump laser and a sequence of NOPCPA stages consisting BBO amplifier crystals(Fig 1).

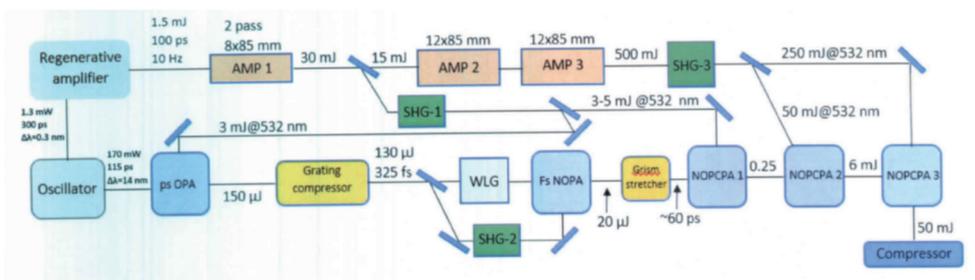


Fig.1. Schematic layout of SYLOS Experiment Alignment

The most important output parameters are shown in Table 1. The energy can be slowly varied continuously from 10 mJ to 42.5 mJ while other parameters are kept constant. The pulse duration can be stretched up to 200 fs with additional negative chirp or alternatively with limiting the spectrum at the expense of pulse energy. All other parameters, including repetition rate and beam profile are not flexible.

Parameters at the laser output	Guaranteed values	Best effort values	Tuning range
Peak power	2 TW	3.5 TW	0.1 TW - 3.5 TW
Pulse energy	>40 mJ	42.5 mJ	10 mJ – 42.5 mJ
Pulse duration	<15 fs	10.4 fs	12 fs – 200 fs (negatively chirped)
Rep.rate	10 Hz	10 Hz	not tunable
Energy stability	<2%	0.87%	not tunable
Pre-pulse temporal contrast	>10 ⁶	10 ⁷	not tunable
Strehl ratio	>0.7	0.93	not tunable
Central wavelength	825 nm	825 nm	not tunable
Beam pointing	5 μ rad (10% of total divergence)	2.5 μ rad (5% of total divergence)	not tunable
Beam profile	Top-hat 82 mm diameter	Top-hat 82 mm diameter	not tunable

Table 1. Measured laser parameters at the output

The typical spectrum ranges from 750 nm to 960 nm, and subject to minor day-to-day variations (Fig.2 a), while the pulse duration kept shorter than 12 fs. The beam profile is 82 mm diameter top-hat shape (Fig.2 b).

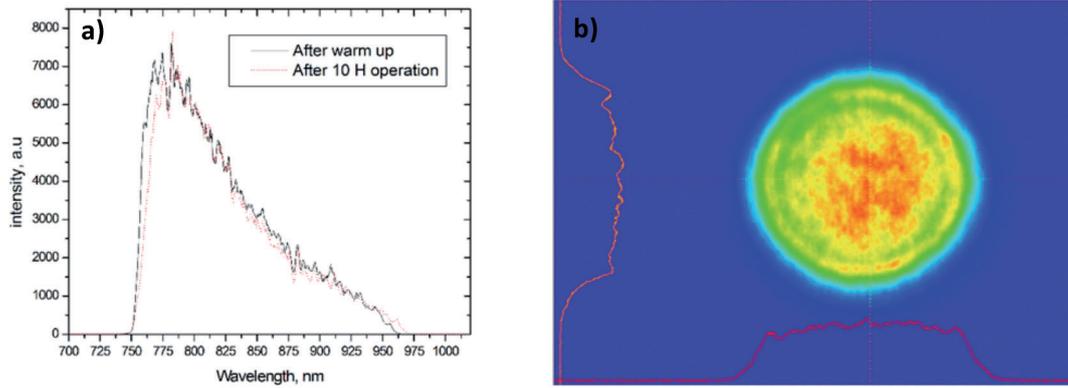
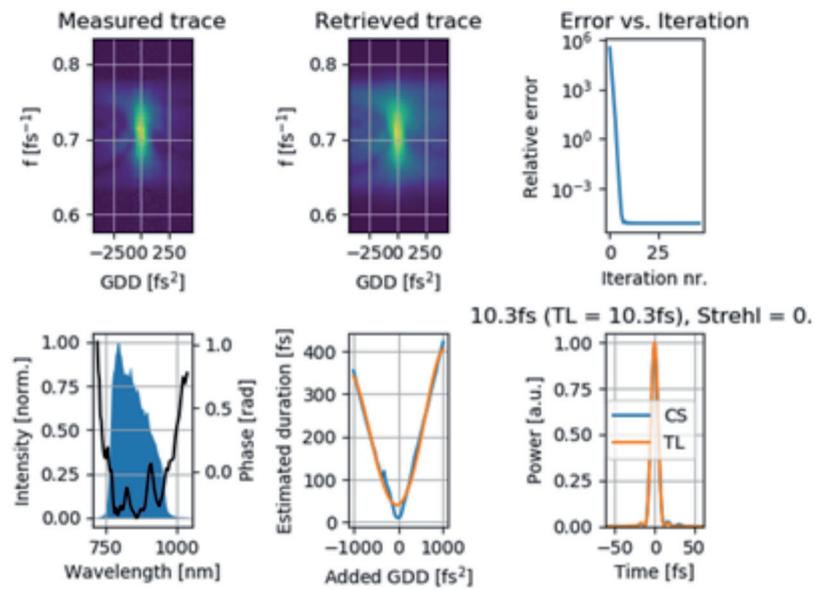


Fig.2. Typical spectrum (a) and near field beam profile (b)



Best-effort pulse duration, measured by chirp-scan.

References

- [1] R. Budriūnas, T. Stanislauskas, J. Adamonis, A. Aleknavičius, G. Veitas, D. Gadonas, S. Balickas, A. Michailovas, A. Varanavičius: 53 W average power CEP-stabilized OPCPA system delivering 5.5 TW few cycle pulses at 1 kHz repetition rate OE 25 (2017) 5797.