



Contribution ID: 243

Type: **Poster ARD**

High-Energy Cryogenic Yb:YLF Lasers for Matter, Technology, and Fusion Applications

Monday 3 November 2025 20:00 (3 minutes)

Cryogenically cooled Yb:YLF lasers provide a promising path toward high-energy, high-average-power laser systems with excellent beam quality and efficiency. At DESY, we are developing next-generation cryogenic Yb:YLF lasers that combine advanced crystal-to-metal bonding, efficient cryogenic cooling, and numerical modeling of gain dynamics and thermal effects. The systems are being scaled to deliver several hundred millijoules per pulse at sub-picosecond durations and hundreds of watts average power. These developments are particularly relevant for high-energy-density matter research, laser-driven particle acceleration, and inertial fusion energy (IFE) concepts. Owing to its broad tunability and favorable thermo-optical properties, Yb:YLF represents a key material for future high-repetition-rate laser drivers in both scientific and fusion-related applications within the Helmholtz community.

Speed talk:

I am unwilling/unable to present a speed talk

Author: PERGAMENT, Mikhail (Deutsches Elektronen Synchrotron (DESY))

Co-authors: YAKOVLEV, Alexey (FS-CFEL-2 (Ultrafast X-rays Group)); KAERTNER, Franz (FS-CFEL-2 (Ultrafast X-rays Group)); THESINGA, Jelto (FS-CFEL-2 (Ultrafast X-rays Group)); KELLERT, Martin (FS-CFEL-2 (Ultrafast X-rays Group))

Presenter: PERGAMENT, Mikhail (Deutsches Elektronen Synchrotron (DESY))

Session Classification: Poster