

The HORIZON project : towards face-cooled kiloWatt-class Yb:YAG laser systems

Thursday, 21 September 2023 18:25 (20 minutes)

The LEAP/HORIZON project at CELIA in Bordeaux aims to develop new laser amplification technologies, suitable for the next generation of compact chirped-pulse amplification lasers, with high repetition rate and high average power, at or beyond the kiloWatt landmark, with Joule-level interaction pulses –a range of parameters in energy and repetition rate of interest for laser-wakefield electron acceleration. While the choices of cw diode-pumping and of Ytterbium-YAG amplification media are commonplace, the HORIZON project decided not to resort to cryogenic temperatures of bulk slabs, but to explore and test a panel of alternative technologies to ensure amplification, especially direct face-cooling on the amplifier disks.

The talk will first present the main features of the HORIZON laser prototype, with its three main stages – custom seeder, pre-amplifier, and power amplifier, then focus on the latter, especially on the crucial issue of thermal management. The patented rotating disk approach will be described ; we will introduce the thermo-hydrodynamical issues of direct face-cooling, advantages and possible limitations. We will present results on cw amplification on the power head, that demonstrate the ability of this technology to reach the kiloWatt level.

Primary author: BALCOU, Philippe (CELIA/Université de Bordeaux)

Presenter: BALCOU, Philippe (CELIA/Université de Bordeaux)

Session Classification: WG2: Laser technology (WP6 - Task2)

Track Classification: WG2: Laser technology