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Construction and characterization of Yb:YVO4 Laser System

Since the creation of the first operational laser in 1960, lasers, Light Amplification by Stimulated Emission of Radiation, have found applications in various fields such as research, communications, medical procedures, and materials processing. The Ultrafast Optics and X-rays Group at CFEL is one of the most advanced groups in the world, developing high energy and high-power lasers. Nowadays, solid-state laser oscillators are the core part of any laser system. Ytterbium doped laser gain material is the basis for many laser systems due to its low quantum effect and the availability of laser pump sources. We suggest that the applicant begin their journey into the world of lasers by understanding and building a solid-state laser oscillator. This internship specifically centers around the utilization of the Ytterbium: Yttrium orthovanadate (Yb:YVO4) crystals as a gain medium to construct and characterize 2 different laser operation modes: 1) Continuous Wave (CW) Operation: In the CW mode, the Yb:YVO4 crystal is excited continuously, producing a steady laser output. This mode is ideal for applications requiring a constant (continuous) beam. 2) Cavity Dumped Operation: Employing a modulator (electro-optic or acousto-optic) or an additional mirror releases stored energy in a single pulse, it leverages the gain medium's gain and efficient energy extraction. This work will be supervised by Muharrem Kilinc, a master's student and Dr. Mikhail Pergament, a team leader in the Ultrafast Optics and X-rays group.

Group

FS-CFEL-UFOX

Project Category

A5. Lasers and optics

Special Qualifications

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