

Max-Planck-Institut für Quantenoptik

Diploma / Master thesis position

Diagnostic development for ultraintense laser pulses

Background: The Laboratory for Attosecond and High-Field Physics at the Max-Planck-Institut für Quantenoptik is developing a number of ultrahigh intensity laser systems. They will be used for research in the field of compact laser-plasma accelerators, generation of brilliant, femtosecond (10^{-15} s) and attosecond (10^{-18} s) X-ray pulses for experiments with unprecedented temporal and spatial resolution and driving and probing ultrafast phenomena in dense plasmas. In a novel approach for generating ultraintense, broadband optical pulses, one of Germany's largest Ti:Sapphire laser systems delivering 15 TW light pulses with 70 fs duration will be used to pump an optical parametric chirped pulse amplification (OPCPA) chain to deliver approx. 5fs, 10-20 TW pulses.

In any high-power, short-pulse laser system the overall performance strongly depends on the beam quality. Therefore monitoring and controlling the spatial and temporal structure as well as the spectral phase of the beam is crucial for achieving the extreme properties we aim for.

The main task of this project is to participate in building a set of beam diagnostics tailored for the particular needs of the new laser system in order to monitor and control the beam quality. The techniques will include 3rd order autocorrelation for the investigation of the temporal contrast of the pulse, GRENOUILLE for monitoring the chirp of the pulse, and an inverted field-autocorrelator to investigate the tilt of the pulse front. The diploma student will join a group consisting of postdoctoral researchers and graduate students who currently work on the development of the laser system. In this way the student will also be involved in the other aspects of the development of this system, as well as experiments that will be carried out once the facility is operational.

Qualification: Interest in experimental work. Good knowledge of physics and optics as well as LabVIEW programming skills are appreciated.

Contact:

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