

Jena, 26. January 2016

Bachelor or Master thesis

Construction and Characterisation of a Laser Beam Shaping System for Application in laser-induced Ion Acceleration

State of the art high-power laser systems and recent progress in construction of appropriate targets allow various conceptions and thus, investigation of laser-driven ion acceleration. Besides the development of targets it is important that the laser parameters suit the corresponding mechanism of ion acceleration. At present, the specific adjustment of the distribution of both amplitude and phase inside the focal spot of an ultra-short (few 10 fs pulse duration), high intensity (ca. 10^{22} W/cm²) laser pulse is a challenging issue and of utmost interest.

The task of this thesis' work is to build up a beam shaping system which is capable of creating a Super-Gaussian intensity profile in the focal plane of a high-power, ultra-short pulse laser.

Initially, a test system using a cw laser has to be set up and characterised while dealing with the development of adaptive feedback control systems in order to optimise the beam. An adaptive mirror, a spatial light modulator and wavefront sensors will be used in the process where all essential components are already available in the laboratory.

Once the system has been characterised using a cw laser, the beam shaping system needs to get upgraded and adjusted for ultra-short laser pulses in a second step. Finally, novel freeform optics will be applied to the existing beam shaping features and the whole system has to be implemented and tested at a high power laser facility.

Basic knowledge and experience in optics and laser physics are required.

If you are interested in working on this topic please contact one of the persons written on the right side.

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