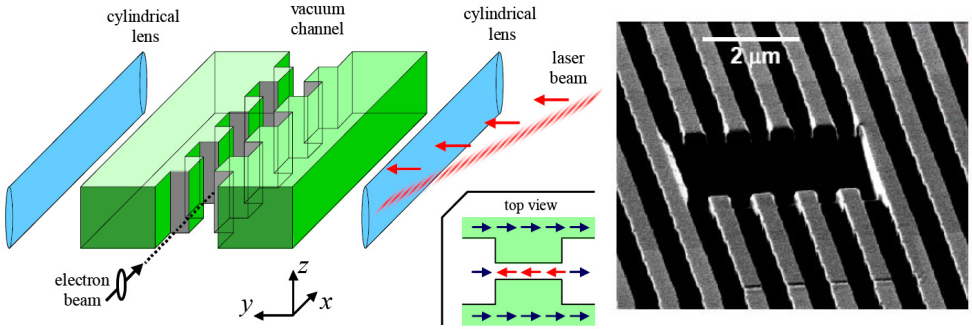
Field Simulation for Dielectric Laser Acceleration (DLA)

Bachelor / Master Thesis
Accelerator Physics / Computational Engineering
Start: variable

TECHNISCHE UNIVERSITÄT DARMSTADT

Motivation

Commercially available lasers serve to drive micrometer scale dielectric structures, such that acceleration fields, similar as the ones in a conventional Wideroe linear accelerator, are obtained. On the small length scale, extremely high acceleration gradients (GV/m) can be achieved. Recently, acceleration of both relativistic and non-relativistic electrons has been shown experimentaly. However, the beam intensity (number of particles) is very low. Our research group works on the theoretical quantification of intensity limitations in the Dielectric Laser Acceleration (DLA) scheme.



Setup for DLA and image of dielectric grating structure. Pics.: Plettner et al. PRSTAB 2006.

Aim of the Bachelor / Master thesis

- Simulation of the laser fields in the dielectric structure
- Optimization of the coupling between optical fibers and DLA devices
- Simulation of the wake fields created by an electron beam
- Quantification of beam loading effects

Requirements

Basic knowledge of accelerator physics, electromagnetic field theory, numerical simulations.

Institut für Theorie Elektromagnetischer Felder

Prof. Dr. O. Boine-Frankenheim
Fachgebiet Beschleunigerphysik

Ansprechpartner/in:
Dr.-Ing. Uwe Niedermayer

Tel. +49 (0)6151 16-24039
niedermayer@temf.tu-darmstadt.de

http://www.temf.de