

# Beam Dynamics in Dielectric Laser Accelerators

## PhD Position

Electrodynamics / Accelerator Physics / Computational Engineering

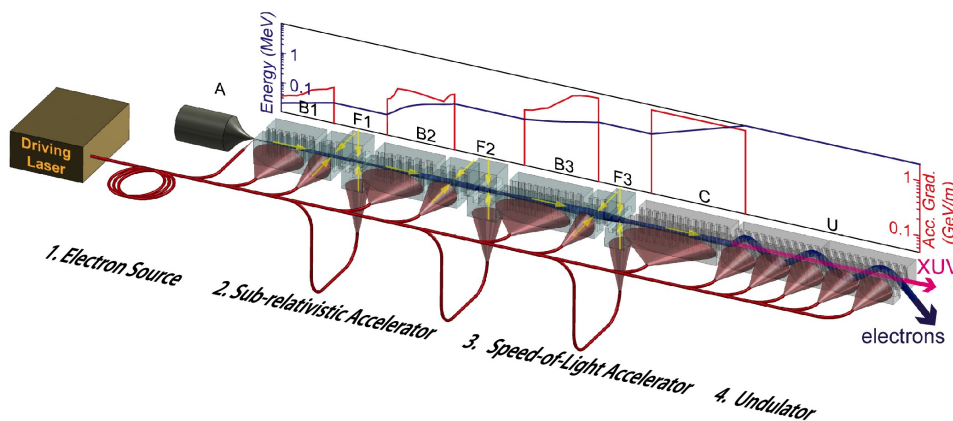
Start: variable, preferred on 1st July 2016



TECHNISCHE  
UNIVERSITÄT  
DARMSTADT

**Motivation: Dielectric Laser Acceleration (DLA) achieves highest acceleration gradients among non-destructive accelerators which are limited by electric breakdown of materials. However, the beam parameters impose challenges to design structures for reasonable particle current throughput.**

Only the near-fields contribute to particle acceleration in DLAs, thus the beam needs to be close to the dielectric structure and apertures become smaller than one laser wavelength ( $\sim 1 \mu\text{m}$ ). Focusing and transport of such beams is challenging, particularly for increasing beam current when space charge effects play a role at low energy. *This project targets on simulations of high intensity beam dynamics in an integrated DLA acceleration system, both for sub-relativistic and relativistic electron beams.*



Outline of a fully integrated laser accelerator system. Picture: FAU Erlangen

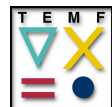
## Opportunities

The project has a duration of 3 years and is outlined to work in an international collaboration which is mostly funded by the Gordon and Betty Moore Foundation. The candidate will be enabled to attend twice annual collaboration meetings at e.g. Stanford University, PSI (Switzerland), FAU Erlangen, etc.

## Prerequisites

Excellent M.Sc. or equivalent in electrical engineering or physics. Knowledge in electrodynamics, numerical methods, and accelerator physics. Interest in beam dynamics.

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>