

Ultrashort laser pulse guiding in hollow core optical fibers

Optical fibers provide the possibility to guide light in a wide parameter range over large distances, playing a very important role for everyday life applications and science. In particular, hollow-core fibers (HCFs) have attracted scientists' interest, supporting low optical loss, dispersion, and nonlinearity. Their ability to propagate light in vacuum or gases makes them highly suitable for delivering high-energy laser pulses. This project focuses on exploring parameter limits for ultrashort, high-energy pulse propagation inside HCFs including both experimental and theoretical research. The anticipated tasks can be adapted depending on the skills and preferences of the candidate. The candidate will be able to work closely together with laser experts (supervised by Dr. Hanna Stawska, research team led by Dr. Christoph Heyl) and participate in research on the following problems:

1. Design of HCF based mode converters and beam combiners suitable for high-power pulse delivery.
2. Simulations of propagation of high-power, ultrashort pulses through hollow core optical fibers and devices, including the development of efficient semi-analytical methods (e.g. using the conformable derivative and the generalized exponential rational function method).
3. Participating in the experimental part of the project with close contact to researchers at the DESY Photon Science and DESY Accelerator divisions.

Field

A5: Lasers and optics (methodology oriented)

DESY Place

Hamburg

DESY Division

FS

DESY Group

FS-LA

Special Qualifications:

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