# Investigation of the plasma relaxation process in a high-repetition-rate plasma-wakefield accelerator

High electric fields in excited plasma wakes make them an attractive medium for electron-bunch acceleration with broad applicability to industry and medicine, as well as research facilities such as particle colliders and free-electron lasers. For such facilities, the luminosity and brilliance, respectively, scale with the achievable repetition rate, thus making it a crucial performance parameter.

FLASHForward is an electron-beam-driven plasma-wakefield accelerator, on which experimentation into the limitations of repetition rates in plasma is performed. After a particle bunch drives a wakefield, a subsequent later-arriving bunch may witness a plasma perturbed by the preceding bunch if it arrives very soon after. The shorter the separation between such bunches, the greater the magnitude of perturbation. The lifetime of this perturbation places the most fundamental limit on the repetition rate of plasma acceleration.

In this project the limitations on beam-quality preservation in high-repetition-rate plasma-wakefield accelerator will be investigated by setting up realistic particle-in-cell and beam-tracking simulations. The final goal of the project will be to test the efficacy of the simulation packages by comparing their results to experimental data from FLASHForward.

## Field

B4: Research on Accelerators

## **DESY Place**

Hamburg

#### **DESY Division**

FH

# **DESY Group**

FTX-AST

# **Special Qualifications:**

Excellent Python scripting; Knowledge of MATLAB would be beneficial.

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