



# PHYSIKALISCHES KOLLOQUIUM

Wintersemester 2018/19

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## **FLASHForward into the Future - Challenges and Prospects for Plasma-Wave Acceleration**

**Dr. Jens Osterhoff**

Deutsches Elektronen-Synchrotron DESY



The field of particle acceleration in plasma waves has seen remarkable progress in recent years. These days, acceleration gradients of more than 10 GV/m can be readily achieved using either ultra-short intense laser pulses or particle beams as wake drivers. Such field strengths imply a possible reduction by orders of magnitude in the footprint of accelerator installations compared to the current

state-of-the-art with potentially revolutionary consequences for applications in photon science, medicine, and high-energy physics.

DESY, Germany's leading accelerator centre, has established a unique research programme for plasma-based novel acceleration techniques with the goal to symbiotically combine conventional and new accelerator concepts. This presentation will give an introduction into the field of plasma wake acceleration and provide an overview about novel-accelerator experiments at DESY including the FLASHForward project.

FLASHForward is a pioneering beam-driven plasma-wakefield experiment that aims to produce, in a few centimeters of ionized gas, electron beams of energies exceeding 1.5 GeV that are of sufficient quality to demonstrate gain in a free-electron laser. The experimental beamline will allow for milestone studies assessing plasma-internal particle injection regimes, external injection, and controlled beam capturing and release important for future applications in photon science and particle physics. The facility provides a unique combination of low-emittance GeV-class electrons from the superconducting MHz repetition rate accelerator FLASH synchronized to a 25 TW laser interacting in a windowless, optically accessible, versatile plasma target. Experiments commenced in 2018 and are foreseen to run for the next decade, opening up new avenues in this highly dynamic research field.

Einführung: Prof. Dr. H. Krabbe

Die Fakultät lädt alle Interessierten herzlich ein.