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Towards spin-polarised electron beams from a Laser Plasma Accelerator — •Felix Stehr[1,2], Simon Bohlen[1], Louis Helary[1], Jennifer Popp[1,2], Jenny List[1], Gudrid Moortgat-Pick[2,1], Jens Osterhoff[1], and Kristjan Põder[1] — [1]Deutsches Electronen-Synchrotron DESY, Hamburg — [2]University of Hamburg

Polarised beams are indispensable for many experiments in particle, atomic and nuclear physics where spin-dependent processes are to be studied. Unlike RF accelerators, the accelerating fields in Laser-Plasma-Accelerators (LPA) are not limited by material breakdown. LPAs can create beams of tens to hundreds of MeV in only a millimeter, making them a promising alternative to conventional accelerators.

The LEAP (Laser Electron Acceleration with Polarisation) project at DESY aims to generate and measure spin-polarised electron beams from a compact LPA for the first time. The generation of spin-polarised beams from an LPA relies on a pre-polarised plasma source, where hydrogen halide molecules are dissociated by a circularly polarised UV laser pulse. The dissociation of an HCl gas target requires a laser pulse with a wavelength of about 200 nm, which has to be synchronised with the LPA driver laser, as the depolarisation of the electrons in the gas occurs in the sub-nanosecond range. Therefore, the UV pulse will be generated by cascaded second harmonic generation of the fundamental 800 nm LPA driver pulse. This contribution will discuss the physics of spin-polarised LPA, the experimental progress of preparing a pre-polarised plasma source for LPA and will provide an overview of the polarisation measurement within the LEAP project.

Part: AKBP
Type: Vortrag;Talk
Topic: New Accelerator Concepts
Email: felix.paul.georg.stehr@desy.de