

Refurbishment of the H1 SPACAL for LUXE-NPOD

The LUXE experiment at the DESY will study strong-field quantum electrodynamics in the interactions of a beam of electrons or photons with a high intensity laser. The photons produced in the primary interactions can be directed to a beam dump to search for axion-like particles (ALPs). Axions are hypothetical particles that are not included in the standard model of particle physics. They could be a possible explanation for longstanding problems in physics.

The ALPs are long-lived and can escape the dump before decaying into two photons. A detector capable of accurately measuring the energy, direction, and time of the photon energy depositions must be developed. An available option on-site at DESY is the backward spaghetti calorimeter SPACAL used in the H1 detector at the HERA collider. It was decommissioned in 2007. Even though the SPACAL does not fully meet the criteria for the new detector, it may be possible to upgrade.

The goal of this summer school project is to participate in the feasibility study of the SPACAL for the new physics search. This could include the extraction and characterization of one submodule of the electromagnetic calorimeter. Furthermore, possible upgrade options could be planned and prepared.

Physics / Computing / Engineering Content of the project : 33% / 33% / 33%

- Engineering: Study and Characterise SPACAL detector module.
- Computing: Acquire data with SPACAL module. Study response in Geant4 simulation.
- Physics: Understand impact of SPACAL on ALPS signal reconstruction.

Field

B3: Development of experimental particle physics equipment (hardware-oriented)

DESY Place

Hamburg

DESY Division

FH

DESY Group

FTX

Special Qualifications:

Basic skills programming (C++ or python) to perform a data analysis. Lab experience is a plus.

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