

LUXE: a new experiment to study non-perturbative QED and search for new particles in electron-laser and photon-laser collisions

Thursday, 19 February 2026 16:00 (1 hour)

The LUXE experiment (Laser Und XFEL Experiment) is an experiment in planning at DESY Hamburg using the electron beam from the European XFEL. LUXE is intended to study interactions between a high-intensity laser pulse and 16.5 GeV electrons from the EuXFEL electron beam, as well as interactions between the laser pulse and high-energy secondary photons. This will elucidate quantum electrodynamics (QED) at the strong-field frontier, where the electromagnetic field of the laser is above the Schwinger limit. In this regime, QED is non-perturbative and remains largely unexplored in the laboratory. LUXE intends to measure the positron production rate to high precision in an unprecedented laser intensity regime. There is also the possibility to search for particles beyond the Standard Model of particle physics by dumping the large number of photons produced in target and looking for exotic signatures. An overview of the LUXE experimental setup and its challenges and recent progress will be given, along with a discussion of the expected physics reach in the context of testing QED in the non-perturbative regime.

Presenter: WING, Matthew (University College London and DESY)