

Contribution submission to the conference Heidelberg 2022

Detection of Spectra in the Strong-Field QED Regime with LUXE — ●JOHN HALLFORD^{1,2} and MATTHEW WING^{1,2} —

¹University College London — ²Deutsches Elektronen Synchrotron

Conventional QED's validity breaks down in the presence of an external strong electric field. LUXE (LASER Und XFEL Experiment), in Hamburg, intends to collide a high-intensity LASER pulse with highly boosted electrons and photons, up to 17.5 GeV from the EuXFEL, creating assisted electric fields up to and greater than the Schwinger limit.

This enables a non-negligible probability of non-linear Compton Scattering and Breit-Wheeler interactions - which represents a spontaneous boiling of the vacuum. The rates and kinematics of these interactions will be measured. Detection challenges include low-flux positron detection and tracking in a high-radiation environment, GeV-photon spectrometry, and high-flux, high-energy electron energy distribution reconstructions for a variety of spectrum shapes and dynamic ranges.

One of two detection solutions employed for the electron detection is a thin screen of a scintillating material, imaged remotely by optical cameras, and using magnetic deflection to reconstruct with respect to energy. The reconstruction methods and expected results for this detector and its consequences for LUXE are discussed.

Part: T
Type: Vortrag;Talk
Topic: 3.12 Experimentelle Methoden (allg.);
3.12 Experimental Methods (general)
Email: john.hallford.19@ucl.ac.uk