Contribution ID: **586** Type: **Parallel session talk**

High-rate electron detectors to study Compton scattering in non-perturbative QED

Thursday 24 August 2023 09:10 (20 minutes)

Research in non-perturbative QED in strong-field backgrounds has gained interest in recent years, due to advances in high-intensity laser technologies that make extreme fields accessible in the laboratory. One key signature of strong-field QED is non-linear Compton scattering in collisions between a relativistic electron beam and a high-intensity laser pulse. In the vicinity of strong fields, the electron gains a larger effective mass, which leads to a laser-intensity-dependent shift of the kinematic Compton edge and the appearance of higher-order harmonics in the energy spectrum. One of the challenges of measuring the Compton energy spectrum in laser-electron-beam collisions is the enormous flux of outgoing Compton-scattered electrons and photons, ranging from 10^3 to 10^9 particles per collision. We present a combined detector system for high-rate Compton electron detection in the context of the planned LUXE experiment, consisting of a spatially segmented gas-filled Cherenkov detector and a Scintillator screen imaged by an optical camera system. The detectors are placed in a forward dipole spectrometer to resolve the electron energy spectrum. Finally, we discuss techniques to reconstruct the non-linear Compton electron energy spectrum from the high-rate electron detection system and to extract the features of non-perturbative QED from the spectrum.

Collaboration / Activity

no formal collaboration

Primary authors: ATHANASSIADIS, Antonios (None); RANKEN, Evan (CMS (CMS Fachgruppe TOP)); LIST, Jenny (FTX (FTX-SLB)); HALLFORD, John (UCL); HELARY, Louis (DESY - FTX); HENDRIKS, Luke (FTX (FTX Fachgruppe SLB)); WING, Matthew (UCL); JACOBS, Ruth Magdalena (FHR (Bereichsreferent FH)); SCHMITT, Stefan (ATLAS (ATLAS Scientific Computing))

Presenter: ATHANASSIADIS, Antonios (None)

Session Classification: T12 Detector R&D and Data Handling

Track Classification: Detector R&D and Data Handling