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Approaching the Schwinger Critical Field with the LUXE experiment — •Marius Hoffmann[1] and Beate Heinemann[1,2] — [1]DESY, Hamburg, Germany — [2]University of Freiburg, Germany

The theory of quantum electro dynamics (QED) is one the most precise theories mankind has ever developed. It has however not yet been tested in the regime above the so called Schwinger critical field, which is theoretically predicted to be $1.32 \times 10^{18}\, V\, m^{-1}$.

The LUXE experiment which is currently developed, aims to test the QED in the regime of the Schwinger critical field and even determine the value of the Schwinger critical field at a linear electron accelerator such as the European XFEL with a 17.5 GeV electron beam. LUXE is a two-scenario experiment aiming to use a high intensity laser system whose pulses are collided nearly head-on with the electron beam of the XFEL (scenario 1) or a beam of bremsstrahlung gamma rays produced by the electron beam in a foil before the interaction (scenario 2). The production rate of the e^+/e^- pairs in this interactions for various laser intensities is sensitive to the Schwinger critical field.

The talk will feature detector design studies outlining possible layouts of the experiment for a location at European XFEL, as well as simulation studies showing the sensitivity of the experiment on the Schwinger critical field.

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