

E-320: Current Status and Future Plans

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The experiment E-320 installed at SLAC FACET-II aims to study QED in the strong field regime.

By colliding 10 GeV, high-quality electron beams with 10 TW NIR laser pulses it is aspired to probe the QED critical (Schwinger) intensity of 10^{29} Wcm^{-2} in the electron rest frame.

In this regime, characterized by $\chi = E^*/E_{cr}$

*gtrsim*1, quantum corrections to classical synchrotron radiation become important and the probability for electron-positron pair production is no longer exponentially suppressed [1-3].

A central objective of E-320 is to observe the transition from the perturbative ($a_0^2 \ll 1$) to the non-perturbative regime ($a_0^2 \gg 1$), characterized by the intensity parameter $a_0 = eE/(mc\omega)$, while quantum effects are important (i.e., $\chi \sim 1$). During this transition, qualitative changes are expected to occur, namely a substantial red-shift of the Compton edges in the photon-emission spectrum and a quasi-continuous spectrum.

We will report on first results from the commissioning run 2022 at $a_0 < 1$ [4], ongoing developments, and future plans.

[1] A. Fedotov et al., Phys. Rep. (2023)

[2] A. Gonoskov et al., Rev. Mod. Phys. (2022)

[3] A. Di Piazza et al., Rev. Mod. Phys. (2012)

[4] C. Clarke et al., LINAC2022 (2022)

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