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## Update on the progress of the E-320 SFQED experiment

The E-320 experiment at SLAC FACET-II aims to investigate Quantum Electrodynamics (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  $10E29 \text{ Wcm}^{-2}$  in the electron rest frame.

In this regime, characterized by  $X = E/E_{cr} > 1$ , 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  $a_0$ , while quantum effects are important (i.e.,  $X \sim 1$ ).

Here, qualitative changes are expected to be observed, such as e.g. a substantial red shift of the Compton edges in the electron or photon spectrum and eventually a transition to a quasi-continuous spectrum. We will report on recent progress and results in the E-320 research program as well as future plans and development efforts.

[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)

### Working group

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