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From LUXE to Future Colliders: Probing Strong-Field QED and Beyond

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Strong-field quantum electrodynamics offers a unique window into non-perturbative phenomena such as vacuum pair production, where electron-positron pairs emerge from intense electromagnetic fields. The LUXE experiment at DESY will soon probe this regime using collisions between a high-intensity laser and the 16.5 GeV electron beam of the European XFEL. Future accelerator infrastructures, such as linear colliders, could extend these studies to even higher intensity and energy scales. Additionally, high-energy photons produced in such interactions can be used in beam-dump experiments to search for new physics, as proposed in the LUXE-NPOD concept.

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