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High Field QED Experiments with Lasers Progress and Challenges

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The combination of GeV electron beams and ultra-intense lasers provides a perfect basis for experiments testing high intensity QED effects from vacuum pair production to determining the equation of motion of an electron in an intense laser field including strong radiation reaction.

Initial experiments (for example [1,2]) have shown significant promise and highlighted the remaining challenges. First experiments have shown that significant radiation reaction effects are observable and have demonstrated that our detection equipment is capable of measuring vacuum pair creation against the strong gamma and pair background present in LPAs.

The experiments performed to date and the developments underlying future successful experiments are discussed.

[1] K. Poder et al., Experimental Signatures of the Quantum Nature of Radiation Reaction in the Field of an Ultraintense Laser, PHYSICAL REVIEW X, Vol: 8 (2018)

[2] J.M.Cole et al., 2018, Experimental Evidence of Radiation Reaction in the Collision of a High-Intensity Laser Pulse with a Laser-Wakefield Accelerated Electron Beam, PHYSICAL REVIEW X, Vol: 8 (2018)

Working group

Secondary radiation generation & applications

Primary author: ZEPF, Matt (Helmholtz Institut Jena)

Presenter: ZEPF, Matt (Helmholtz Institut Jena)

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