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## Electron-seeded pair-creation in external fields

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Motivated by the ever-increasing interest in simulating the intense irradiation of plasmas by combining the scales of classical plasma physics and strong-field QED processes, we present the results of two studies into common approximations. First, we derived polarised non-linear Compton scattering and pair-creation rates in a constant crossed field and studied their inclusion in simulations, finding good agreement in the spectra and number of photons generated when photons are treated as scalars but also a large asymmetry in the polarisation distribution [1]. Second, we derived electron-seeded pair creation (the trident process) in a constant crossed field to investigate the approximation of using chains of integrated tree-level processes to approximate higher-order ones [2]. The only disparity we recorded here was inclusion of photon polarisation which corresponded to less than 10% difference in the total rate. Furthermore, the results hint that short-pulse lasers and electron beams could be used to measure the one-step process mediated by a virtual photon.

[1] B. King, N. Elkina and H. Ruhl, Photon polarisation in electron-seeded pair-creation cascades, Phys. Rev. A (accepted) <http://arxiv.org/abs/1301.7001>, (2013)

[2] B. King and H. Ruhl, Trident pair creation in a constant crossed field, <http://arxiv.org/abs/1303.1356>, (2013)

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