Physics in Intense Fields (PIF22)



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Colliding laser pulses: From Sauter-Schwinger to Breit-Wheeler

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We study electron-positron pair creation induced by the field of two colliding (transversal and linearly polarized) laser pulses ranging from the Sauter-Schwinger regime at small laser frequencies to the Breit-Wheeler regime at large photon energies.

On the basis of a generalized WKB approach, we find that the pair creation rate along the symmetry axis (where one would expect the maximum contribution) displays the same exponential dependence as for a purely time-dependent electric field. The pre-factor in front of this exponential contains the corrections due to focusing or de-focusing effects induced by the spatially inhomogeneous magnetic field. Through this new method, we can thus not only reproduce particle production rates within a purely time-dependent toy model approach but also analyze the distortions the magnetic field creates with respect to the particle momentum spectrum as well as the total yield.

Primary author: Prof. SCHÜTZHOLD, Ralf (Helmholtz Zentrum Dresden Rossendorf)Presenter: Prof. SCHÜTZHOLD, Ralf (Helmholtz Zentrum Dresden Rossendorf)Session Classification: Strong Field QED