

## Electron-Positron Pair Creation in Strong Time- and Space-Dependent Electric Fields -- An example of non-equilibrium QED in the strong-field regime --

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[based on work in collaboration with G. Dunne, H. Gies, and F. Hebenstreit]

The electron-positron pair production from vacuum for short laser pulses with sub-cycle structure is considered in the nonperturbative regime (Schwinger pair production). After an introduction to the mechanism, the non-equilibrium quantum kinetic approach is introduced and compared to WKB approximations. Results for the momentum spectrum of the created electron-positron pairs are presented. These could help not only in the design of laser pulses to optimize the experimental signature of Schwinger pair production, but also ultimately lead to new probes of light pulses at extremely short time scales. Last but not least, recent progress on pair creation in space- and time-dependent fields is reported.