# QED cascade in a tightly focused standing wave

M. Jirka[1,2,3], O. Klimo[1,2], M. Vranic[3], S. Weber[1], G. Korn[1]

[1] *Institute of Physics of the CAS, ELI-Beamlines project, Prague, Czech Republic*

[2] *Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University in Prague, Prague, Czech Republic*

[3] *GoLP/Instituto de Plasmas e Fusão Nuclear, Instituto Superior Técnico, Universidade de Lisboa, Lisbon, Portugal*

The advent of laser technology is opening exciting opportunities for testing new physical regimes. A possibility to generate an electron-positron cascade via the Breit-Wheeler process in the field of an ultra-intense laser beam has attracted considerable attention. One possible interaction scenario leading to a prolific pair production is the interaction of seed particles with an intense standing wave formed by two colliding laser pulses [1]. To efficiently generate electron-positron pairs in this configuration, the intensities of the order of $10^{23-24}$ W/cm$^2$ are required [2].

To achieve such intense laser fields with the upcoming generation of 10 PW laser beams, the laser pulse has to be focused to a $\lambda$ scale spot size. However, as the laser pulse is focused more tightly, the ponderomotive force becomes stronger and seed particles are expelled more rapidly from the interaction region, so the focusing acts against an efficient cascade seeding. That prevents cascade development even at very high laser intensities in case of low-density targets [3].

Nevertheless, here we show that using a target with an appropriate density can help balance the effect of expelling seed particles from the high-intensity region [4]. We also show how tight focusing affects the cascade development for a wide set of initial conditions. Optimising the target density lowers the threshold power required for cascade pair production, which is favourable for experiments at upcoming 10 PW-class laser facilities that are now under construction and will become accessible soon.

## References

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