



## Evolution of positrons produced in a plasma target of solid density

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When an ultra-intense laser pulse interacts with a solid matter, electrons quickly acquire energies that are much higher than the threshold for the electron-positron pair production in the electron-ion collisions. Consequently, a significant number of positrons may be produced [1,2,3,4]. Positrons, being light, but positively charged, have the potential to visibly affect the plasma dynamics within the target, even if their concentration is not very high. In order to investigate this effect we studied the evolution of the positron distribution within the target of solid density. In particular, we investigated the possibility of creating electrically neutral electron-positron plumes at the rear end of the target. Our approach is mostly based on the Vlasov-Maxwell equation for a multicomponent plasma containing an admixture of positrons. The Vlasov-Maxwell approach, although more demanding computationally than the commonly used PIC method, offers some advantages when it comes to dealing with the admixtures of small relative concentration.

### References

1. P. L. Sholnikov, A. E. Kaplan, A. Pukhov and J. Meyer-ter-Vehn, *Appl. Phys. Lett.* 71, 3471 (1997).
2. D. A. Gryaznykh, Ya. Z. Kandiev and V. A. Lykov, *JETP Letters* 67, 257 (1998).
3. E. P. Liang, S. C. Wilks and M. Tabak, *Phys. Rev. Lett.* 81, 4887 (1998).
4. Hui Chen et al., *Phys. Rev. Lett.* 102, 105001 (2009).