

Abstract Submitted  
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**High-order harmonic generation in an electron-positron-ion plasma**<sup>1</sup> WENLONG ZHANG, THOMAS GRISMAYER, KEVIN SCHOEFFLER, RICARDO FONSECA, LUIS SILVA, GoLP/Instituto de Plasmas e Fuso Nuclear, Instituto Superior Tcnico, Universidade de Lisboa, Lisboa, Portugal — The laser interaction with an electron-positron-ion mixed plasma is studied, from a perspective of the associated high-order harmonic generation. The harmonic spectrum is shown to be significantly changed after an electron-positron pair plasma is produced. A dense positron beam accelerated by the laser at the target front excites strong counterpropagating plasma waves and triggers inverse two-plasmon decay. Moreover, prominent and well-defined signals at harmonics of the plasma frequency in the high-order harmonic spectrum are efficiently produced. Particle-in-cell simulations with OSIRIS show that significant radiation at twice the plasma frequency can be observed for a pair density as low as  $\sim 10^{-5}$  of the electron plasma density. For higher pair densities, the radiation at this characteristic frequency after the pair production can be above 5 orders of magnitude higher than the counterpart radiation from the plasma without pair production.

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