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Generation of wakefields and EM solitons in a relativistic degenerate plasma

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Abstract

The transition from wakefield generation to the formation of electromagnetic (EM) solitons due to the nonlinear interaction of intense high-frequency (hf) EM waves and low-frequency electron plasma oscillations is studied in a relativistic degenerate plasma. It is found that the relativistic degeneracy parameter (R) and the velocity of the stationary frame (M) play important roles for the transition from the wakefield generation to the soliton formation. A critical value of R is also found for which the wakefield generation is suppressed, and instead the EM-pulse undergoes nonlinear self-modulation and eventually gets localized. Numerical results also reveal that the wakefield amplitude is enhanced for lower values of R .

References:

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