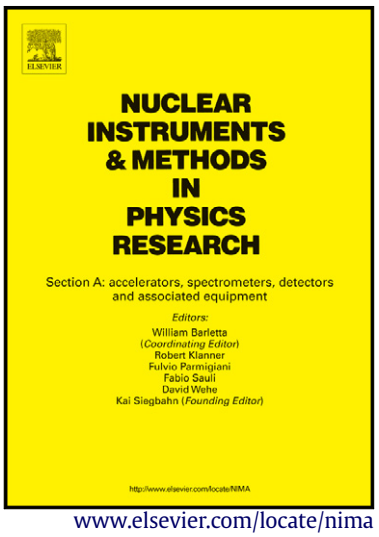

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A possible scheme of electron beam bunching in laser plasma accelerators

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advanced accelerators technologies

Abstract – A possible scheme for increasing the injection efficiency in laser plasma accelerators is proposed. It allows an improvement of both the number of captured electrons and the energy spread. The operation in linear regime is discussed. The plasma channel is divided into two stages: the modulating stage with a variable plasma density for pre-bunching the beam and the accelerating stage with a constant plasma density. The variation of the plasma density in the bunching stage and the matching between the stages are discussed.

Keywords: laser plasma wake-field acceleration, energy spread, electrons trapping, injection.

PACS codes: 29.27.Bd

1. Introduction

One of the main directions in accelerator technology, known as the energy frontier, is the development towards higher energies. In that way, ever higher rest mass particles can be discovered and the associated physics investigated. However, the accelerating gradient in both room temperature and superconducting accelerating structures is limited by the field effects and processes on the surface. Even with the best of today's RF technology, the scale of future high-energy accelerators sets to tens of kilometers in length, and the fabrication costs are high in both