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Longitudinal Motion Stability of Electrons inside the Plasma Channel of LPWA

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The acceleration of electrons in laser plasma channels is one of the contemporary ideas on energy frontier of accelerators. Many simulations and experimental studies are provided before now but all results shows that low fraction of electrons are capturing into acceleration and accelerated electrons have very broad energy-band. New results of beam dynamics simulations in laser plasma channel having pre-bunching stage are discussed in report. Main simulations were focused to the study of the longitudinal motion stability. It was shown that plasma potential well form is sufficiently depends of laser pulse amplitude and plasma density gradient and the electron beam dynamics is defined by the form and velocity of the plasma potential well. Electrons loosed from the synchronous motions with the plasma wave are defocusing fast after fall out from the potential well.

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