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## DYNAMIC OF SELF-INJECTED BUNCHES AT LASER WAKEFIELD ACCELERATION IN AN INHOMOGENEOUS PLASMA

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At the moment, one of the urgent problems of high-energy physics is research in the field of creating an Advanced Linear International Collider (ALIC). This collider is based on the methods of advanced and novel accelerator (ANA), among which one of the most efficient is laser wakefield acceleration. The aim of this study was to investigate the dynamics and parameters of self-injected bunches depending on the plasma density, taking into account that the plasma is inhomogeneous. Clear advantages of using longitudinally and transversely inhomogeneous plasma were shown. Three profiles were considered. The results of the studies demonstrated that the use of longitudinally inhomogeneous plasma leads to an increase of the stay time of the bunch in the acceleration phase. In the case of transverse inhomogeneity, a waveguide effect is observed relative to the laser pulse. In addition, the parabolic inhomogeneous transverse distribution leads to transverse stabilization of the bunch.

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