Contribution ID: **1143** Type: **Oral**

Study of the effects of laser pulse intensity modulations on the plasma oscillations and electron energy gain in the bubble regime.

Tuesday 25 June 2019 11:00 (15 minutes)

The study was evaluated on a hydrogen Z-pinch plasma guiding channel generated by a fast discharge in a capillary with diameter of 3 mm and length of 50 mm. By using the 1D MHD model a radial distribution of the electron density profile was computed which capable for guiding the high intensity TEM_{00} mode CO_2 laser pulse with input spot size of 150 μm and peak intensity of 10^{18} W/cm^2. Intensity modulation of the laser pulse was obtained by inverse Fourier transform after wave optics computations performed on the plasma guiding channel in the frequency space. For demonstrating the effects of intensity modulations on the plasma oscillations and electron energy gain in the bubble regime a density perturbation and a Particle-In-Cell (PIC) model was used, respectively. The former model provides exact value of plasma frequency and its wavelength at each point of domain, so that it was used to compare the discrete plasma frequency with the continuous one. In order to minimize the difference between two plasma frequencies a coupling factor was introduced. The PIC simulations showed that during the propagation time the electrons gain their energy in cascaded way and this process is in sync with the intensity modulations.

This study was supported by the Human Resource Development Operational Program (contract EFOP-3.6.2-16-2017-00005).

Authors: SHAPOLOV, Anatoliy (Institute of Physics, University of Pecs); FEKETE, Balazs (Institute of Physics, University of Pecs); KISS, Matyas (Institute of Physics, University of Pecs); Dr SZATMARI, Sandor (Institute of Physics, University of Szeged); Dr KUKHLEVSKY, Sergei (Institute of Physics, University of Pecs)

Presenter: SHAPOLOV, Anatoliy (Institute of Physics, University of Pecs)

Session Classification: 4.2 Particle Acceleration with Laser and Beams

Track Classification: 4.2 Particle Acceleration with Laser and Beams