

**Plasma Lens with a Current Density Depended on External Magnetic Field,** V. BELAN, V. BUTENKO, B. IVANOV, V. KISELEV, V. KITSENKO, A. LINNIK, I. ONISHCHENKO, V. PRISHCHEPOV, NSC KIPT, Kharkov - Plasma lenses (PL) with longitudinal current are used successfully for ion beam focusing (e.g. [1]). In this work some inhomogeneous (along  $z$ ) PL are considered which are placed in the longitudinal magnetic field  $B_z(z)$  that can be changed the radius of the current channel  $a(z)$ , the current density, and the focusing azimuthal magnetic field. (This scheme partly resembles the 'passive' plasma adiabatic focuser [2] where plasma density is changed along  $z$ .) For these PL the efficiency can be increased by the radius  $a$  decreasing, simultaneously with the focused beam (FB) radius. The FB's entrance radius and time duration can be increased too. Some examples of these PL are examined theoretically. Experiments are being carried out on the installation where plasma flow is produced by the coaxial plasma gun and penetrates through the magnetic field of the coil. The current about 1 kA carried out from the gun changes own cross-section accordingly to the magnetic field profile. The radial dynamics of the focused proton beam (of 5 MeV energy) is being investigated in dependence on the plasma gun and magnetic field parameters.

- [1] E. Boggasch, A. Tauschwitz, H. Wahl e.a. Appl. Phys. Lett., 60, 2475 (1992).
- [2] P. Chen, K. Oide, A.M. Sessler, S.S.Yu. Phys. Rev. Lett., 64, 1231 (1990).