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## Two-pulse Thomson Scattering System for Measurements of Fast Fluctuation of Electron Density Profile in Multi-Mirror trap GOL-3

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At the GOL-3 set up in BINP experiments on studying the relaxation mechanism of a powerful relativistic electron beam, and plasma confinement in multimirror magnetic field are carried out. At present, the mechanisms of generation of microwave radiation in plasma with Langmuir turbulence are investigated. An important place in these studies is the observation of the dynamics of plasma density in the spatial and temporal scales typical for turbulent processes. These include the modulation instability and Langmuir collapse observed in beam-plasma experiments [1]. Characteristic time scale in similar plasma [1] can be reach order of 10 ns, the spatial - the order of 1 mm. Measuring the density dynamics of high-temperature plasma with a similar time resolution represents a significant challenge. Traditional approach (repletion-rate, burst-mode) [2] is not applicable under the experimental conditions on the GOL-3. Therefore double-pulse Thomson scattering system has been developed [3].

This paper presents the modification of Thomson scattering system for studying the density profile dynamics, which allows measurements at 8 points along plasma radius at two points in time. Two pulses from a neodymium laser  $\lambda = 1054$  nm, with a time interval between  $t = 60$ -150 ns, the energy  $E = 10$ -20 J and a duration of  $\tau = 20$ -40 ns, have been used for scattering in the plasma.

In result from the experiments the data on a fast local dynamics of the plasma density in the various operation regimes have been obtained. The dynamics of the plasma density in some registration channels has reached 30% in during 100 ns.

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