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Digest contains the materials on the fundamental and applied problems of pulsed lasers. It is interesting for researches and engineers working in the sphere of quantum electronics, spectroscopy, plasma physics, medicine and laser technologies.

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## RUNAWAY ELECTRON BEAM GENERATION IN AIR AT ATMOSPHERIC PRESSURE

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In this report results and analyses of some experiments on generation of runaway electrons beams in discharge gaps in air at atmospheric pressure have presented. The basis of high current electron beams generation in air at atmospheric pressure is runaway effect discovered several decades ago. Its essence is uninterrupted acceleration of electrons without interaction with atoms and molecules of gas when electrons got enough energy in short time. Portion of runaway electrons in electron beam have increased since invention of this effect. It occurred due to development of pulse subnanosecond equipment. In carried out experiments high voltage pulse generator has used. It has negative voltage pulse amplitude 200 kV, pulse duration 2 ns and pulse leading edge 0.7 ns. Electron beam has recorded on phosphor luminescence behind anode foil by photomultiplier and oscilloscope. Anode foil has thickness 20  $\mu\text{m}$ .

Quartz tube in scheme of experiment is authors innovation. One of its tips was make fast closely on the cathode, other tip was located in discharge gap. Electron beam current density was increased in several times by such change of discharge gap configuration in comparison with tests without quartz tube. Also beam divergence decreased. Plasma cathode is forming in quartz tube bounded volume. It emit electrons, which accelerate between quartz tube tip and anode foil. It was observed that phosphor luminosity brightness increased, when some quantity of liquid locate on the cathode surface. This effect may be related to decrease electron work function from metal cathode surface because of adsorption molecules of liquid.

H-4

## SOLUTION OF INVERSE LIGHT SCATTERING PROBLEM FOR MONONUCLEAR CELL CHARACTERIZATION

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In this study we examined whether morphological parameters of lymphocytes could be determined based on light scattering alone during scanning flow cytometry. A method of characterizing mononuclear cells was developed using a model of two-concentric spheres. We also established the applicability criteria for application of a global optimization method to solve the inverse light-scattering problem for mononuclear cells. Several parameters of lymphocytes were determined, including cell size, nuclear size, the refractive indices of the cytoplasm and nucleus. The method used to define lymphocyte parameters in this study is applicable to all mononuclear cells. Our preliminary results using this approach indicate that B-lymphocytes bigger than T-lymphocytes. These parameters may be sensitive to different diseases of the human immune system.

H-5

## THERMAL LENS IN LASER DIODE END-PUMPED Yb : YVO<sub>4</sub> LASER

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Research and development of diode pumped solid-state femtosecond systems on the crystals doped with trivalent ytterbium ions open a way to creation of high-intensity laser installations for