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O5.302 Dynamics of the gas discharge sustained by the powerful radiation of 0.67 THz gyrotron

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At present, the THz frequency range is still the least studied from the point of view of gas discharge physics. The study of the discharge, sustained by the powerful focused beams of THz radiation, has become possible recently due to the development of powerful sources in this range (FELs and gyrotrons) and is of interest both from a fundamental research and from possible applications.
This paper presents the results of studies of the discharge dynamics sustained by the gyrotron radiation (40 kW@0.67 THz). The discharge propagation velocity towards electromagnetic radiation was measured in various gases and their mixtures (helium-argon, argon, krypton, nitrogen). It was shown that the discharge propagation velocity in noble gases decreases with an increase in the atomic mass of the gas (from helium to krypton).
The dependence of the discharge propagation velocity in wide gas pressure ranges (0.1 - 2 atm) was investigated. It was shown that in all gases the discharge propagation velocity decreased with an increase in pressure value and for noble gases was at the level of 10^5-10^6 cm/s, and in nitrogen - 10^4-10^5 cm/s. The dynamics of the discharge glow in various ranges (from VUV to IR) was investigated. The presence of a powerful recombination afterglow at the end of a heating radiation pulse in a low-pressure discharge (less than 100 Torr) in noble gases and an afterglow in a high-pressure discharge in nitrogen, which is associated with excited metastable states (A^3Sigma_u+) of the nitrogen molecule, is shown.

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