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Measuring of the nonlocal EDF of penning electrons by the wall electrode in the plasma afterglow ANATOLY KUDRYAVTSEV, KIRILL KAPUSTIN, ALMAZ SAYFUTDINOV, St. Petersburg State University — In [1] was patented ionization detector for gas analysis, based on the method of collisional electron spectroscopy (CES), which allows working at a high gas pressure. The CES method provides an opportunity to analyze energy of nonlocal electrons released during Penning ionization of atomic or molecular impurities by metastable helium atoms. In this case, the EDF of fast electrons will be narrow peaks that correspond to the energies of their appearance in Penning ionization. To realize the CES method at high (atmospheric) pressure the plasma gap must be small $L < 0.1$ mm. In this condition the traditional Langmuir probe is impossible to use for measuring the EDF. To overcome this difficulty in [1] was proposed to use afterglow plasma and one of the electrodes as a measuring probe for the registration of EDF of fast penning electrons. In this paper we simulate the afterglow of argon discharge between parallel electrodes and show that EDF and electron sources of Penning ionization are determined by the first derivative of the current to the wall electrode with respect to potential. This work was supported by RSCF and SPbSU.

[1] A.A.Kudryavtsev, A.B.Tsyganov. US Patent 7,309,992, issued December 18, 2007.

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