

Abstract Submitted
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Probe measurements of penning electron spectra in the afterglow of nonlocal helium microplasma¹ ANATOLY KUDRYAVTSEV, DENIS BELSKIY, SERGEY GUTSEV, NIKOLAY KOSYKH, ANTON KRYUKOV, St. Petersburg State University — Method PLES [Blagoev A.B., Kolokolov, N.B., Kudryavtsev. *Physica Scripta*, 1994, v.50, p.371] is based on identification of atoms and molecules of impurities M by selective registration of groups of fast electrons $e(f)$ created in Penning ionization: $\text{He}(m) + M \rightarrow \text{He} + M^+ + e(f)$. The electron energy spectrum $e(f)$ contains discrete peaks corresponding to the difference between the energy 19.8 eV of metastable helium atoms $\text{He}(m)$ and the ionization energies E_i of impurities M. Since the ionization potential E_i of each type of atom or molecule is a well-known, it is possible to identify the atoms or molecules M of the unknown impurity by their ionization potential E_i . Probe registration of the energy spectra of penning electrons is carried out in the nonlocal afterglow plasma of pulsed microdischarge in helium and its mixtures with argon, krypton and air. In helium, the non-local plasma condition corresponds to $p \times L < 5 \text{ Torr} \times \text{cm}$, where p is the gas pressure and L is the plasma volume size. It is demonstrated that the obtained maxima appear at the characteristic energies corresponding exactly to the expected maxima for penning electrons of the known gas impurities used.

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