Abstract Submitted
for the GEC13 Meeting of
The American Physical Society

Glow Discharge with Confinement of Electrons in an Electrostatic Trap ALEXANDER METEL, Moscow State University of Technology "STANKIN" — Theory based on the concept of the gas ionization cost W is found to be in a good agreement with experimental study of the glow discharge with electrostatic trap in the gas pressure range 0.001-10 Pa. When the mean ionization length λ of emitted by the cathode electrons exceeds the trap width $a = 4V/S$, where $V$is the trap volume and S is area of the trap boundary, and their energy relaxation length $\Lambda = (eU_c/W)\lambda$, where U_c is cathode fall of potential, is lower than the trap length $L = 4V/S_o$, where S_o is output aperture of the trap, U_c is independent of the pressure p. In this middle pressure range due to multiplication of fast electrons in the cathode sheath U_c diminishes about 2 times from its maximum W/eγ, where γ is coefficient of ion-induced electron emission, with the discharge current reduction. At $\Lambda > L$ the cathode fall U_c rises from hundreds to thousands of volts and p tends to the discharge extinction pressure p^{ex}, at which the ionization length λ of electrons with energy equal to the energy of electrons emitted by the cathode in the middle pressure range is equal to L.

Alexander Metel
Moscow State University of Technology "STANKIN"

Date submitted: 05 Jun 2013 Electronic form version 1.4