# 1998 International Congress on Plasma Physics

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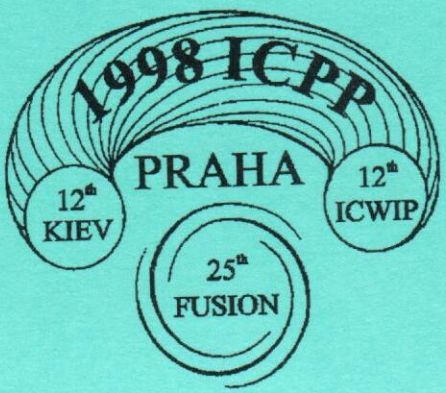


## Abstracts of Invited and Contributed Papers

### PART I: Monday - Tuesday

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# P1 . 101

## Electron Heating in Mirror by End Potential Plates

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Hot target plasma was obtained without additional heating in an open trap AMBAL-M from arc source located behind the mirror [1]. Previously longitudinal electron current in the plasma was found and investigated. In this paper the model of longitudinal electron current generation and the model of effective electron heating are presented and discussed. Radial and longitudinal profiles of plasma density, potential and electron temperature have been measured. Vlasov's equation and simplified Fokker-Planck equation in nonuniform fields have been solved. Development of instability, particle and energy balances in the mirror, transversal ion current in the plasma periphery have been considered in detail.

The arc source electrode potentials form a positive radial electric field on periphery, which together with the diffusion from ion-ion collisions leads to the significant transversal ion current in the transport region. The longitudinal electron current flows out into the mirror to provide quasineutrality. As the plasma density in the throat is low, the current needs the electric field accelerating the electrons to be formed in front of the throat. The found longitudinal electric field forms the population of fast electrons which transports the current. The electron flow heats the trapped electrons effectively (due to an ambipolar potential and the high velocity of the flow electrons) as a result of the Coulomb collisions. This «non-joule» non-turbulent effective heating of electrons by the current in an open trap has been first identified and investigated.

The model described shows the possibility of obtaining of hot plasma in a mirror by control of the radial profile of the potential. The plasma state obtained is close to the one which can be described basing on the classical (collisional) phenomena. This control of the radial profile of the potential and the «classical» character of the plasma obtained are pointed out as characteristic favourable features of open traps.

[1] T. D. Akhmetov et al. *Plasma Phys. Reports* **23** (1997) 988.