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Effects of anomalous transport on magnetic filter effect YEVGENY RAITSES, IGOR KAGANOVICH, Princeton Plasma Phys Lab, ANDREI SMOLYAKOV, WINSTON FRIAS, University of Saskatchewan, Canada — The application of the magnetic field in a low pressure plasma can cause a spatial separation of cold and hot electron groups. This so-called magnetic filter effect is not well understood and the subject of our studies. In this work, we investigate electron and ion velocity distribution functions in a low pressure plasma discharge with crossed electric and magnetic field. Previous experimental studies showed that the increase of the magnetic field leads to a more uniform profile of the electron temperature across the magnetic field. This surprising result indicates the importance of anomalous electron transport that causes mixing of hot and cold electrons. High-speed imaging revealed a coherent rotating structure with frequency of a few kHz. Theory describing coherent rotating structures and resulting anomalous transport has been developed and points to ionization and electrostatic instabilities as their possible cause [1-3]. The rotating structure affects perturbations of the plasma potential in both azimuthal and axial directions of the plasma discharge. Preliminary results of Particle-in-Cell simulations and Laser-Induced-Fluorescence measurements showed these perturbations alter the ion velocity distribution function.

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