Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

A Low-Voltage Heated-Cathode Discharge Device for Nonlocal Control of Plasma Properties[1] V.I. DEMIDOV, WVU, I. SCHWEIGERT, ITAM, I. KAGANOVICH, PPPL, A.S. MUSTAFAEV, NMRU, S.F. ADAMS, AFRL, M.E. KOEPKE, WVU — In this research a low-voltage gas discharge device with heated cathode has been used for demonstration of controlling plasma properties by means of regulation of nonlocal energetic electrons. The discharge is formed between a heated cathode and an anode. A special molybdenum diaphragm, the control electrode, is placed between cathode and anode. Experiments and modeling of the device suggest the presence of two dramatically different modes, which are dependent on the diaphragm voltage. The transition between modes leads to a significant variation in plasma properties. It is experimentally shown that increasing the gas pressure (which leads to transition from plasma with nonlocal electron energy distribution (EDF) to plasma with local EDF) will eventually terminate this effect and for higher pressure there is only one mode in the discharge. Modeling for different radii of the diaphragm opening allows demonstrate modification of the effect.

[1]This work was supported by the DOE OFES (Contract No DE-SC0001939) and AFOSR.

V. I. Demidov
WVU

Date submitted: 19 Jul 2012 Electronic form version 1.4