Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Plasma instabilities in ExB plasma devices[1] MEGHRAJ SENGUPTA, ANDREI SMOLYAKOV, University of Saskatchewan — Inter-streaming instabilities between electrons and ions are studied in a range of EXB plasma devices. Study 1: Nonlinear development of Electron Drift Instability is studied in azimuthal-radial PIC simulations of the annular channel of a Hall thruster. It is shown that in the nonlinear stage, the instability which starts as a short length scale linear instability, undergoes a sequence of transitions into longer wavelengths modes. The transitions in mode wavelengths are accompanied by related transitions of the magnitude of anomalous axial current. Study 2: Collisional PIC-MCC Simulations of the cross-sections of a Penning Discharge and a Cylindrical Magnetron are used for studying instabilities driven by ioniziation of neutrals. Evolution of these modes to a steady state and the possibility of modulating these ionization modes and associated plasma currents by tuning the background neutral pressure and the discharge voltage is investigated. Study 3: An E X B plasma existing in the parametric space where conventional quasi-neutrality just transitions over to non-neutrality, is simulated in the cross-section of a Penning-Malmberg trap. The differential drift between the ion and the electron component drives a spectrum of transient azimuthal-radial modes.

[1]This work was carried out under grants form NSERC Canada and the U.S. Air Force Office of Scientific Research FA9550-15-1-0226

Meghraj Sengupta
University of Saskatchewan

Date submitted: 03 Jul 2019 Electronic form version 1.4