Abstract Submitted
for the GEC11 Meeting of
The American Physical Society

Atomic chlorine and electron densities in inductively-coupled plasmas in pure Cl2 : Comparison of numerical simulations with experiments PASCAL CHABERT, NISHANT SIRSE, YASMINA AZAMOUM, JEAN-PAUL BOOTH, LPP, CNRS-Ecole Polytechnique, LPP, CNRS-ECOLE POLYTECHNIQUE TEAM — Two-photon laser-induced fluorescence (TALIF) at 233.2nm was used to measure the absolute density of Cl atoms in a 13.56MHz Inductively-coupled plasma in pure chlorine. The variation of the absolute Cl density at the reactor centre was measured as a function of pressure and RF power in the range 3-90 mTorr and 20-500W. We also used the TALIF technique to determine the recombination coefficient of atomic chlorine at the reactor walls from the rate of decay of the Cl density in the afterglow of a pulsed discharge. Finally, the electron density was measured by an hairpin microwave resonator in the same conditions. The electron density radial profiles were also recorded. This large set of experimental results was compared to the HPEM hybrid numerical simulations developed by Mark Kushner at the University of Michigan. The experimental recombination coefficient of atomic chlorine at the reactor walls was used as an input of the simulations. A fairly good agreement between simulations and experiments was found (both on electron density and Cl atom density) at the lowest pressure investigated (3-5 mTorr). However, the agreement was not satisfactory at higher pressure. The possible reasons for this discrepancy will be discussed during the presentation.

Pascal Chabert
LPP, CNRS-Ecole Polytechnique

Date submitted: 15 Jul 2011 Electronic form version 1.4