Abstract Submitted
for the GEC16 Meeting of
The American Physical Society

On the role of helium molecules in atmospheric pressure discharges EMILE CARBONE, CHRISTIAN SCHREGEL, DIRK LUGGENHLSCHER, UWE CZARNETZKI, Institute for Plasma and Atomic Physics, Ruhr-University Bochum, 44780 Germany — Despite their intrinsic simplicity, helium plasma kinetics are still not fully understood and quantitatively described. This is particularly the case at high pressures when various molecular helium species (i.e. ions, excimer(s) and Rydberg states) are formed. In this contribution, the absolute density of helium Rydberg molecules is measured for the first time by a combination of laser photo-ionization and Thomson scattering experiments. The experiments are performed on a parallel plate, nanosecond pulsed, DC discharge at 700 mbar. The results are combined with electron and helium metastable densities measurements and compared with a kinetic model of the discharge. The source of He_2 molecules in the discharge and afterglow phases are identified and discussed. The present experimental data and kinetic model solve several inconsistencies between reaction paths proposed in the literature.

Emile Carbone
Ruhr-University Bochum

Date submitted: 10 Jun 2016 Electronic form version 1.4