

Influence of Plasma Manipulation on Complex Plasmas

C. A. Knapek¹, P. Huber¹, D. P. Mohr¹, E. Zähringer¹, H. M. Thomas¹

¹ *DLR German Aerospace Center, Research Group Complex Plasmas, Wessling, Germany*

Complex plasmas are generated by injecting micrometer-sized grains into a low temperature noble gas discharge. The particles acquire high negative charges of up to several thousand elementary charges, interact with each other via a screened Coulomb potential, and can form gaseous, liquid or solid states. Since the particles are individually visible, complex plasmas provide an experimental approach for fundamental studies of strong coupling phenomena with fully resolved dynamics at the individual particle level.

Electron temperature and plasma density play an important role for the charging and interaction potential of the particles. The Zyflex plasma chamber, which has been developed within the PlasmaLab/EkoPlasma project as the future laboratory for complex plasma research in microgravity on the International Space Station (ISS), offers several possibilities for manipulation of plasma parameters, either by variable rf operation modes, or by using special grid electrodes for electron temperature control. In the latter case, the region of plasma production is separated from the working volume containing the particles, and the electron temperature can be controlled by the grid parameters. Results of first experiments – performed during parabolic flights and in the laboratory – with complex plasmas in such a “controllable” plasma environment are presented.

This work is funded by DLR/BMWi (FKZ 50WM1441).