



Laboratory simulation of dust charging in space plasma

M. Jeřáb, M. Beránek, J. Pavlů, I. Richterová, J. Šafránková, Z. Němeček, J. Vaverka, and M. Vyšinka
Faculty of Mathematics and Physics, Charles University, Prague, Czech Republic (martin.jerab@mff.cuni.cz)

Dusty plasmas are ubiquitous in different parts of the cosmic environment, namely in planetary rings, in the interplanetary medium, in cometary tails, in interstellar clouds. A dust grain immersed in a plasma is charged and/or discharged by various processes like collection of ions and electrons from the ambient plasma, photoemission, secondary electron emission, and also minor charging like thermo-emission and field emissions. Laboratory simulations of charging properties of dust grains are a way to understand the role of dust grains in the complex (dusty) plasma in the space. On the other hand, the dust plays an important role in many technical applications. In the last decades, many laboratory simulations in which different kinds of charging processes were studied have been realized. One of them is our actual experiments which are performed for more over 14 years.

The apparatuses are based on an electro-dynamic quadrupole trap when we are able to hold a single dust particle for a long time (typically tens of hours). We can to study effects of electron and ion charging of various energies and species and effects connected with the UV radiation exposure of dust grains, respectively. The goal of the presentation is to introduce our experiments to investigate the properties of small dust grains and survey important discoveries we obtained during our research.