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Microgravity Experiments from Sub-Orbital to Orbital Platforms (3)

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## DUSTY PLASMAS ON PARABOLIC FLIGHTS AND DROP TOWER

**Abstract**

Dusty plasmas consist of micrometer or submicrometer particles immersed in a gaseous plasma. Dusty plasmas are ubiquitous in astrophysical situations like the rings of the Great planets, at comets, in interstellar clouds etc. as well as in technological applications of plasmas in plasma etching or surface processing.

In our experiments on dusty plasmas, we are interested in the fundamental aspects of plasma-particle interactions. General questions of interest relate to the structure of dust cloud, the charging of the particles in the plasma, interparticle forces and forces exerted by the plasma on the particles. A major interest also lies in the particle dynamics, such as self-excited dust-density waves. Recent investigations are related to the phase separation behaviour of binary mixtures of particles with a (slightly) different size.

Under usual gravity conditions the particles sediment into the lower regions of the plasma where the particles form flat, nearly two-dimensional, structures. Under microgravity conditions, the particles fill (almost) the entire plasma volume and form large three-dimensional clouds. We have studied dusty plasmas under the weightlessness conditions of numerous parabolic flights and in three campaigns at the Bremen drop tower.

In this talk, an overview over our research on dust plasmas together with the diagnostic tools are given. The diagnostics include video microscopy and particle tracking as well as stereoscopic techniques to retrieve the full three-dimensional particle trajectories.