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Life and Microgravity Sciences on board ISS and beyond (Part II) (7)

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ARISE: BUILDING PLANETARY SEEDLINGS ON THE ISS

Abstract

The planet forming process begins with collisions of sub μm sized grains of dust inside of a protoplanetary disk. These grains stick after hitting each other building larger, fractal like aggregates. The fractal structure disperses with further collisions and the aggregates form to compact spheres with a sub mm diameter. At this stage collisional growth is no longer possible which is known as the "bouncing barrier". A growth-supporting effect is given by triboelectric charging of the aggregates. This effect describes the transport of charge between aggregates in collisions. Even though the phenomenon of triboelectric charging is not understood fundamentally, charged aggregates inside of a protoplanetary disk attract each other due to emerging electrical fields between them. ARISE is an experiment on board of the ISS which investigates the influence of electrical charge on the clustering of sub mm sized silicate spheres. The spheres are shaken and charged in collisions. Finally, they are released into a larger volume where the clustering is observed.