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Complex Plasmas under free fall conditions aboard the International Space Station[1] UWE KONOPKA, EDWARD THOMAS, JR., DYLAN FUNK, BRANDON DOYLE, Phys. Dept. Auburn Univ., Auburn, AL, USA, JEREMIAH WILLIAMS, Wittenberg University, Springfield, OH, USA, CHRISTINA KNAPEK, HUBERTUS THOMAS, German Aerospace Center (DLR e.V.), Oberpfaffenhofen, Germany — Complex Plasmas are dynamically dominated by massive, highly negatively charged, micron-sized particles. They are usually strongly coupled and as a result can show fluid-like behavior or undergo phase transitions to form crystalline structures. The dynamical time scale of these systems is easily accessible in experiments because of the relatively high mass/inertia of the particles. However, the high mass also leads to sedimentation effects and as a result prevents the conduction of large scale, fully three dimensional experiments that are necessary to utilize complex plasmas as model systems in the transition to continuous media. To reduce sedimentation influences it becomes necessary to perform experiments in a free-fall (microgravity) environment, such as the ISS based experiment facility Plasma-Kristall-4 (PK-4). In our paper we will present our recently started research activities to investigate the basic properties of complex plasmas by utilizing the PK-4 experiment facility aboard the ISS. We further give an overview of developments towards the next generation experiment facility Ekoplasma (formerly named PlasmaLab) and discuss potential additional small-scale space-based experiment scenarios.

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