

Ekoplasma – The Future of Complex Plasma Research in Space

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The Ekoplasma project, a Russian-German cooperation, is the future multi-purpose laboratory for the investigation of complex plasmas under microgravity conditions on the International Space Station (ISS), following in a line of successful preceding experiments aboard the ISS: PKE-Nefedov, PK-3 Plus, and the currently operating PK-4 facility.

The experimental apparatus of Ekoplasma features a newly developed large, cylindrical plasma chamber (the Zyflex chamber) with an adaptive internal geometry and 4 rf-driven electrodes for plasma generation. With the implemented technology, the accessible experimental parameter range will be extended by magnitudes (e.g. particle charge, neutral gas pressure range) and it will allow an independent control of plasma parameters. Further, particle dynamics will be investigated by a 3D optical diagnostic system, giving new insights into physical phenomena by adding the information of the 3rd dimension, which is usually lost when observing a 2D cross-section of the observation volume.

The experimental setup and the current project status will be presented, as well as selected results of experiments on earth and in parabolic flights, which demonstrate the scientific possibilities of this new laboratory.

Ekoplasma is planned to be launched to the ISS after 2022, and it will cover a wide range of research topics such as solidification and melting, phase separation in binary systems, the transition to turbulence, active matter or electrorheology.

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