

NEW RESULTS OF THE "PLASMAKRISTALL-4" SPACE EXPERIMENTS

*Zobnin A. V.,*¹ Lipaev A. M.,¹ Naumkin V. N.,¹ Usachev A. D.,¹
Thoma M. H.,² Kretschmer M.²*

¹*JiHT RAS, Moscow, Russia, ²JLU, Geissen, Germany*

**zobnin@ihed.ras.ru*

Two recent results of experiments performed on PK-4 installation [1] onboard ISS are presented. The first is the observation of a microparticle cloud fragmentation and collapse into dense clusters due to Le Sage - like attraction between microparticles in the dense enough plasma. The experiments were performed using a special procedure, which provided conditions for microparticle attraction and gravity-like instability in some parts of the cloud. Plasma parameters and densities of the microparticle clusters were estimated. Main results have been published recently [2]. The second is the experimental determination of the lattice modes in a three-dimensional plasma crystal. A stable crystalline structure of microparticles was formed in the direct current discharge with alternating polarity. The microparticles were in random motion with effective temperature 4000-6000 K. The Fourier analysis of the microparticle velocities showed a lattice wave pattern for longitudinal and transversal modes. The experimental spectra were compared with theoretical ones, obtained by molecular dynamic simulation of the Yukawa crystals with suit parameters.

-
1. M. Y. Pustynnik, M. A. Fink, V. Nosenko, et al. // Review of Scientific Instruments. 2016. V. 87. 093505.
 2. A. V. Zobnin, A. M. Lipaev, R. A. Syrovatka, A. D. Usachev, V. N. Naumkin, O. F. Petrov, M. H. Thoma, O. V. Novitsky, and S. N. Ryzhikov // Phys. Rev. E. 2024. V. 110. 035203.