creation of THREE-DIMENSIONAL dust structures and clusters in glow discharge in strong magnetic fields

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One of methods of experimental study of dust plasma is an imposing of controlled influence on the system (dust trap) and observation of a response of dust subsystem. The using of magnetic field as external influence began with works of N. Sato [1, 2] in which the dust trap was created in RF discharge as more stable in magnetic field.

In the last 5 years the range of the used magnetic field passed into the area of the strong field   
[3–5]. In the last work the dusty plasma was successfully created in standing striation in the glow discharge in the field of 10000 G. Some features of a formation of dust plasma: dynamics of rotation, the size of dust structure, an internal arrangement of particles, stability of structure, are discussed in the present message.

Besides, dust component is used for diagnostics. Dust formations show the geometrical size of the trap and also the stability in strong magnetic field. This is registered in the experiment on observation of particles inside the cryostat of a superconducting magnet.

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References

1. Sato N., Uchida G., Kaneko T., Shimizu S., Iizuka S. // Physics of Plasmas. 2001. V. 8. P. 1786.
2. Sato N. AIP Conf. Proc*.* 649 (2002) р. 66.
3. M. Schwabe, U. Konopka, G. Morfill et al., Phys. Rev. Lett.106 215004 (2011).
4. Thomas E., Lynch B., Konopka U., Merlino R., Rosenberg M. Phys. Plasm. 22 030701. (2015).
5. E.S. Dzlieva, L.G. Dyachkov, L.A. Novikov, S.I. Pavlov and V. Yu. Karasev EPL 123 (2018) 15001.