

## P4.3018 Spectral investigations on concentric double hollow grid cathode discharges

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See full abstract here:

<http://ocs.ciemat.es/EPS2019ABS/pdf/P4.3018.pdf>

Spectral investigations were carried out on a cathode system, consisting of two concentric spherical hollow grids with aligned orifices to diagnose Complex Space Charge Structures (CSCS) bordered by an electric double layer. CSCS in form of a single or multiple quasi-spherical luminous plasma bodies are called fireballs, plasma bubbles or anode dots, appearing frequently in plasmas attached to electrode surfaces due to electric field perturbations [1-3]. Inverted fireballs are structures which require a special electrode configuration, appearing inside a closed gridded, usually spherical cathode mesh. An electron beam forms through the orifices once the elementary processes assure the necessary electric charge equilibrium [1,2]. Experimental investigations have been carried out to understand the reactions that play a role in the phenomenology. Data obtained from optical emission spectroscopy were used to estimate the axial profiles of electron and ion excitation temperature and density, respectively. The increasing peaks of particle temperatures and densities, respectively, near the orifices are due to local constrictions of the plasma, as well as to an acceleration of the electrons in a potential gradient, which is reported here, and in previous research [2], in the double grid [1] as well as in the single grid configurations [4]. Besides research on basic phenomena present in the formation of such multiple CSCS, the importance of a multiple concentric cathode discharge configuration is revealed for deposition applications.

References [1] R. Schrittwieser et al., Phys. Scr. 92 (2017) 044001.

[2] C.T. Teodorescu-Soare et al., Int. J. Mass Spectrometry 436 (2019) 83.

[3] S. Gurlui et al., Rom. J. Phys. 54(7-8) (2009) 705.

[4] C.T. Teodorescu-Soare et al., Physica Scripta 91 (2016) 034002.

**Presenter:** TEODORESCU-SOARE, C.T. (EPS 2019)

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