

Project 4.2. Microphysics of Coulomb explosions

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Unit: ON2.7 - Group of Optical Characterisation of Micro- and Nanoobjects

www: <http://info.ifpan.edu.pl/sdvs/en/on2.7.html>

Background:

The droplet break-up, taking place when the repulsive electrostatic forces overcome the surface tension (Rayleigh limit) is a phenomenon known since Coulomb days (Coulomb explosion). However, it has been described in the language of continuous medium, which overlooks granularity of the matter – effects taking place at the interface at nano- and molecular level.

Aim:

The objective of the research is to analyse the phenomena at the air-liquid interface, look in detail for discrepancy with the continuous medium description and propose a new one. The Rayleigh limit can be classically controlled with the droplet charge or/and with the droplet surface tension. We plan to study the dynamics of evaporation of charged composite droplets of various liquids with electrically interacting components (surfactants, dielectric and metallic nanospheres, etc.) as a function of initial droplet parameters.

Requirements:

- Master's degree in physics or related field.
- Skills in experimental physics (best but not obligatory – in the field of optics, electrodynamics, thermodynamics or related), ideally – proven by publications.
- Ability to work in a team.
- Good spoken and written English.