

PhD. Positions in Plasma physics, Comenius University, Bratislava, Slovakia

The Department of Experimental Physics at Comenius University invites applications for PhD. to work on several ongoing projects related to the **Ion Mobility Spectrometry, RF-discharges, Bio plasma, Electron-Induced Fluorescence, and Modeling of Electron-induced processes.**

An overview of our current activities is available at the following websites:
<http://dep.fmph.uniba.sk/>

We seek motivated and highly talented candidates with a Master's degree (or an equivalent diploma giving access to doctoral studies) in Physics with good communication skills in English

Salary: 914Eur/month (after 18 months 1054Eur)

Deadline for applications: 30. April 2023

We are looking for students for the following Ph.D. project (they may be later modified to be more specific and suitable for the student):

1. Monitoring of processes initiated by the atmospheric discharges using the methods of IMS and IMS/MS spectrometry

The student will study atmospheric discharges using IMS and IMS-MS techniques. He will optimize the parameters of IMS and IMS-MS spectrometer for diagnostics of discharges and their applications in the field of biomedicine, and agriculture. These new methods will be applied for diagnostics of the plasmas and its applications in the fields of new materials, agro, and biomedicine

Supervisor (Prof. Štefan Matejčík matejcik@fmph.uniba.sk)

2. Inelastic electron interactions with molecules studied using cross beams techniques

The processes of excitation reactions of electrons with atoms and molecules are studied with a high resolution of the electron beam and optical spectroscopy using Electron Induced Fluorescence - EIF. The method makes it possible to perform fundamental studies of the optical emission spectra of molecules, excitation-effective cross sections, and the time course of excitation reactions in detail and with high resolution. The acquired knowledge will be applied in the field of optical emission diagnostics of low-temperature, astronomy, and astrophysics.

(Supervisor Prof. Štefan Matejčík matejcik@fmph.uniba.sk and Assoc. prof. Juraj Országh juraj.orszagh@uniba.sk)

3. Biomedical application of atmospheric plasma jets

The presented dissertation project is focused on the optimization of plasma sources, which were designed at the Department of Experimental Physics, and their bioapplications. Ongoing projects, which will be followed by work, will focus on the degradation of harmful molecules from waste and tap water and the decontamination of seeds in the agro-industry and seeds and their germs in the food industry.

(Supervisor Assoc. Prof. Matej Klas matej.klas@uniba.sk)

4. Pulsed and Rf microdischarges

The aim of the dissertation is the study of microdischarges and their applications generated in pulse and RF mode at moderate and high pressure. The successful candidate is expected to perform analyzation of measured data based on the Fowler-Nordheim theory and General thermal field emission theory to evaluate the parameters of the whiskers. Electrical circuit optimization and impedance matching is also an essential part of the job.

Requirements for the applicant: radio-frequency technique, basic electronics, OES, and Lab view programming are welcome

(Supervisor Assoc. Prof. Matej Klas matej.klas@uniba.sk)

5. Modeling of electron-induced processes with standard quantum physical methods

Quantum chemical calculations of molecular properties, conformational studies, optimal geometries, ground state energies, energies of excited states, ionization energies, electron affinities, proton affinities, and bond energies. This knowledge will be useful for the theoretical interpretation of the results from electron-induced experiments.

(Supervisor Assoc Prof. Peter Papp, peter.papp@uniba.sk)

6. Precision spectroscopy of “small” molecules

The modeling of ro-vibrational electronic transitions present in the optical spectra is a key ability to extract the information about energy distribution within different states of species in the discharges. These data represent an important diagnostic tool, which helps us to understand the physics and chemistry of such non-equilibrium processes.

(Supervisor Assoc Prof. Peter Čermák, cermak@fmph.uniba.sk)