UNIVERZITET U BEOGRADU

INSTITUT ZA FIZIKU BEOGRAD

Laboratory for Atomic Collision Processes

SEMINAR PROJEKTA #OI 171020

LABORATORIJA ZA FIZIKU ATOMSKIH SUDARNIH PROCESA

U utorak, 01.11.2016. sa početkom u 11 časova u sali "Dragan Popović" Instituta za fiziku održaće se seminar:

"*Charge relaxation in macroscopic glass capillary after ion beam irradiation*"

Dr. Károly Tőkési

Institute for Nuclear Research, Hungarian Academy of Sciences (Atomki), 4026 Debrecen Bem tér 18/c, Hungary, EU

ELI-ALPS, ELI-HU Non-profit Ltd., Dugonics tér 13, H-6720 Szeged, Hungary, EU

Abstract:

While the guiding of ions through glass-capillaries due to charged patches is qualitatively understood [1], the complex nature of the electric conduction in such insulators makes quantitative predictions still a challenging task. Indeed, for a given ion beam, the guiding is determined by the charging rate combined with the discharge rate where the "discharge" dynamics of the charge patches at the surface depend on the electrical properties of insulators and on the position and nature of grounded electrodes. In order to get some insights into the discharge dynamics in those insulators, we did a combined experimental and theoretical study of the charge relaxation in glass capillaries. We studied the discharge of the conical macro-capillary after irradiation with highly charged ions. The electric field, generated by the initially deposited charges is monitored by a bypassing ion beam. The latter is deviated by the electric field and its Coulomb deflection is followed in time on a position sensitive detector, yielding the relaxation in time of the deposited charge.

Using a home-made numerical code [2], the same observables were simulated and compared to the experimental data. They highlight the importance of the depolarization field due to the ionic conductivity in glasses. Indeed, if the conductivity was due to electron and hole mobility alone, the discharge curve has a non-exponetial form, which contradics our experimental data, which show a perfectly exponetial decrease of the charge. Least but not last, it was found that much attention must be paid to secondary electrons generated by the beam, as they contibute strongly to discharge the capillary. They effect on the discharge is highlited.

References:

[1] K. Schiessl, W. Palfinger, K. Tőkési, H. Nowotny, C. Lemell, and J. Burgdörfer, Phys. Rev. A.72 (2005) 062902.

[2] E. Giglio, R.D. DuBois, A. Cassimi, K.Tőkési, Nucl. Instr. and Meth. Phys. Res. B354 (2015) 82.