

**Report on the Visit of N. Stolterfoht at the ATOMKI Institute  
from Aug. 29 to Sept. 4, 2004 within COST P9 Action**

The laboratories in Berlin and Debrecen have an ongoing collaboration concerning the fragmentation of molecules by impact of slow highly charged ions. Recently, we started experiments studying the fragmentation of water molecules because of its relevance to biological matter. The experiments were performed at the Electron Cyclotron Resonance (ECR) accelerator facility in Berlin where the energy and angular distribution of fragment ions from collisions of 2 – 90 keV  $\text{Ne}^{q+}$  ions of charges states  $q = 1, 3, 5, 7, \text{ and } 9$  and 1-5 keV  $\text{He}^{2+}$  with  $\text{H}_2\text{O}$  molecules were measured.

In this Short Term Scientific Mission we have continued our work started during the recent visit of a member of the Debrecen group in Berlin at the ECR accelerator facility. The results were interpreted within the framework of a Coulomb explosion and over-barrier model. Deviations from these models in the energy and angular distribution of recoil ions are attributed to post-collision effects by the electric field of the projectile. We calculated the Coulomb explosion process and obtained good agreement with the experimental results. For the first time we modelled transfer ionization mechanisms initiated by the electron-electron interaction. This process could explain fragmentation of water by Coulomb explosion following a single transfer of an electron to the incident  $\text{He}^{2+}$  projectile.

Furthermore experiments using ions with lower charge state and higher energy were prepared at the accelerator facility of the ATOMKI Institute in Debrecen. These experiments require a target consisting of vaporized water where the know-how of the Berlin group was used to construct a vapour jet for water.

HMI Berlin, September 18, 2004

(N. Stolterfoht)

I agree with this Report of the Short Term Mission by Nikolaus Stolterfoht

ATOMKI Debrecen, September 21, 2004

(B. Sulik)