Radiation Damage in Biomolecular Systems
COST Action P9

Scientific Report

About a Short Term Scientific Mission

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Period: from **Oct. 12, 2004 to Oct. 18, 2004**
Place: CIRIL/GANIL, rue Claude Bloch, BP 5133, 14070 Caen Cedex 5, France (F)

The aim of the present *short term scientific visit* was to

- discuss our next common experiment in Berlin (Nov. 15-22), and the problems of theoretical interpretation of the data collected up till now.
- discuss the state of the preparation in our laboratories in Caen and Debrecen, and the possibilities to coordinate and accelerate our experimental work.
- Finally, we intended to perform test experiments in Caen during the short visit, but it was technically not possible at that time..

During my STSM in Caen, we had a series of discussions with Jean-Yves Chesnel and Lamri Adoui about possible common directions within the RADAM collaboration. With Jean-Yves Chesnel, we went through the plans for the next Berlin beamtime. We will share it with some overlap, I start in the period of Nov. 15-22, and Jean-Yves Chesnel will continue from Nov. 18. We agreed to continue with a systematics in ion-energies, and start to take electron spectra as well.

Lamri Adoui talked to me about the planned GANIL experiments of studying fragmentation processes by coincident momentum mapping with reaction microscopy. by using energetic Ni(24+) and bare carbon projectile ions. We discussed the recent trends to apply carbon ions in cancer therapy.

At this point, we discussed my plans to study the electron emission process in ion impact on biomolecules. In Debrecen and Berlin, we recently learned that in a certain impact velocity range, the so-called Fermi shuttle acceleration mechanism may significantly enhance the emission of high-energyelectrons. This effect might modulate the electronic stopping power. More importantly, it can produce a long range halo of relatively fast

electrons, which causes secondary damaging in biological tissues. We agreeed to study these effects both experimentally and theoretically, collaborating within a COST-RADAM framework.

Moreover, we considered some future experiments in Debrecen, to study the fragmentation of water and other relatively simple molecules by proton and single charged ion-impact in an intermediate (0.1 - 2MeV/u) impact energy range. In the present stage of the work, we are preparing a water target for our electrostatic spectrometer arrangement.

All these discussions were very helpful for me. I feel the present short visit very useful.

Debrecen, 15-11-2004

Béla Sulik
ATOMKI, Debrecen