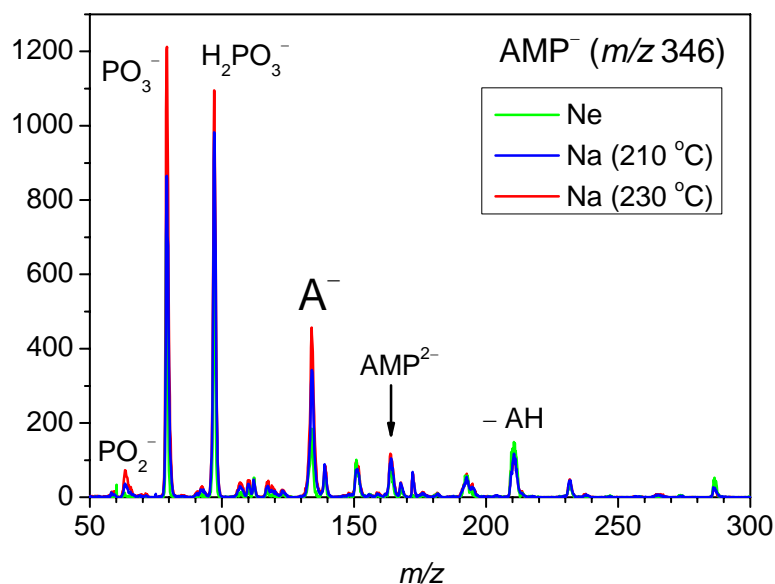


Scientific report regarding the Short-Term scientific Mission at University of Aarhus Department of Physics and Astronomy

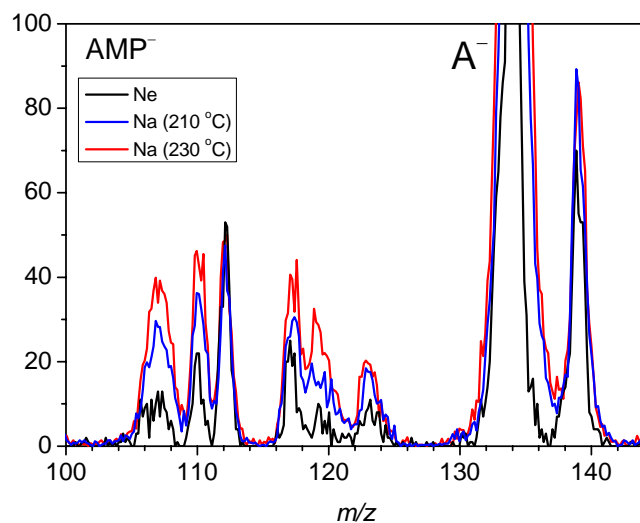
During my STSM at the University of Aarhus, Department of Physics and Astronomy, I have investigated the outcome of 50-keV collisions between nucleotides and atomic gases using an accelerator mass spectrometer equipped with an electrospray ion source. Electrospray ionization is a “soft” way of transferring fragile ions present in solution into the gas phase without breaking them apart. In our experiment, ions were formed from spraying a solution of nucleotides in methanol. Both mononucleotides (nucleobase-sugar-phosphate) and dinucleotides (nucleobase-sugar-phosphate-sugar-nucleobase) were chosen as projectiles, and target gases were neon and sodium.

The main objective of my STSM was to get acquainted with the electrospray technique which will be implemented also in our laboratory in Innsbruck.

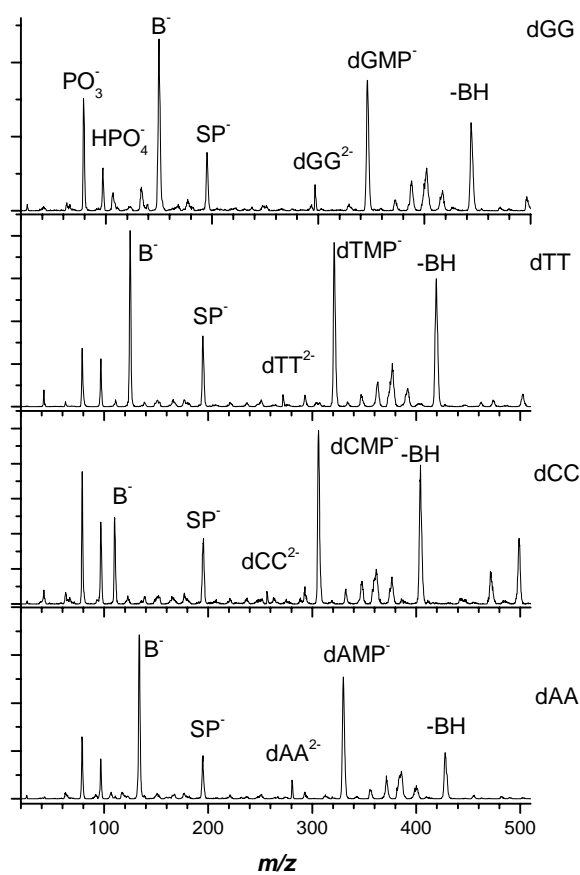
In collisions with both neon and sodium the major channel was collision-induced dissociation (cleavage between the sugar and nucleobase or breakup of the phosphate group). However, in collisions with sodium we also observed the formation of dianions due to e^- capture. This process is particularly efficient at high collision energies at which the collision interaction time is only a few femtoseconds. After subtracting the spectra obtained by colliding AMP (adenosine 5'-monophosphate) with neon and sodium at different pressures we found that some fragments appear due to secondary collisions (red peaks in the figure):



We observed also the formation of the neutral adenine base (A) during CID followed by electron attachment and fragmentation of the base:



In the case of the di-nucleotides dAA (adenine base), dCC (cytosine base), dGG (guanine base), dTT (thymidine base) we observed basically the same things like on AMP and also some fragments due to the decomposition of the sugar (peaks in between those of the single nucleotide and the dinucleotide minus the nucleobase, e.g., between m/z 335 and 430 in the case of dAA):



The results obtained during these two weeks will be published in the near future.

This STSM initiated a good collaboration between our Institutes which it will continue also in the future.

I like to thank European Science Foundation and COST Office for this opportunity of working on a new set-up, to learn a new technique and open a fruitful collaboration between Innsbruck and Århus.

16 June 2004

Hasan Valeriu Gabriel