

Report on the stay of Akos Kover
in the positron Group of UCL between 4-31 of March, 2007

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It is difficult to overestimate the importance of water as it makes up the bulk of living organisms and it provides the medium for a host of chemical reactions. Therefore the ionization and fragmentation of water by different projectile impact is very important to understand the fundamental interaction processes.

Several measurements were carried out for electron impact on water molecules to determine the total ionization cross section. For positron impact, data are still scarce but in the last few years the UCL group has measured the total cross-sections as well as for Ps formation, direct ionization and fragmentation, the last two integrally and differentially. In the latter case, significant forward scattering has been revealed however no corresponding data for electron impact have been found in the literature for comparison. Therefore we decided that, prior to changing the positron source to increase the positron beam intensity, we would carry out measurement by electron impact using the secondary electrons ejected from the moderator by the fast positrons. With the current source the electron beam at $\sim 5 \times 10^4$ was sufficiently low to permit measurements using exactly the same set up as for positrons. The fragments of water have thus been determined in coincidence with the energetically analyzed scattered electrons around zero degree at 100eV incident energy.

At first, measurements have been carried out with electrons on Ar in order to test the performance of the system and compare with previous results. Then we have begun data collection with H₂O as target. We have measured the scattered projectiles in coincidence with the water fragments in the range of 80-92 eV. We had to solve several problems, e.g. with the pick up pulses which came from the fast ion extraction pulses for which we applied a veto pulse on the stop input at the time-digital converter. We also stopped the beam during the ion extraction to avoid perturbing the collision. The random background was measured using extraction triggered by a pulse generator. In the future, we plan to extend measurements to 50eV impact energy and, after completing the measurement with electrons, we plan to increase the source activity to perform the positron measurements. We hope we can finish the measurement in Autumn time.

