ESRF	**Experiment title:** APECS study of Auger transitions in Si	**Experiment number:** SI267
Beamline: ID32	**Date of experiment:** from: 18 - 1 - 1997 to: 25 - 1 - 1997	**Date of report:** *27 - 3 - 1997*
Shifts: 18	**Local contact(s):** P. Calicchia	*Received at **ESRF**:* - 1 AVR. 1997

Names and affiliations of applicants (* indicates experimentalists):

P. Calicchia - ESRF Grenoble

S. Lagomarsino - I.E.S.S. C.N.R. Via Cineto Romano, 42 - 00156 Rome(I)

F. Scarinci - I.E.S.S. C.N.R. Via Cineto Romano, 42 - 00156 Rome (I)

C. Martinelli - I.E.S.S. C.N.R. Via Cineto Romano, 42 - 00156 Rome (I)

Report:

Time Coincidence Spectroscopy in condensed matter plays an important role for

i) it can distinguish events originated by different procesess that in standard spectroscopies are superimposed,

ii) it can separate the signal from the background.

The experiment performed has been the first Auger electrons and Photoelectrons Time Coincidence experiment realized with our own apparatus (an UHV chamber with two hemispherical electron analysers provided with fast timing electronics for time coincidence analyses).

A Si sample has been ionized using a monochromatic X-ray beam of 5KeV; the KLL Auger electrons together with the K shell photoelectrons have been detected using two hemispherical analysers, one tuned to the Auger electrons energy and the other tuned to the photoelectrons energy. The two "single spectra" have been acquired in order to identify the exact position of the main peak in both spectra, as it is shown in figure 1 and 2.

The position of the Auger electrons and photoelectrons peaks being carefully identified,

$\Rightarrow$ using an analyser fixed to 1607 eV and the second one to about 3 153 eV (the first at the Auger peak energy and the second at the photoelectron peak energy)

⇒ with an energy resolution of about 3,6 eV in order to include the highest number of couples of electrons escaping from the ionized atoms,

a time coincidence analysis has been carried out with a long procedure aiming at a very sharp alignment of the two analysers and a fine balance between the recommended small size of the beam on the sample and the flux.

A fast timing unit has detected the signals coming from the two detectors (one delayed of 150 nsec with respect to the other) and sent a "coincidence" pulse with height proportional to the separation in time between the two signals to a multi-channel analyser. This analysis has revealed the presence of a structure in the expected region of the spectra that we have ascribed to coincident events taking place in the sample. Figure 3 shows a peak at about 140 nsec.

The data acquired are under study, The periodic structure of the SR source influences the structure of the mca spectrum and the low statistic doesn't allow this structure to emerge clearly, making the analysis more difficult, and at the moment, a definite statement about the results is not available yet.

To sum up we can assert that the results of this first experiment has underlined some aspects that should be clarified and has shown how to optimize some procedures that will bring, in future works, to data quality enhancement.

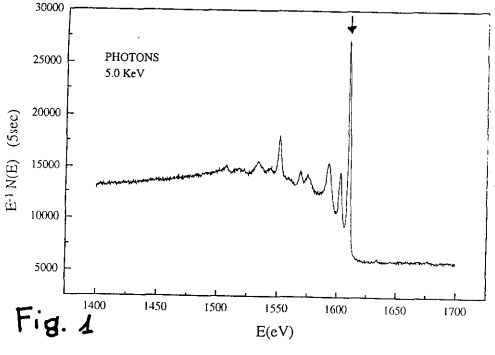

Fig. 1

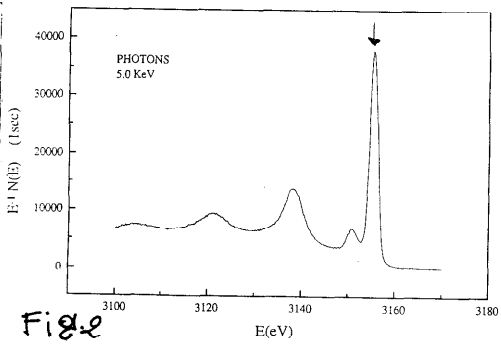

Fig.2

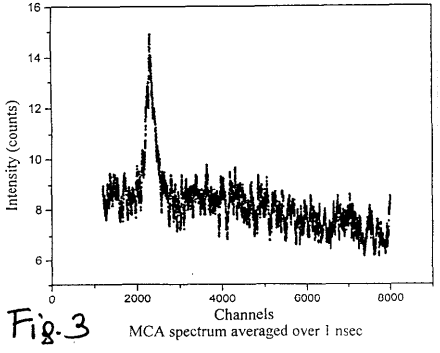

Fig.3

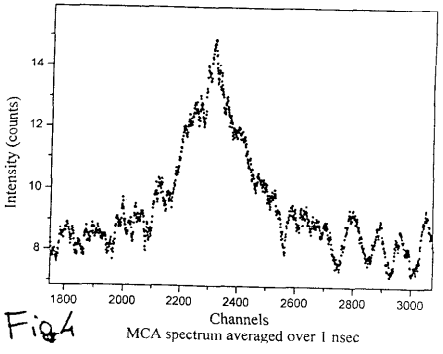

Fig.4