ASSEMBLING A DEVICE FOR MEASURING ALPHA-GAMMA COINCIDENCES

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Fig. 1: Device for measuring alpha-gamma coincidences.

Alpha and beta decays generally populate upper energy states in the daughter nuclei. Gamma radiation is then emitted to reach the ground level. These consecutive emissions can be detected by two different detectors and registered using a fixed interval of time. When both signals in cascade are simultaneous registered in these conditions, we say both signals are in coincidence. This represents a valuable help to study and check decay schemes of interesting alpha emitting nuclides. A new device for measuring alpha-gamma coincidence has been assembled in our laboratory. A silicon PIPS detector for alpha particles has been included in the top of a vacuum chamber. In the back of the chamber, formed by a very thin Be window a low energy germanium detector (LEGe) for gamma radiation has been connected.

Detectors, associated electronics and signal registration software were checked prior the running operations. Calibration of alpha-particle detection part was performed with a triple nuclide source containing ^{233}U, $^{239+240}$Pu and ^{241}Am. For the low energy germanium detector, a triple nuclide source containing ^{241}Am, ^{137}Cs and ^{60}Co and a single source with ^{241}Am, were used in the calibration. In these previous parts, signals were recorded and analyzed with the software for manipulation of spectra, MCDWIN v.2.93 from Canberra. The measured source jointly for alphas and gammas is disposed in the inner part on a rotary support which is exteriorly handled. This adds the double advantage of being used for measuring the thickness of the alpha-particle sources and to detect angular correlations between radiations emitted in cascade.

For coincidences, the dual parameter multichannel analyzer MPA-3 and the MPANT v.1.6 software were used. They were working simultaneously both with individual and dual modes. This software was also used for the analysis of single and dual parameter spectra. Figure 2 shows the spectrum obtained using the triple alpha source.

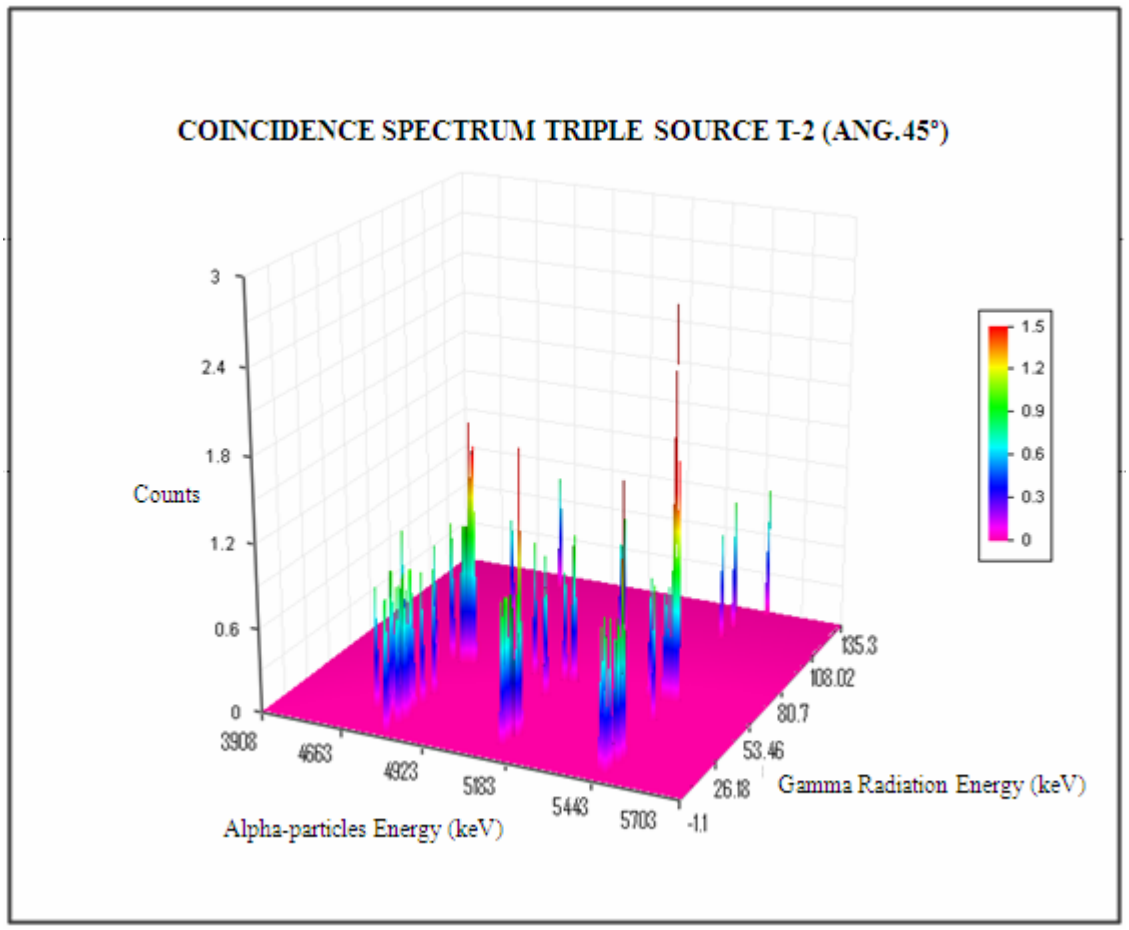

Fig. 2: Coincidence dual parameter spectrum obtained with a triple source.

In this work, the state of the art of the construction of the device will be shown, jointly with some preliminary results. Future improvements for the application of the new device for the measure of radioactivity in alpha emitting nuclides will be also presented.