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Multi-detector registration system for the study of multi-body decays of heavy nuclei.

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Abstract content
   (Max 300 words)

In previous experiments [1,2,3] a new type of ternary decay of low and middle excited nuclei called Collinear Cluster Tri-partition (CCT) under the framework of the "missing mass" method was observed. In this method only two out of the three ternary fragments are detected the other one is missing. In order to detect all the three decaying fragments, a spectrometer of high granularity was needed. In this paper two multi-detector registration systems to be used for the study of the multi-body decays of heavy nuclei are presented.

The first one is the Correlation Mosaic E–T Array (COMETA) which was designed to detect directly all the three decay products of the CCT. In this setup a belt of neutron detectors was installed in order to gate on the neutron data to increase the manifestation of the CCT process. A new calibration procedure which takes into account a so called pulse-height defect for energy registration with silicon detectors and plasma delay for time registration was developed [4]. The setup proved to be a success and direct detection of all the decay products of the CCT was observed. Over and above that a new CCT mode from the COMETA setup which is based on the double magic Sn cluster was also observed. This observation led us to build a new setup called Light Ion Spectrometer (LIS).

The aim of designing the LIS setup was to investigate the new CCT mode of 252Cf (sf) based on the double magic Sn cluster. This new CCT mode is given a special name called "Sn-lost CCT mode" because the missing mass corresponds to the known double magic 132Sn cluster. There is a possibility that instead of the 132Sn in the "Sn-lost CCT mode" we might have the double magic 208Pb. Theoretical indications of such a mode are presented in [5]. If this is experimentally proven to exist, it will be a new type of lead radioactivity. The LIS setup is based on the same operational techniques as a COMETA setup. This setup has an added advantage of being simpler with a smaller angular acceptance. It is also designed for long measurements with intensive sources and precise time measurements…

References

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