

Search and analysis of the Double hit events

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The work focuses on the “double-hit” experimental approach in the registration and analysis of ternary decay events, particularly in the context of fission fragment interactions with a solid-state foil. The methodology employed in the experiment involves a double-armed time-of-flight COMETA-F spectrometer equipped with an MCP time detector and 28 PIN diodes for precise energy measurements. The double-hit registration approach means that two fragments, with an open angle between them 5 degrees or less, were detected in the same PIN diode during one registration gate of 200 ns. The minimum time interval between the fragments timestamps should not exceed 30ns. An algorithm is described for retrieving these events from the collected data, emphasizing the importance of peak detection and analysis through various software tools developed at the Flerov laboratory. Additionally, it addresses the challenge of distinguishing genuine double-hit events from random coincidences with alpha particles, which constitute a significant portion due to their prevalence in ²⁵²Cf decay. A method for filtering out these random coincidences by analyzing energy and velocity data associated with each detected particle is presented here. Thus, for the first time the experiment

demonstrates directly that the partners of the break-up in the solid-state foil fly with very low angular divergence as was hypothesized earlier for the CCT products.

Notes: