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Time of flight identification with FAZIA

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FAZIA (Forward A and Z identification Array) is an array of three-stage Si-Si-CsI(Tl) telescopes. It was designed to operate with beams in the 20-100 MeV/u energy range and it provides charge and mass discrimination over a wide range of nuclei and energies. Indeed, in the last few years the FAZIA apparatus proved an excellent identification capability for charged particles emitted in nuclear collisions at Fermi energies. In particular, we achieved charge discrimination through Pulse Shape Analysis (PSA) for particles which penetrate at least 30-60 μm (depending on their charge) in the first silicon layer. In the perspective of FAZIA experiments at lower energies (e.g. to be realized at the new ISOL facilities SPES and/or Spiral2), and in general to lower the identification thresholds, the time of flight (ToF) information could be used.

Usually, time of flight can be obtained in two ways: either two detectors (start and stop) are used at a certain well measured distance, or the start time mark is given by the accelerator RF signal. Considering the possibility to work also in the absence of pulsed beam, we are studying and implementing a new approach that works for those events where at least one ejectile is properly discriminated in mass. The identified fragments can be used to extract the event start time mark from their energy and mass. This algorithm needs a perfect synchronization among all the ADC clock signals and a precise tuning of all the possible clock skews.

This contribution reports on such recent FAZIA activity, focusing on the basic ideas of the method and on some first results from recent experiments at LNS.

Selected session

Accelerators and Instrumentation

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