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# FAST-TIMING MEASUREMENT USING A $\text{LaBr}_3(\text{Ce})$ SCINTILLATOR DETECTOR ARRAY COUPLED WITH GAMMASPHERE

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A fast-timing experiment was performed at the Argonne National Laboratory in December 2015 and January 2016, measuring decay radiation of fission products from a  $^{252}\text{Cf}$  fission source. The purpose was to study neutron-rich nuclei in the mass region around  $A=110$  and  $A=150$  by measuring lifetimes of low-lying excited states.

The  $^{252}\text{Cf}$  fission source was placed at the focus of one hemisphere of the Gammasphere array (51 high purity germanium (HPGe) detectors) which was coupled with a fast-timing array, comprising 25  $\text{LaBr}_3(\text{Ce})$  scintillator detectors from the FATIMA@NUSTAR collaboration for FAIR. Gamma-gamma fast-timing with the scintillator detector array is possible by taking advantage of the energy resolution of the Gammasphere HPGe detectors by selecting a decay branch in a desired fission product utilising triple and quadruple gamma coincidences.

The experiment was also a first field test for the fast-timing data acquisition system developed for the NUSTAR collaboration. Details of the setup, integration with Gammasphere, and the data acquisition system will be presented. The timing performance of the setup, capable of measuring lifetimes from the nanosecond region down to tens of picoseconds, will be discussed. First preliminary results from the fast-timing analysis of the fission fragment data will be presented.