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Lifetime measurements in ^{44}Sc excited states using $\text{LaBr}_3:(\text{Ce})$ detectors coupled with the AFRODITE Array

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The progressive development of the scintillator detectors has made it possible to do direct electronic lifetime determination. The $2'' \times 2''$ $\text{LaBr}_3:(\text{Ce})$ detectors provide a combination of excellent time resolution and good energy resolution. With these detectors it is possible to do direct lifetime measurements of excited nuclear states up to a few hundred nanoseconds. Six $2'' \times 2''$ $\text{LaBr}_3:(\text{Ce})$ detectors were coupled to the AFRODITE array as their first in-beam experiment. AFRODITE consisted of eight HPGe clover detectors as well two $3.5'' \times 8''$ $\text{LaBr}_3:(\text{Ce})$ detectors. A particle telescope was used to select the desired reaction channel. The reaction of interest $^{45}\text{Sc}(p,d)^{44}\text{Sc}$ was carried out at a beam energy of 27 MeV. Through this reaction, excited states that have lifetimes which are apt for the characterization of the $2'' \times 2''$ $\text{LaBr}_3:(\text{Ce})$ detectors were populated. One of the nuclei of interest in this work, ^{44}Sc , has states with a wide range of lifetimes at low to moderate energies.

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