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Efficiency and dead time measurements of the iThemba LABS segmented clover detector

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Abstract content
   (Max 300 words)
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The iThemba LABS segmented clover detector is a new generation high purity germanium detector. The detector has four crystals and each crystal has eight electrical contacts on the outside and a central core contact. This detector can be used either as a standard clover detector or in a gamma-ray tracking mode. To develop gamma-ray tracking, the characteristics of the detector need to be measured. As part of the testing of the detector the depletion voltages, energy resolutions, preamplifier rise and decay times and efficiencies were initially measured using Pixie-4 digital electronics. Pixie-4 parameters were optimised for the best energy resolution of the detector. Although it was expected that the dead time with the digital data acquisition system should be small, we did measure it in order to quantify individually the impact on the efficiency by the dead time and by the coincidence summing. The dead time associated with the Pixe-4 digital electronic was measured with a pulse generator. A dead time of about 20 % at a counting rate of 4 kHz per channel was found. The effects of coincidence summing as a function of distance could then be identified. Similar measurements, performed with Pixie-16 digital electronics and using different shaping parameters are in progress. All these results will be presented and discussed.

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