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## Performance of FlexToT Time Based PET Readout ASIC for Depth of Interaction Measurements

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This work discusses the capability of a time based readout ASIC, the so-called FlexToT ASIC, to perform Depth of Interaction (DOI) measurements. In particular we will analyse the performance of the ASIC with a Phoswich PET module. FlexToT ASIC is optimized for readout of common cathode Silicon Photo- Multipliers arrays with direct coupling and individual anode voltage control. FlexToT presents the following features: wide dynamic range, high speed, low input impedance, multi channel, low power and separated timing and charge signal output. It has 16 independent outputs for energy, a single fast timing output and pile-up detection. We will present experimental results on identification of the signal of different crystals (BGO and LYSO) based on timing and energy signals.

### Summary

This work discusses the capability of a time based readout ASIC, the so-called FlexToT ASIC, to perform Depth of Interaction (DOI) measurements. In particular we will analyze the performance of the ASIC with a Phoswich PET module. FlexToT ASIC is optimized for readout of common cathode Silicon Photo- Multipliers arrays with direct coupling and individual anode voltage control. FlexToT presents the following features: wide dynamic range, high speed, low input impedance, multi channel, low power and separated timing and charge signal output. It has 16 independent outputs for energy, a single fast timing output and pile-up detection. FlexToT ASIC has 16 independent outputs for energy aa single fast timing output and pile-up detection. The low jitter current mode processing together with a configurable differential current mode logic (CML) output provides a timing signal suitable for Time of Flight (TOF) measurements. Each channel delivers a digital output of a Time Over Threshold (TOT) type with a pulse width proportional to peak current (charge) input. We will present experimental results on the identification of interactions on different crystals (BGO and LYSO) combining time and energy measurements. Figure 1 shows preliminary results on FlexToT capability for Phoswich operation. The information provided by time and energy channels of FlexToT seems to be sufficient to discriminate signals of GSO and LYSO crystals excited by a Na22 source.

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