Performance of FBK SiPMs coupled to PETA3 read-out ASIC for PET application

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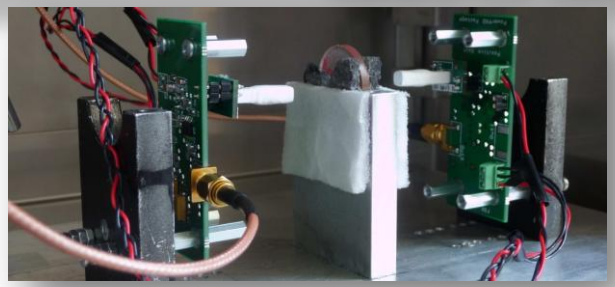
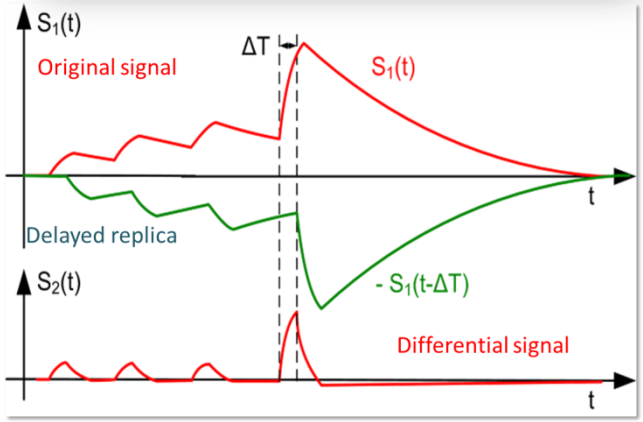
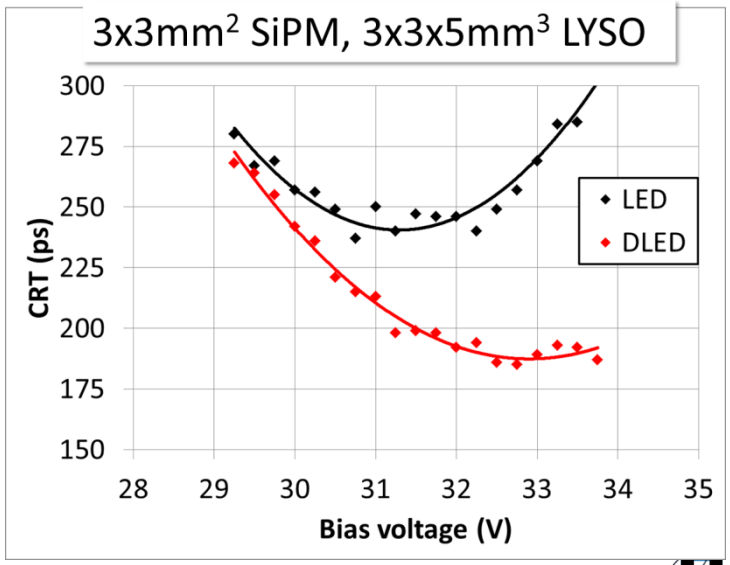
In this contribution we show energy and timing resolution results obtained with FBK SiPMs coupled to LYSO and read-out with PETA3 ASIC developed within HyperImage (FP7 GA #201651) and Sublima (FP7 GA #241711) EU projects.

Reference setup with discrete components



Optimized design to minimize parasitic.
Amplifier's outputs are digitize by an oscilloscope.
Data are analyzed by LabView code.





To reduce the baseline fluctuation due to dark noise we implemented DLED technique.

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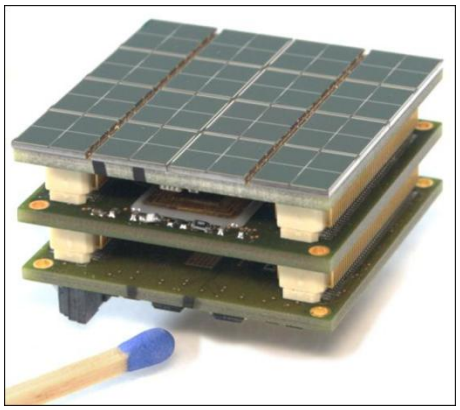
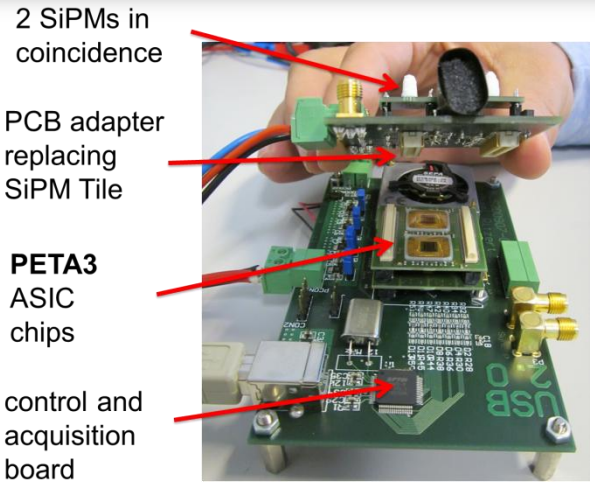
Measurement setup with 32-channel PETA3 ASIC

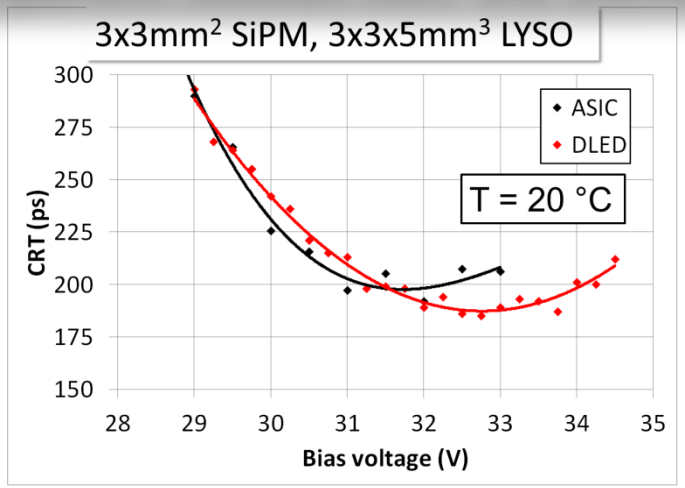
HyperImage PET stack



Modified stack to test 2 single channels in coincidence.



Comparison between ASIC and discrete



CRT with ASIC is very close to the value we obtain with our optimized setup with DLED technique **(~ 190 ps FWHM**).

Conclusions

The results obtained are very important because they show that, in a system-like configuration, we can get energy and timing resolutions that are very close to the values obtained in the optimized bench set-up.
Tests in whole-body PET configuration with previous SiPM and ASIC versions already showed reasonable results: dE/E<15% and CRT <500ps.
System upgrade with new components is expected to give much better results, in line to what presented here.

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