First test of a 180 nm prototype readout chip using a $^{90}_{38}$Sr radioactive source

W. da Silva[1], J. David[1] and F. Kapusta[1] *

LPNHE Paris
Université Pierre et Marie Curie and CNRS/IN2P3
4, Place Jussieu, Case 200, 75252 Paris Cedex 05, France

GLAST and CMS sensors equipped with a new 180 nm UMC readout chip have been tested with a ^{90}Sr source. S/N preliminary results obtained with a Common Mode Subtraction Method developped for few strips reading are presented.

1 Hardware and Software in the Paris Lab Test Bench

There where 3 kinds of detectors: a CMS detector with 3 modules fully equipped with 4 VA1 from IDEAS, another CMS detector with 3 modules equipped with 2 VA1 and 4 180 nm UMC and a GLAST detector with 10 modules equipped with 2 VA1 and 4 180 nm UMC. The GLAST detector is 90 cm strip long and 500 μ thick with a 228 μ pitch . The CMS detector is 28 cm strip long and 410 μ thick with a 183 μ pitch. A sequencer, called the Altera box, supplied all the signals needed for the smooth functioning of the preamps-shaper. A 14 Mbq Strontium source was used with a trigger based on a scintillator signal above some threshold. One PC had an ADC card for the proper reading of the analog signals from the detectors with LabView installed, for data taking and coordination of the all the test bench. Another PC was dedicated to the ROOT analysis software.

2 Source tests and results

A common mode noise subtraction method with a low number of adjacent channels has been developped and tested with simulated and real data. In the following figures the source raw data is shown, then pedestal and common mode subtracted. The final S/N value is obtained from a pedestal and signal fit.

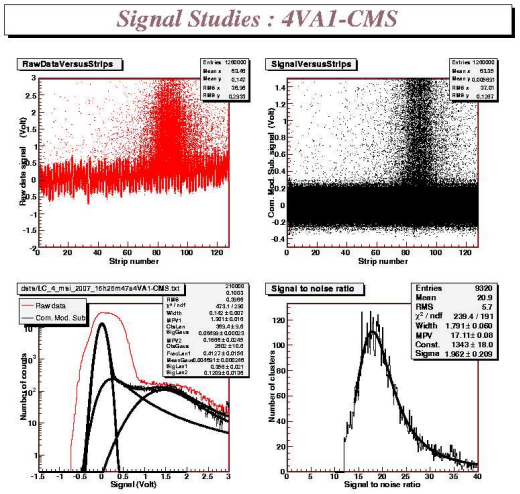

Figure 1: 4VA1

2.1 VA1

The VA1 128 channels have been tested as a reference. A four channel analysis of CMS and GLAST sensors has been done as well as a reference.The Signal over Noise ratios found, respectively of 17, 13 and 12, are consistent with the length and quality of each sensors.

*On behalf of the SiLC Collaboration

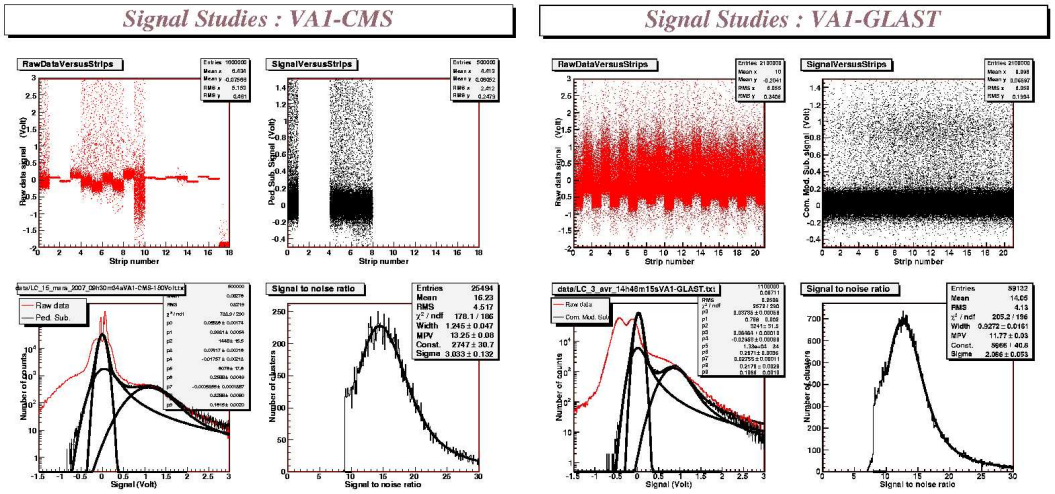

Figure 2: VA1-CMS and VA1-GLAST

2.2 180 nm

The method validated by the VA1 data analysis has been applied to the new 180 nm data. The 180 nm sensor channels have a comparable noise : $\sigma^{Noise} \simeq 16\ mV$. The found S/N ratios are respectively of 11 and 8.

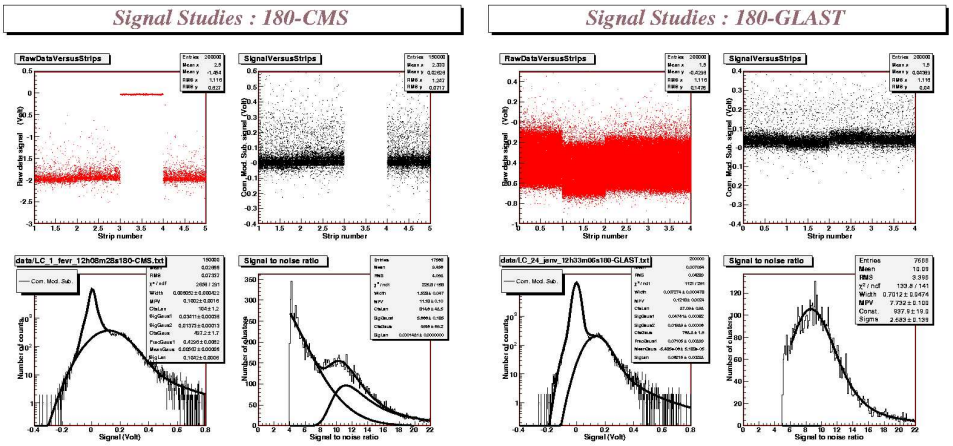

Figure 3: 180-CMS and 180-GLAST

3 Conclusions and outlook

A summary of the S/N results is given in the last figure, where a simulation was used to compute the ENC. The 180 nm chip is working. The global noise should be decreased. This source test will be followed by a beam test at DESY. It is a step towards the use of the new built 130 nm UMC chip with analog pipeline and digital output.

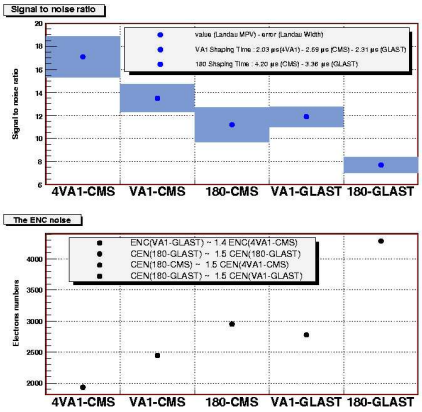

Figure 4: Results

References

[1] Slides:
`http://ilcagenda.linearcollider.org/contributionDisplay.py?contribId=42&sessionId=8&confId=1296`