

PMM2 ASIC : PARISROC

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PARISROC is a complete read out chip in AMS SiGe 0.35 μ m technology for photomultipliers array. It is made to allow triggerless acquisition for next generation neutrino experiments. The ASIC integrates 16 independent channels with variable gain and provides charge and time measurement by a 12-bit ADC and a 24-bits Counter.

Summary

PARISROC is a front-end electronics ASIC designed for the next generation of neutrino experiments. These detectors will take place in megaton size water tanks and will require very large surface of photodetection. An R and D program, funded by French national agency for research and called PMm2, proposed to segment the very large surface of photodetection in macro pixels made of 16 photomultiplier tubes connected to an autonomous front-end electronics. The ASIC must only send out the relevant data by network to the central data storage. This allows to reduce considerably the cost of these detectors.

This paper describes the front-end electronics ASIC called PARISROC.

The PARISROC chip integrates 16 channels totally independents.

Each channel contains:

- a low noise preamplifier with 8 bits variable gain (tuneable by a factor 4) to adjust the PMTs gain variation.
- a variable slow shaper (50-200ns) followed by an analogue memory with depth of 2 to provide a charge measurement up to 50pC.
- a second analogue memory with same depth to sample fine time measurement with precision of 1ns.
- a 12-bit Wilkinson ADC to convert the charge and fine time measures.
- a fast shaper (15ns) followed by 2 low offset discriminators to auto-trig down to 10fC. The thresholds are loaded by 2 internal 10-bit DACs.

A digital part manages all the acquisition, the conversion and the readout and provides by a 24-bit counter the coarse time measurement or timestamp.

The design and simulation results of the first prototype will be presented.

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