

## WaveCatcher and SAMPIC International Workshop



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# WaveCatcher and SAMPIC Systems

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The WaveCatcher systems are a family of powerful and low cost digitizers. Their number of channels currently ranges between 2 and 64 (+8) channels.

They all make use of the SAMLONG analog memory chips which permit sampling the input signal between 400 MS/s and 3.2 GS/s over 12 bits and with a signal bandwidth of 500 MHz.

There are 4 different types of systems:

- 2-channel, USB-powered handy module
- 8-channel (autonomous desktop), composed of a motherboard equipped with two 4-channel mezzanines
- 16-channel (6U board or autonomous desktop module)
- 64-channel (mini crate). This crate can actually house between 1 and 4 16-channel boards, thus providing 16, 32, 48 or 64 channels.

From the second version of the 16-channel boards on, 2 extra channels have been added in the back of the board. They can be digitized together with the other channels. When the board is used in standalone mode, these channels correspond to the external trigger and the external sync. Otherwise, they are equivalent to other channels.

The boards can also be used as TDCs for high precision time measurement between two signals. Sampling time precision after calibration is indeed less than 5 ps rms at 3.2GS/s.

All the systems are currently interfaced with a 480 Mbits/s USB link. A secured Gbit UDP interface is also available on the 8-channel module. An optical version of UDP is available in the 16-channel board and will soon be put into function in the other systems.

Software access to the WaveCatcher systems can be performed in two ways:

1. Via a high-level software library, available on Windows or Linux.
2. Via a dedicated powerful software running on Windows.

There is no low-level library.

The CAEN company distributes equivalent products in the X743 family.

SAMPIC is a Waveform and Time to Digital Converter (WTDC) 16-channel chip designed in the AMS 0.18- $\mu$ m CMOS technology which directly measures the arrival time of fast analog signals without the need of any external discriminator. A detailed description of the circuit and its performances will be presented in the afternoon session by Eric Delagnes.

A set of boards and DAQ system has been developed to record data with detectors in a real environment. This setup, including a powerful software with an original interactive graphical interface, has permitted the characterization of the chip, and the measurements of its time resolution which is as good as 3 to 4 ps rms after a simple correction, itself based on a very simple calibration. The raw time resolution before calibration is already better than 15 ps rms. This calibration remains very stable with time.

The current range of modules offer compact solutions with 16, 32, 48 and 64 channels. 128- and 256-channels systems are under development.

The CAEN company will soon distribute products based on SAMPIC.

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**Classification de Session:** Session 1