Development of a data acquisition platform based on CAEN digital electronics

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About me

- Born in Santa Fe, **Argentina**.

- Bachelor degree in Physics (2018) and Master degree in Condensed Matter (2019) at the **Balseiro Institute** (Bariloche, Argentina).

- Started my ESR position in CAEN SpA in September 2022.

- Currently living in Lucca, Italy.

Data acquisition platform

- From the detectors to data storage.

- **CAEN electronics**

  - Signal conditioning.

  - Power supply.

  - Digitizer.

  - Communication.

- **DAQ software**

  - Integrated, versatile, high performance and easy-to-use.

  - Device configuration and control.

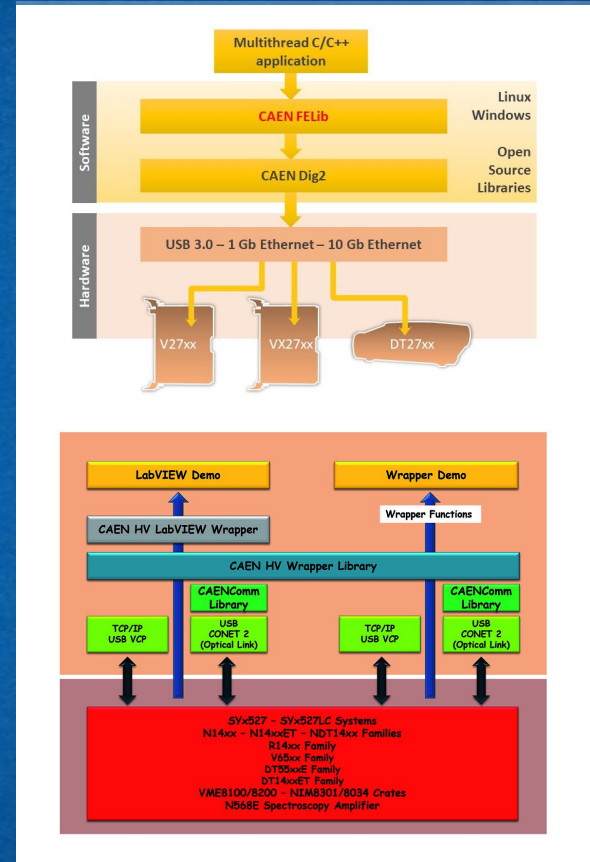 - Data readout and storage (eventually in a cloud database).

Detectors

CAEN electronics

DAQ software

Database
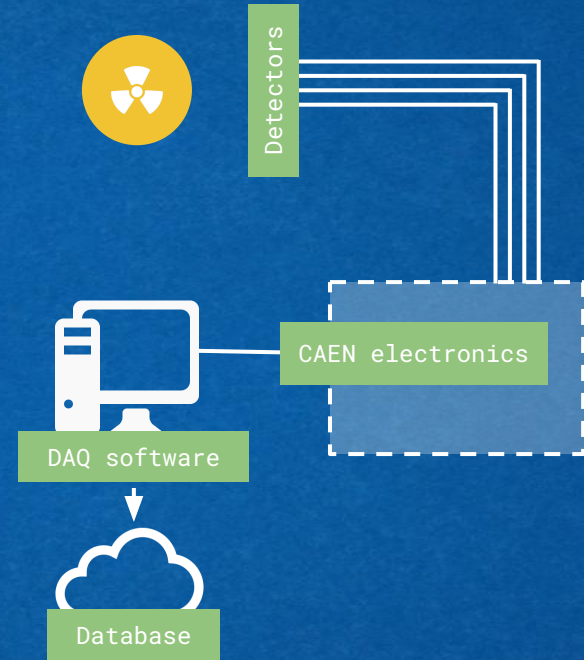
< Digitizer-based   ASIC-based >

- *Signal conditioning*
  CAEN A1442
  16/32 Channel charge sensitive preamplifier.

- *Power supply*
  CAEN V6519
  6 Channel 500 V/3 mA VME

- *Communication*
  CAEN V4718
  VME to USB 3.0/Ethernet/Optical Link Bridge

- *Digitizer*
  CAEN V2740
  64 Channel 16 bit 125 MS/s.

PreAmp | **Detectors** | **Detectors**

VME Crate

Power supply
Bridge
Digitizer

FERS

DAQ software

Data base
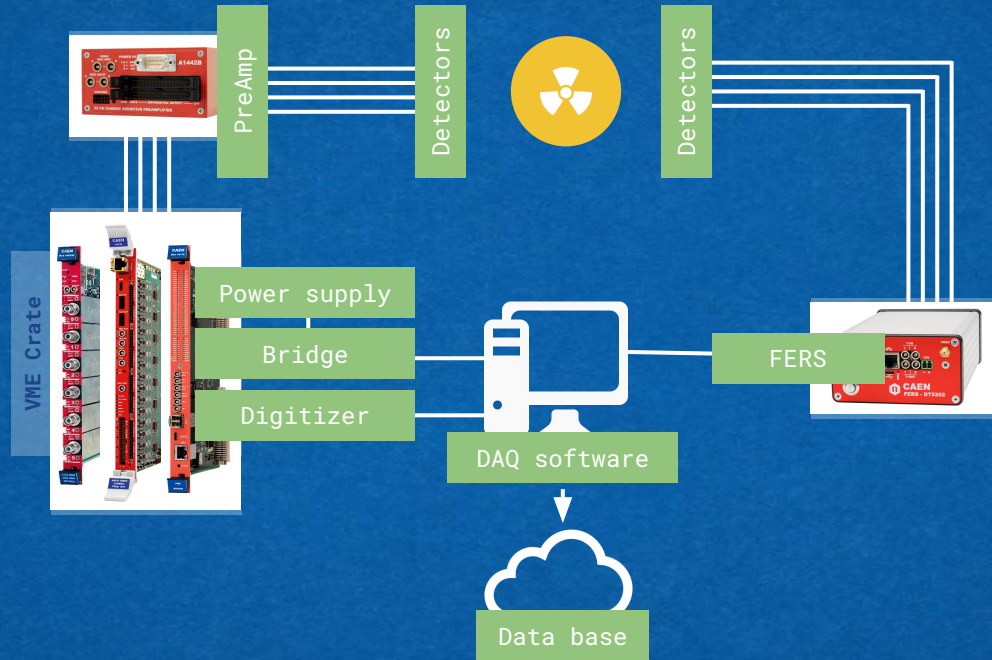
- **CAEN FERS 5202**: *Front-End Readout System*

  - Citiroc 1A 32-channel front-end ASIC (x2).

  - Onboard power supply: CAEN A7585D +85 V/10 mA.

  - Several communication interfaces: USB, Ethernet and TDlink.

DAQ software

- Requirements

  - Integrated, versatile, high performance and easy-to-use.

  - Device configuration and control.

  - Data readout and storage (eventually in a cloud database).

- Current CAEN GUI softwares

  - Geco, Compass, WaveDump, Janus.

  - Communication (device control and data readout) in a simple and complete way with the *different* components of an acquisition system.

- CAEN intermediate level libraries

  - FELib library, HV Wrapper Library, FERSLib.

  - Easy development of application softwares.

New DAQ software

- C++.

- Qt Framework (GUI).

- Using CAEN intermediate level libraries.
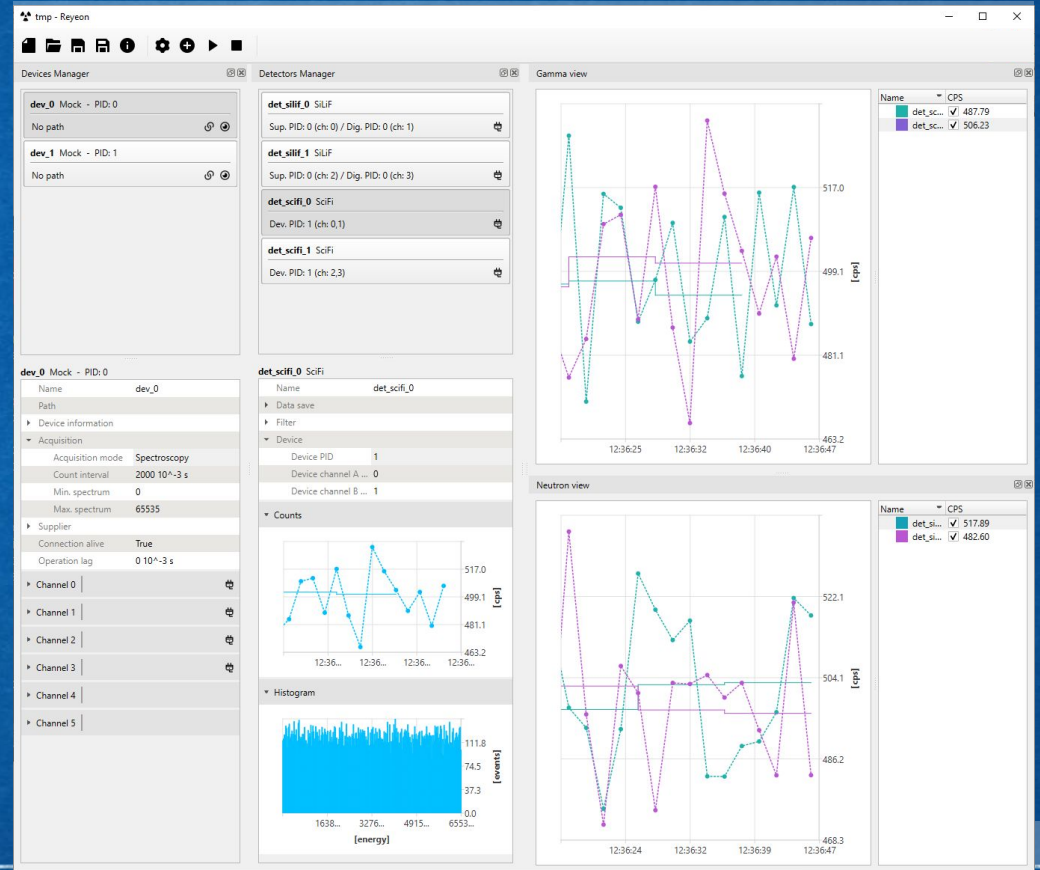
New DAQ software

- Modular design

  - Detectors and devices of different type can be easily added/removed.

- Device management

  - All devices can be setted up from within the software. No need of additional programs.

  - Configurations are saved. Device setup is done only once time and not every time the program is launched.

- Detector management

  - Simple and clear identification of the detectors and their relations with the devices.

  - Straightforward visualization and saving of readed data.

Future work

- Bug fix

  - New DAQ software.

  - Underlying libraries.

- Finish implementations

  - **Cloud database** communication.

  - Alarms.

- Improve **user experience**.