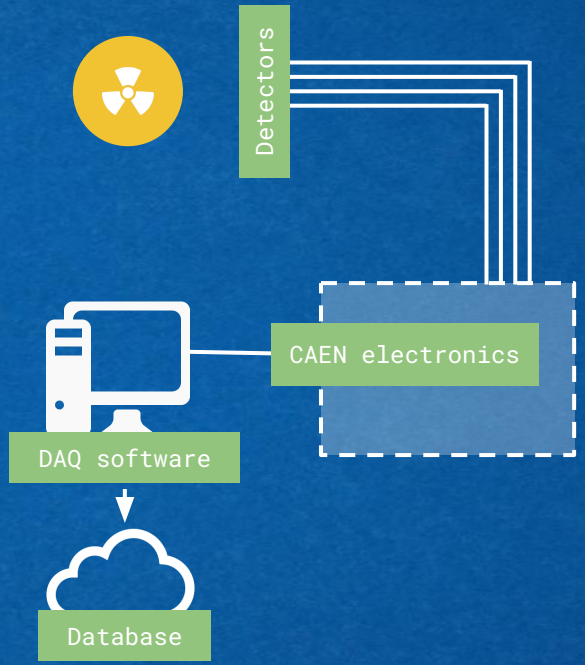
INTENSE *Monthly Meeting - Sep/2022*

Development of a data acquisition platform based on CAEN digital electronics: Cloud database support

Matías ***Simonetto***

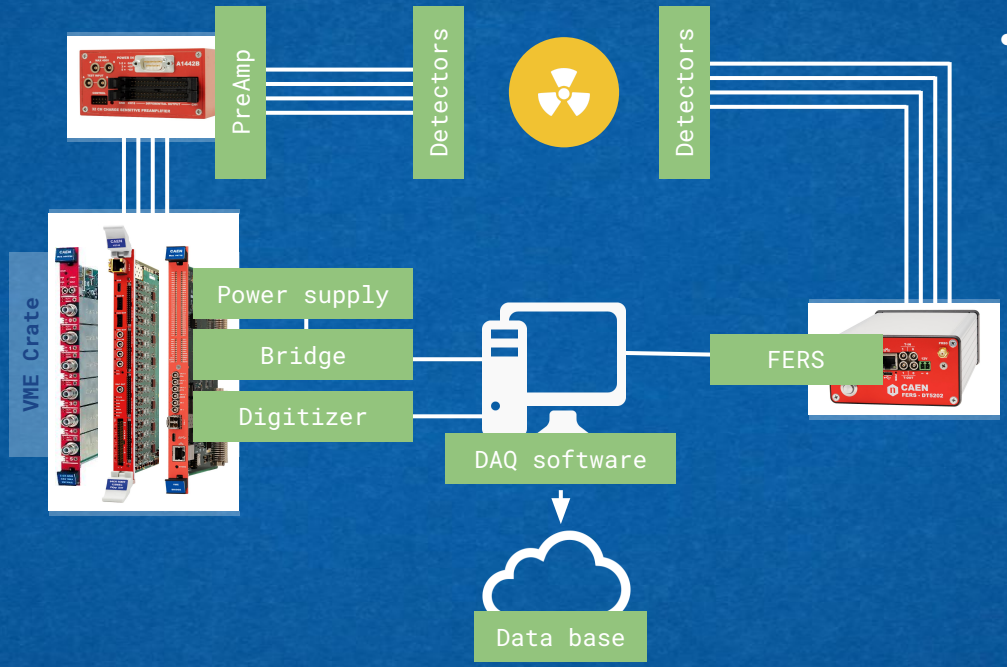
Data acquisition platform

- From detectors to data storage.
- CAEN electronics
  - Power supply.
  - Signal conditioning.
  - Digitize.
  - Communication.
- DAQ software
  - Device configuration and control.
  - Data readout and storage (eventually in a cloud database).
  - Integrated, versatile, high performance and easy-to-use.



< Digitizer-based | ASIC-based >

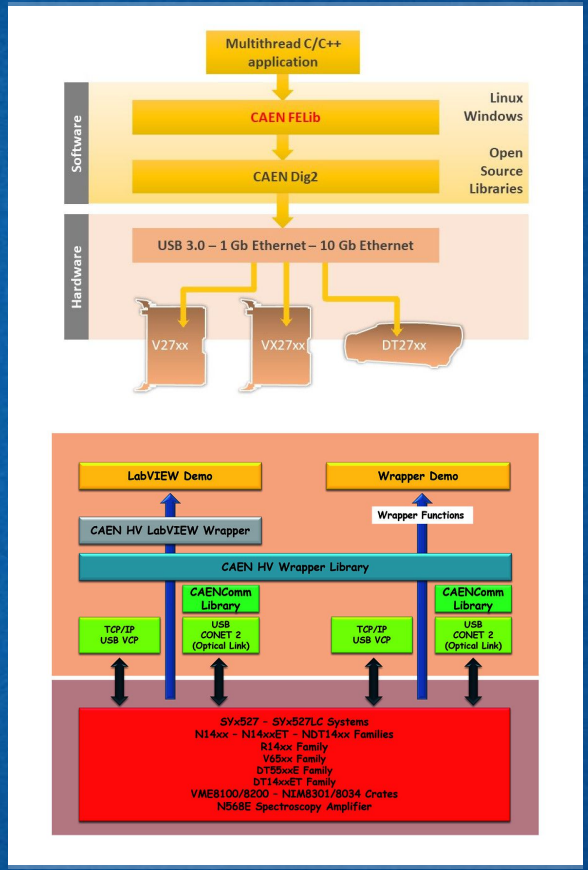
- *Signal conditioning*
  CAEN A1442
  16/32 Channel charge sensitive preamplifier.
- *Power supply*
  CAEN V6519
  6 Channel 500 V/3 mA VME
- *Communication*
  CAEN V4718
  VME to USB 3.0/Ethernet/Optical Link Bridge
- *Digitizer*
  CAEN V2740
  64 Channel 16 bit 125 MS/s.



- **CAEN FERS 5202**: *Front-End Readout System*
  - Citiroc 1A 32-channel front-end ASIC (x2), working in conjunction with a ADC.
  - Onboard power supply: CAEN A7585D +85 V/10 mA.
  - Several communication interfaces: USB, Ethernet and TDlink.

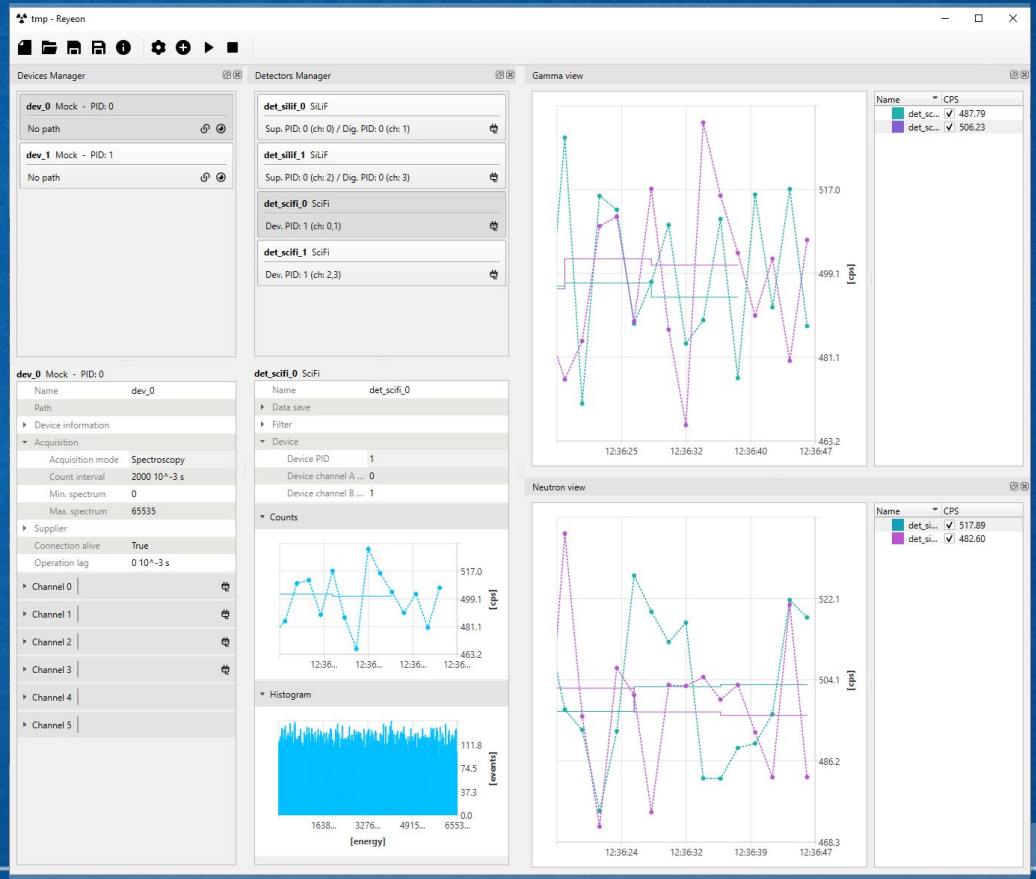
DAQ software

- Requirements
  - Device configuration and control.
  - Data readout and storage (eventually in a cloud database).
  - Integrated, versatile, high performance and easy-to-use.
- 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.



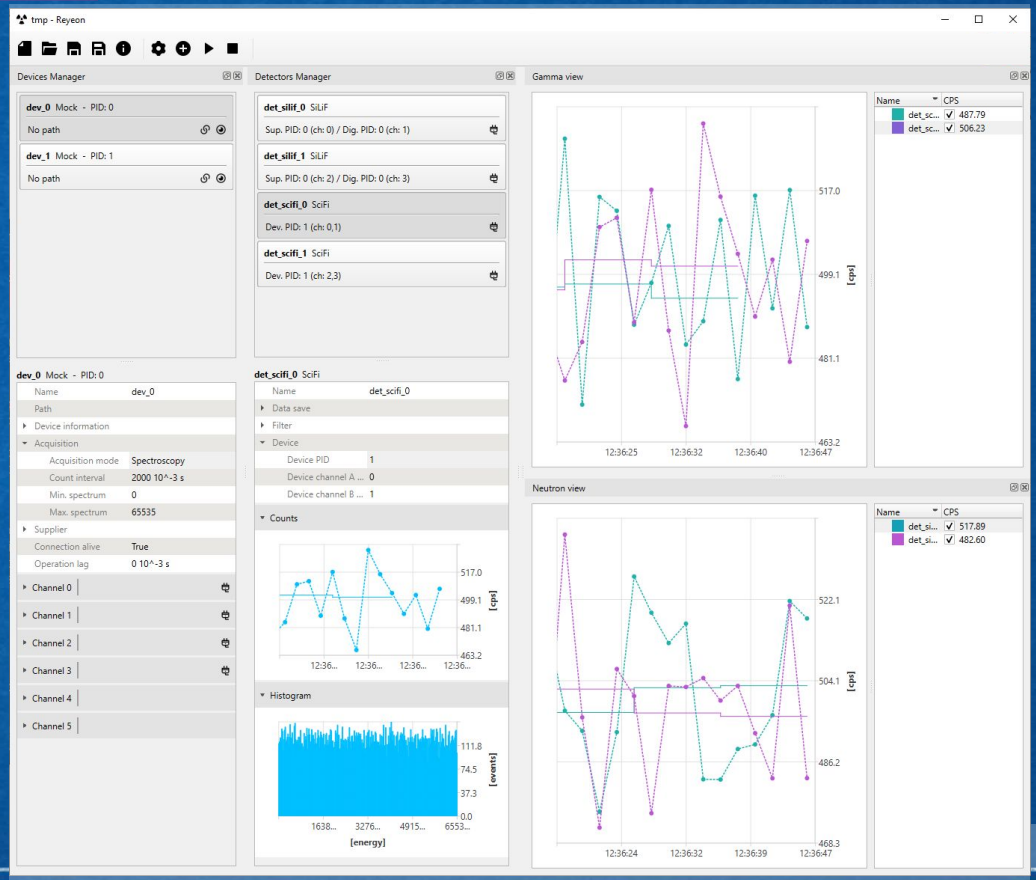
New DAQ software

- Developed in C++.
- GUI built using Qt Framework..
- Using CAEN intermediate level libraries.



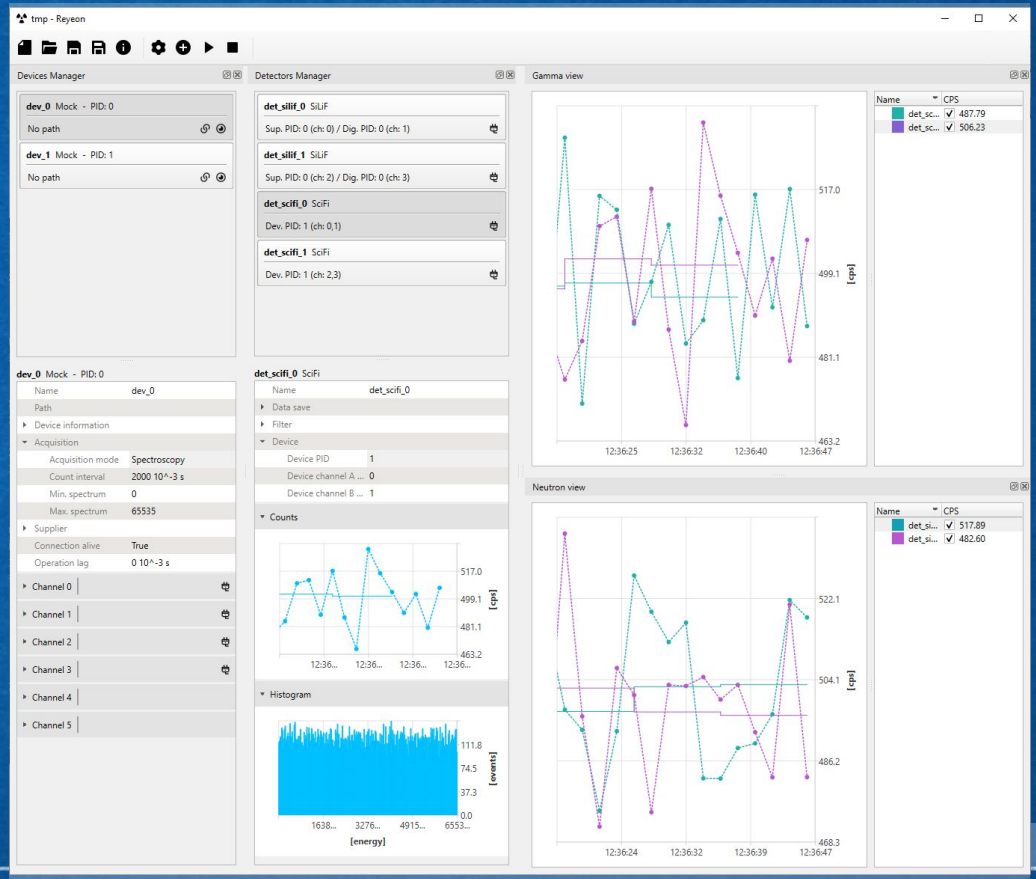
New DAQ software

- Modular design
  - Detectors and devices of different type can be easily added/removed.
- Device management
  - All devices of the platform can be configured and controlled from within the software. No need of additional programs.
  - Configurations are saved and properly reapplied on each run.
- Detector management
  - Simple and clear identification of the detectors and their relations with the devices.
  - Straightforward visualization and saving of the read data.

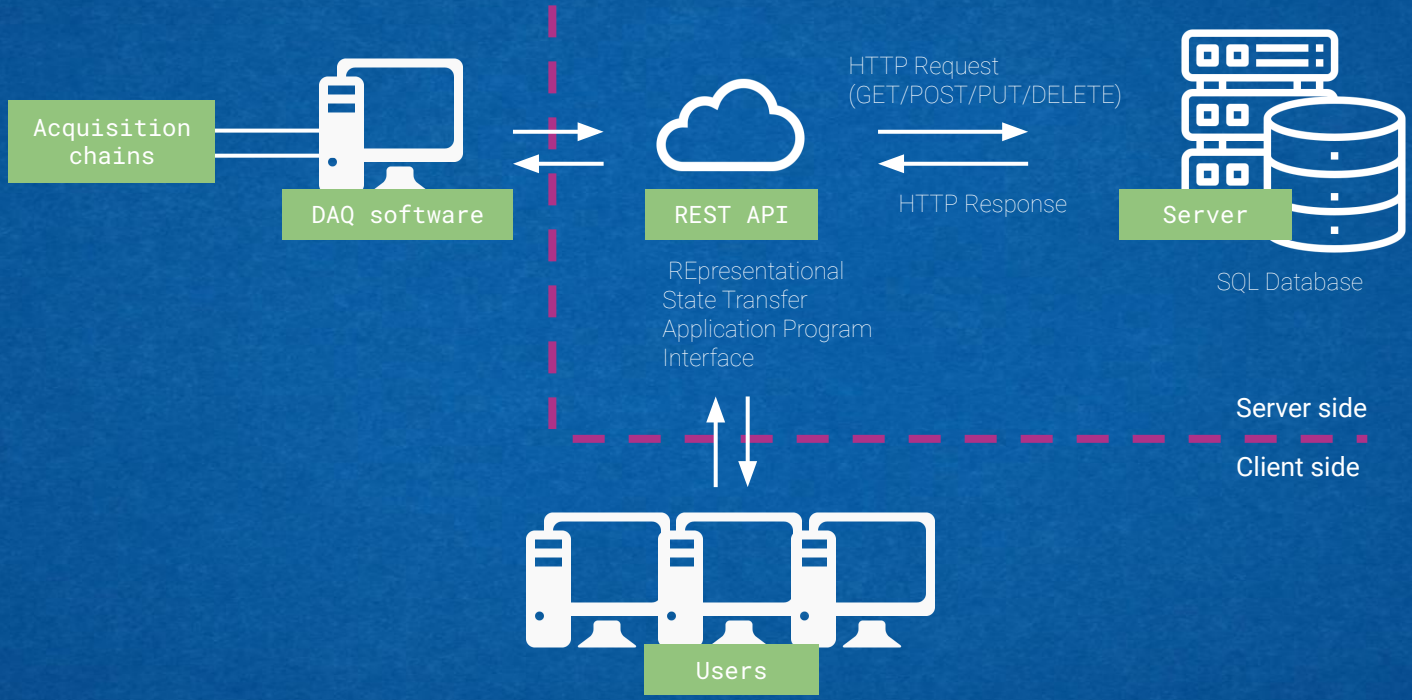


(Previous) Future work

- Bug fix
  - New DAQ software.
  - Underlying libraries. (Including **Qt**)
- Finish implementations
  - **Cloud database** communication.
  - **Alarms**.
- Improve **user experience**.



Database communication



Database communication

- Client side (DAQ Software):
  - **HTTP client** capabilities: implemented using **Qt Network** module.
  - Added support for authentication.
- Server side:
  - Starting point: **RadBASE**.
    - Java (Spring framework).
    - REST API endpoints (including authentication).
    - Web application.
  - Added features necessary for the platform.