Scalable Readout System Data Acquisition using LabVIEW III - Current status on June 2012

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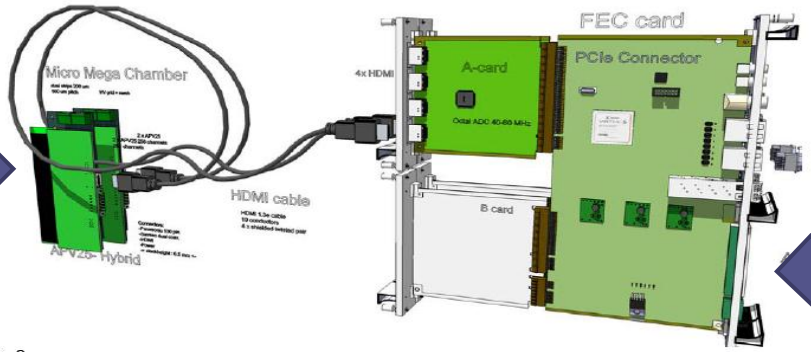
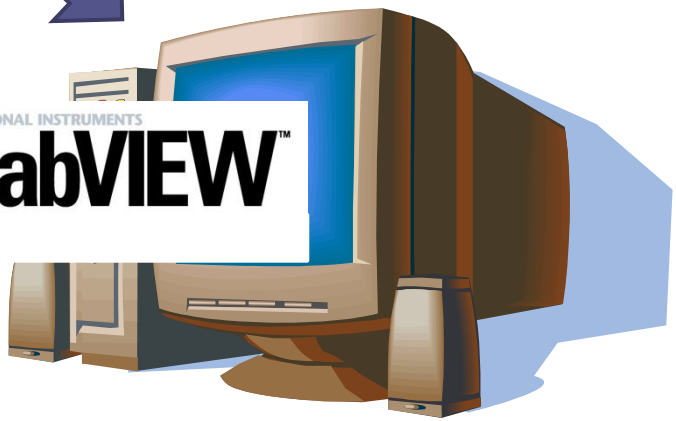
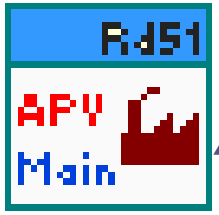
Remind:
The LV Project for srs-DAQ

μMeGas chambers



UDP connection





"RD51-srs" LabVIEW Project

Program Structure

- LabVIEW 2011 Development System
- ~ 40 modules developed (VIs)
- ~ 12 custom data structures for storage & data handling
- GUI (Graphical User Interface) as Main Panel
- Monitor Panels for data flow checks
- Strong parallel processing using multithreading and multicore features from the Machine and O.S.
- Data emulation from acquired datafile in order to allow check & (partially) development also without srs

LabVIEW RD51-srs: several new features introduced

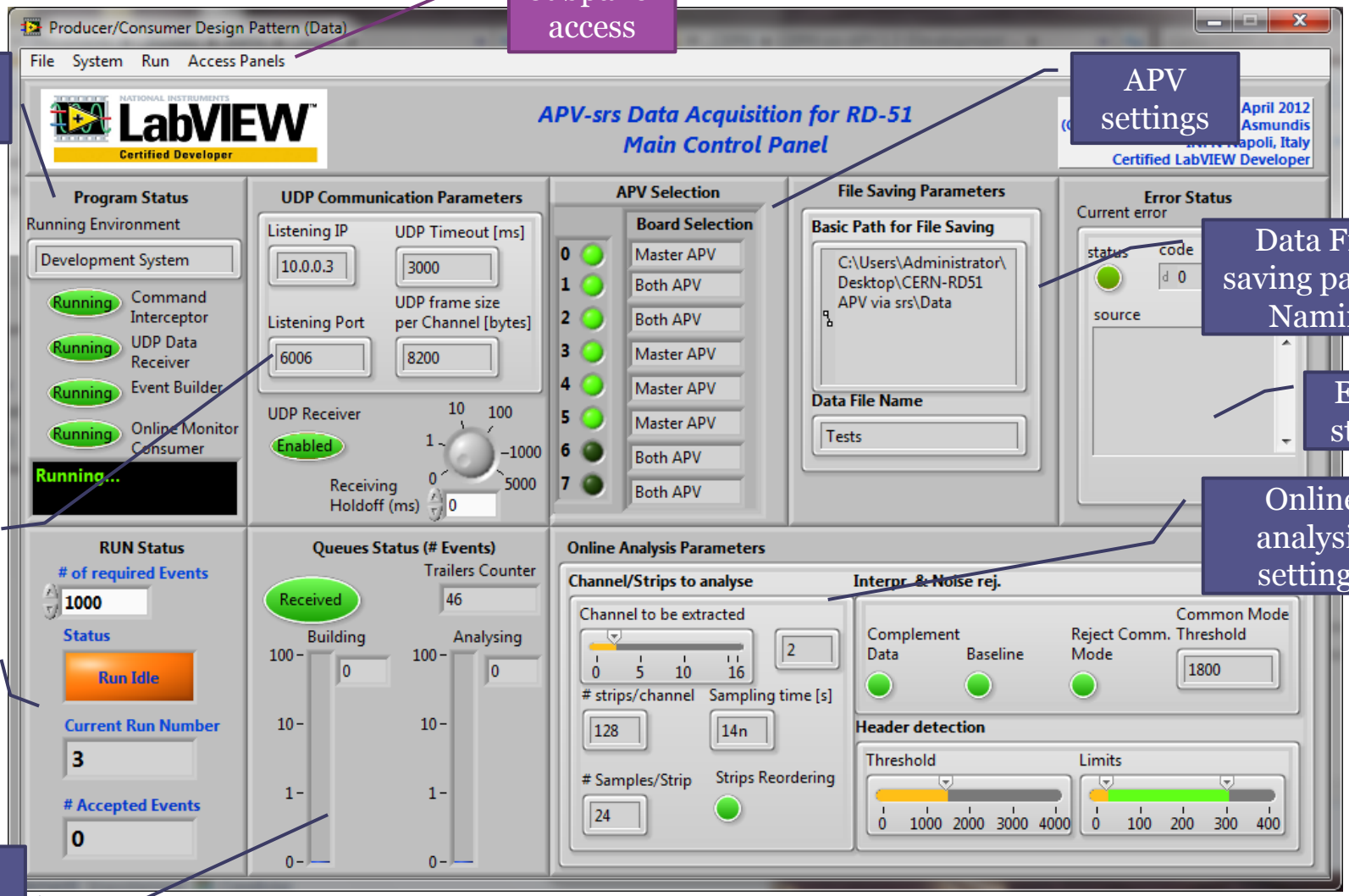
"Old" features & characteristics

- UDP Connection
- Incoming data monitor
- Events filter based on data integrity
- Traceable Events builder (Header and APV Contents generation)
- Data file saving
  - Binary format U32-U16
  - Compatible with the existing Analysis program
  - No zero suppression for the moment (format needed)

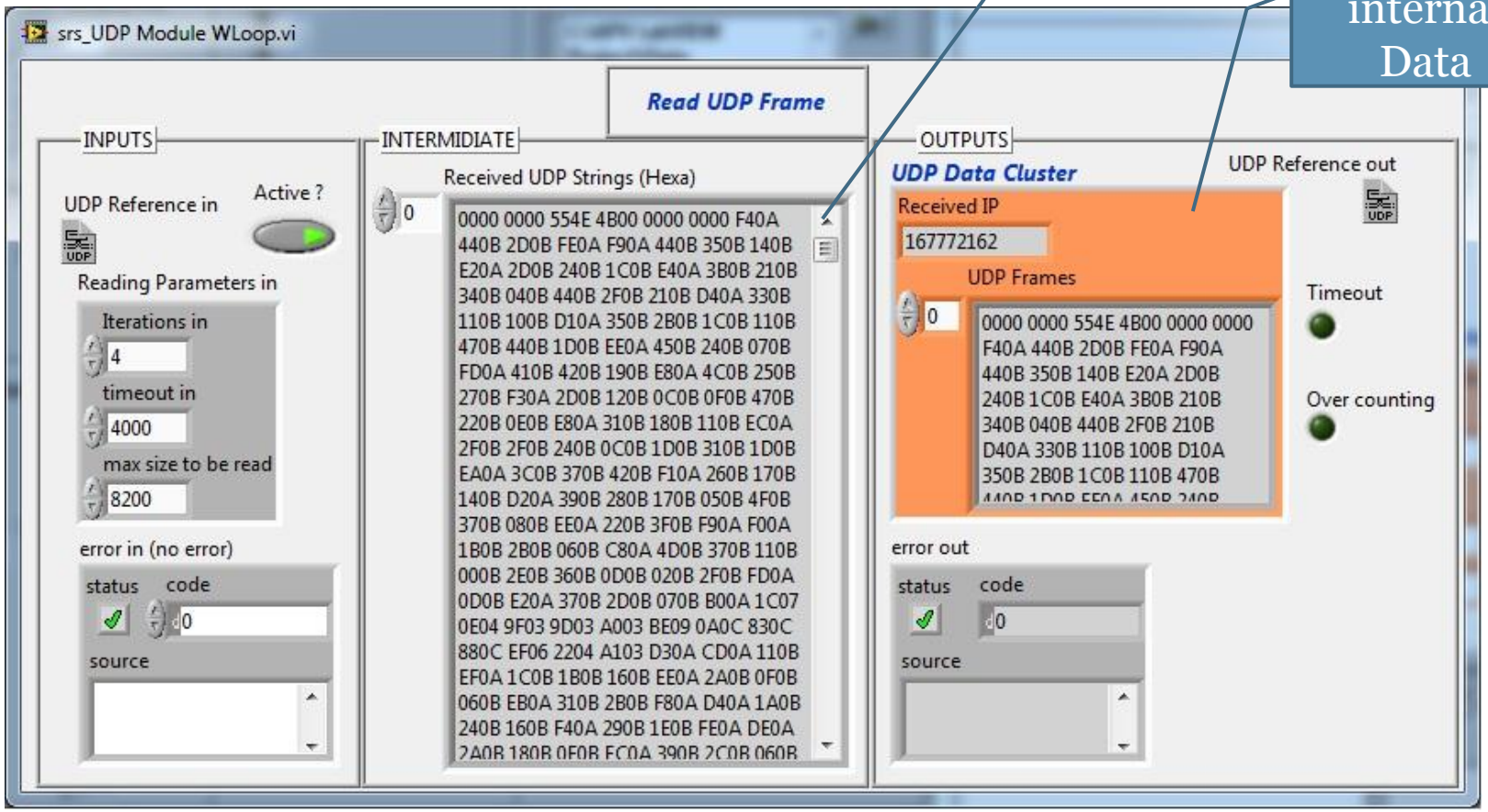
New features

- GUI (Graphical User Interface):
  - Separate panels for program settings
  - srs setups (Sorin's Slow monitor) fully integrated
- Online Data quality monitor
  - Several fetures… → see following
- Standalone (executable) version available

The main control panel (GUI)



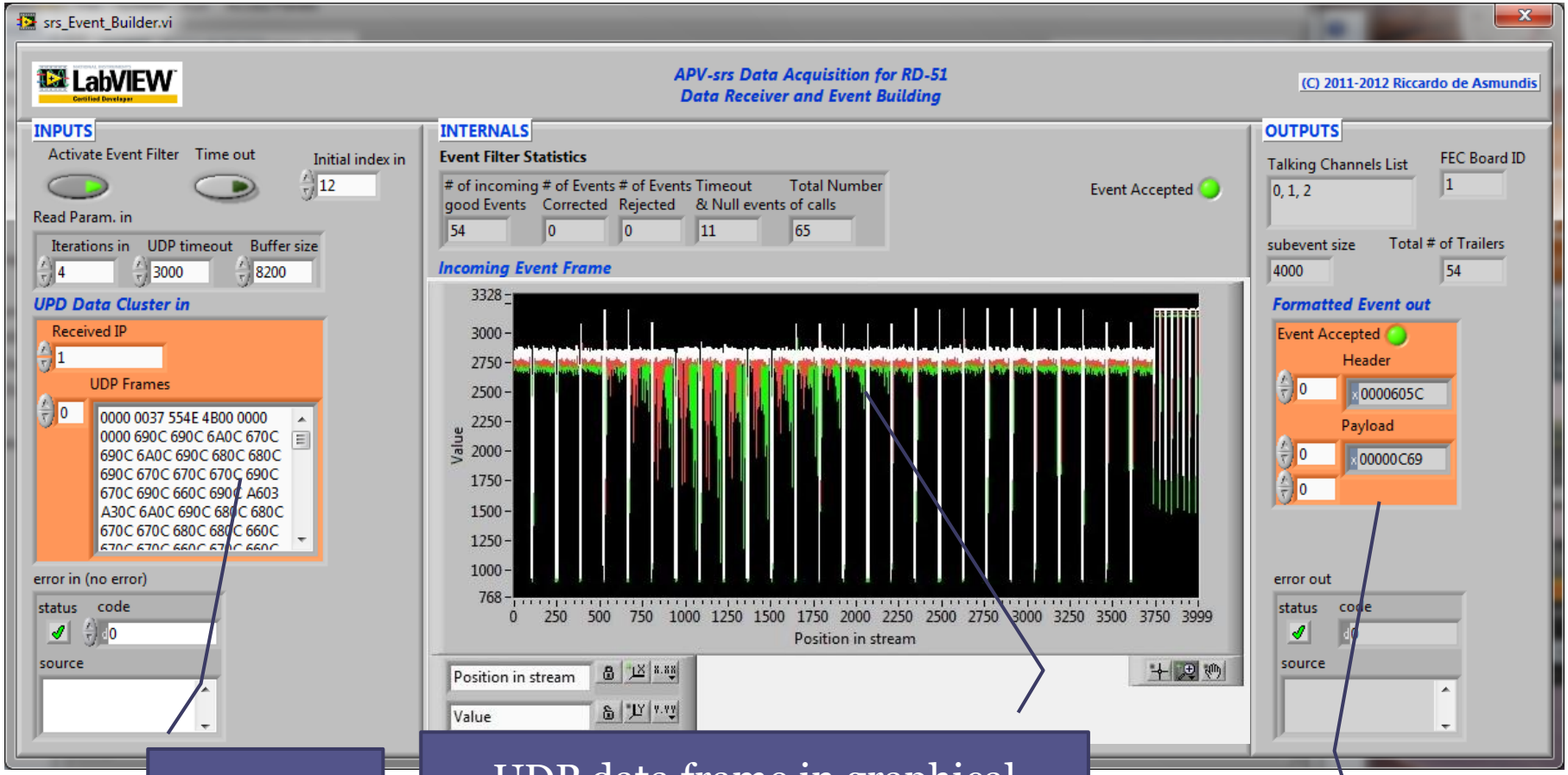
UDP Data Receiver



UDP Codes data monitor

Formatted internal Data

Event recognition and formatting

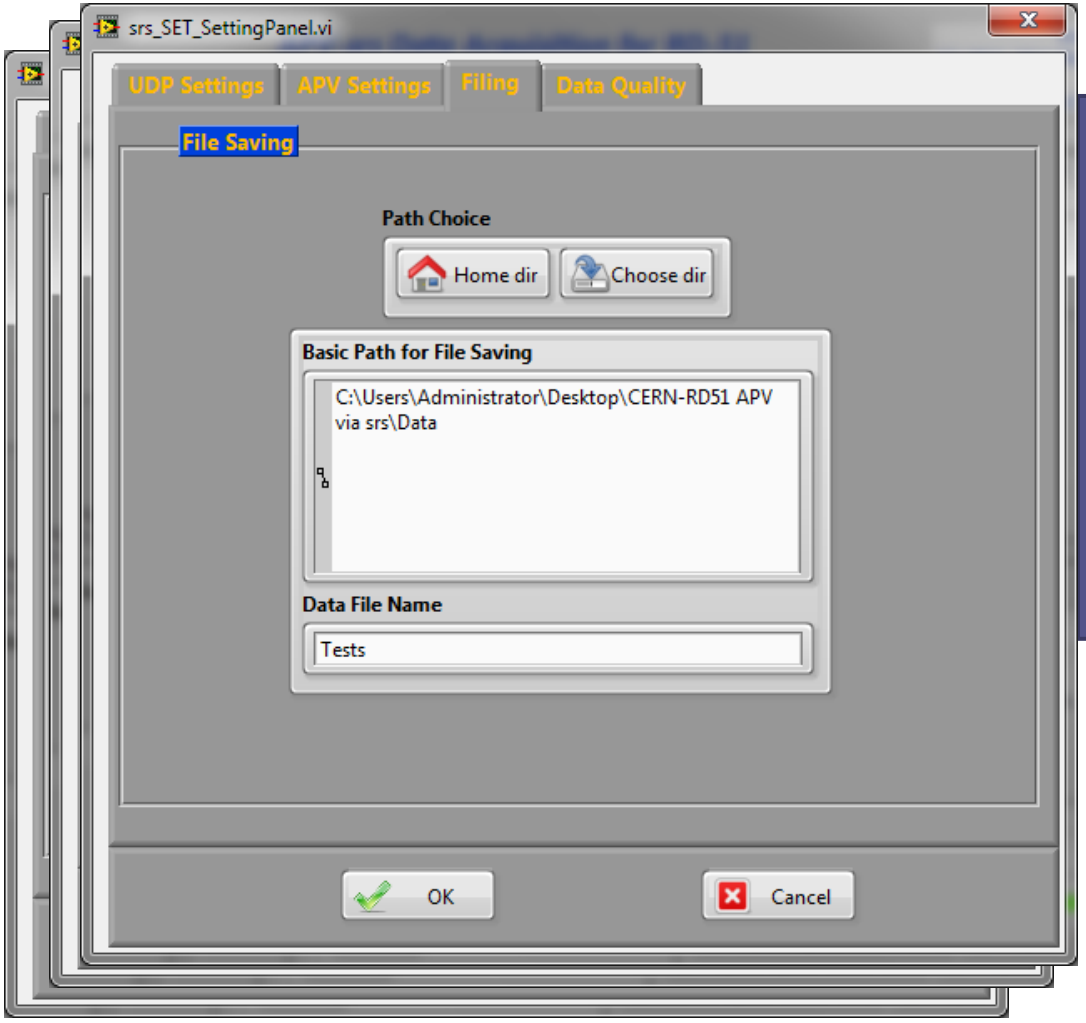


Incoming Event

UDP data frame in graphical representation: channels in color, 1 sample per visible slot;

Formatted Event

Setting program parameters on separate windows



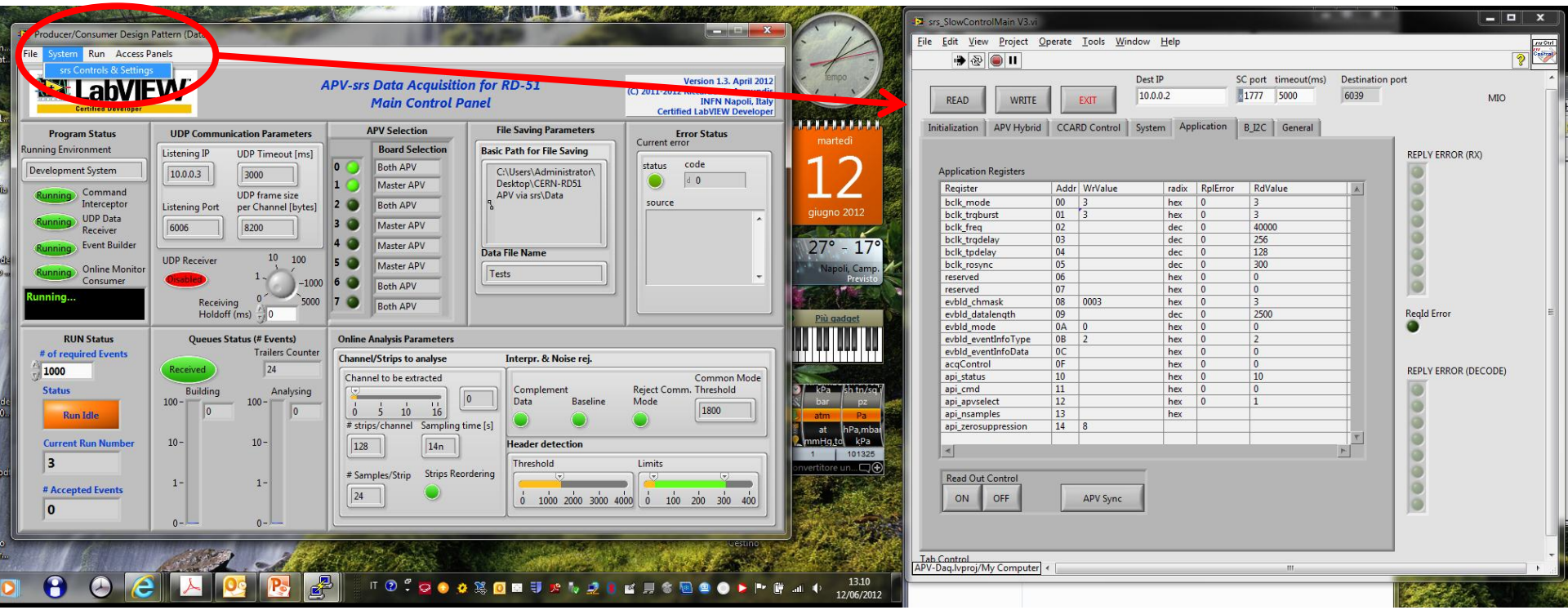
displayed.

- Several important parameters are included here (time and # of sampling, #of strips per channel, thresholds,…)

Example for File Saving Setting:

- Choice of path and base for filename.

Srs_Slow Control accessibility



Online Data Quality Monitor

Most of these features have been developed on requests thanks to the experience in the Utilization of the software by Shikma Bressler (Weizmann Institute of Science).

Presentation features

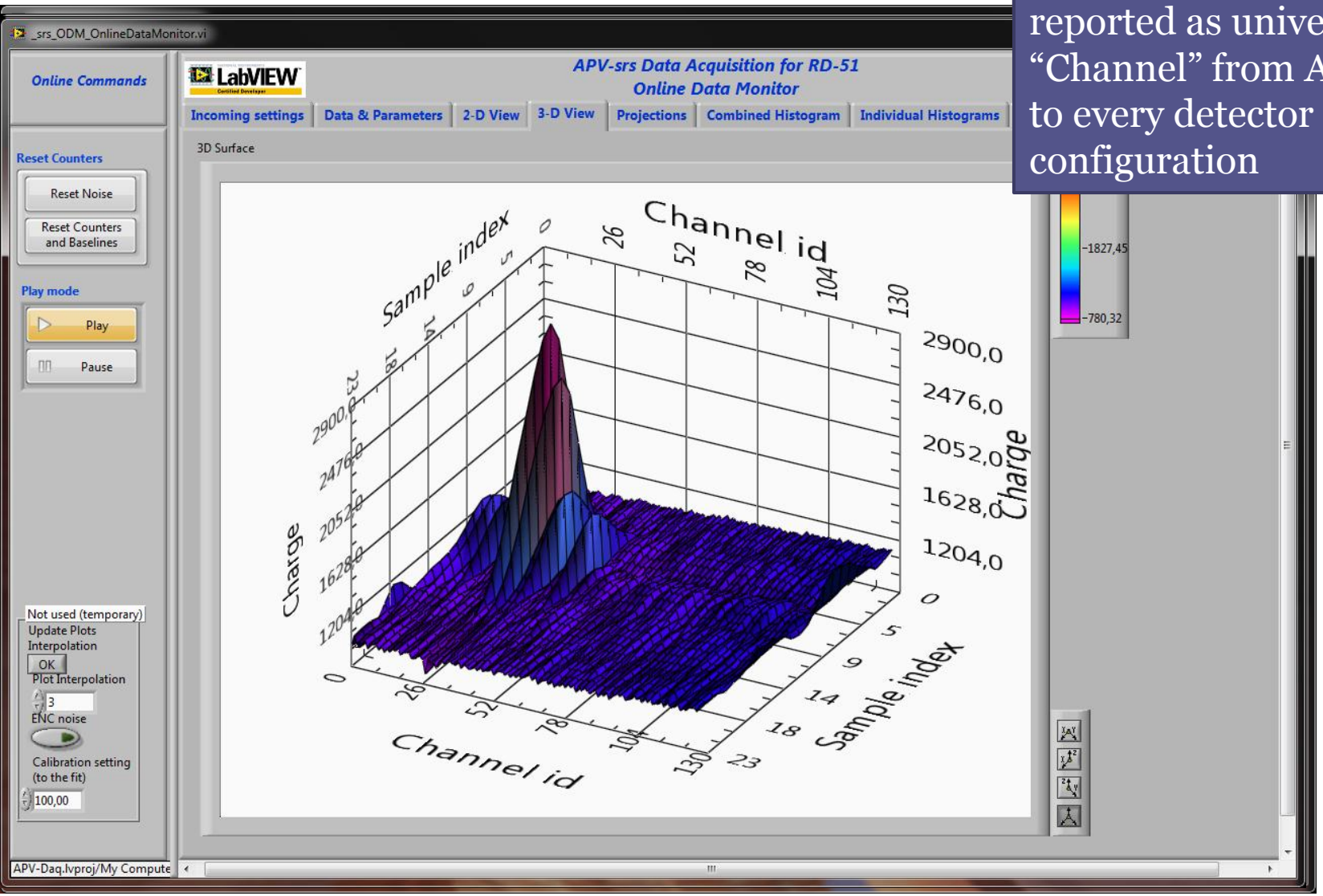
- Raw data view (incoming frames)
- 2-D View of hitted strips or pads on the detector
- 3-D View of channel vs. time charge recorded
- Main projections:
  - amplitude vs. channel (strips)
  - Amplitude vs. time

Data Quality Features

- Hold current event function for inspection
- Online Efficiency and Multiplicity calculation based on separate thresholds
- Total accumulated Charge and maximum detected charge histograms
- Single channels charge histograms

Online Data Monitor: some samples

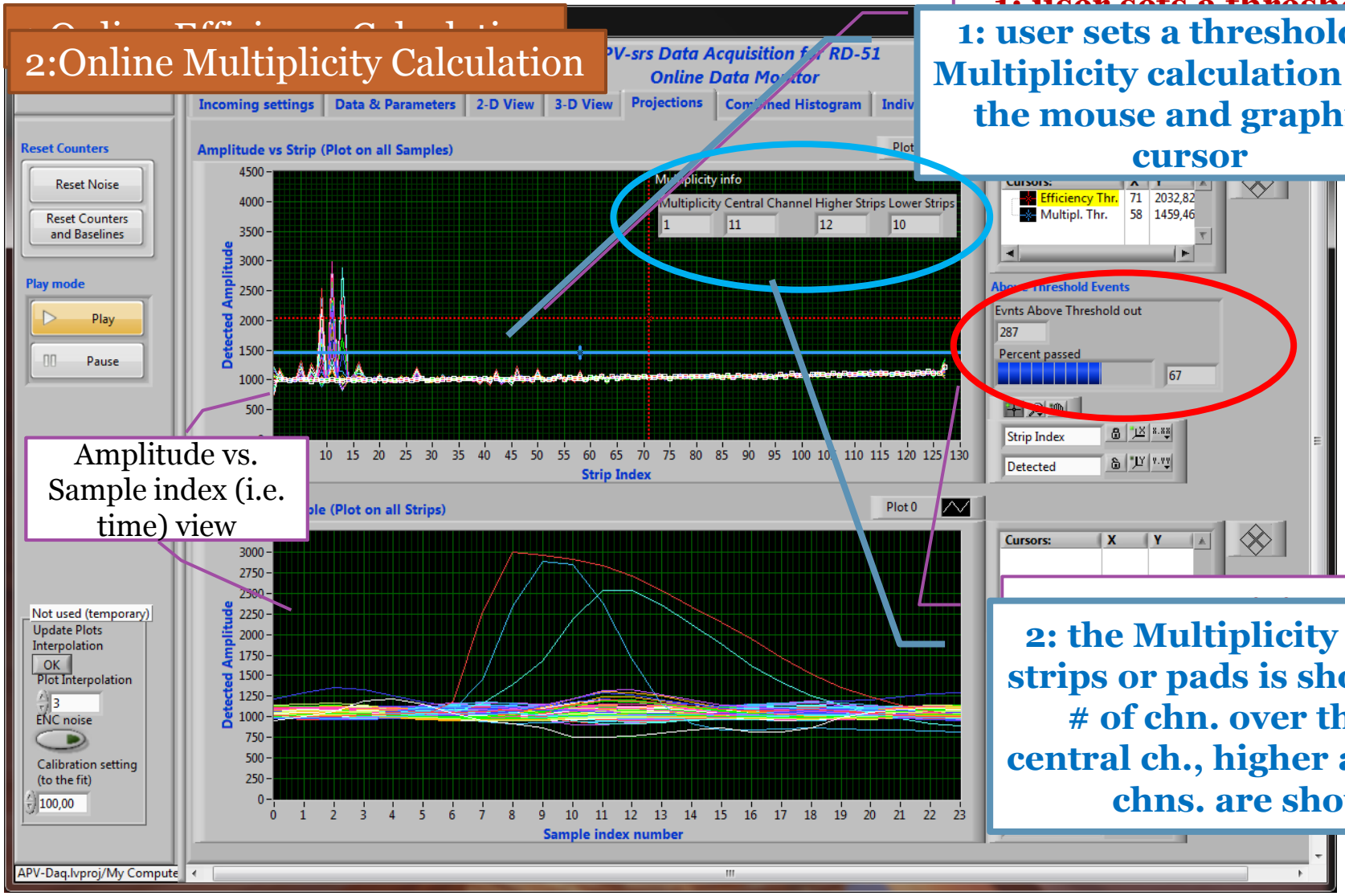
3-D view of a significant Event: here view is reported as universal "Channel" from APV to fit to every detector configuration



Online Data Monitor: some samples II

Example of Efficiency tracing and Multiplicity calculation

2:Online Multiplicity Calculation



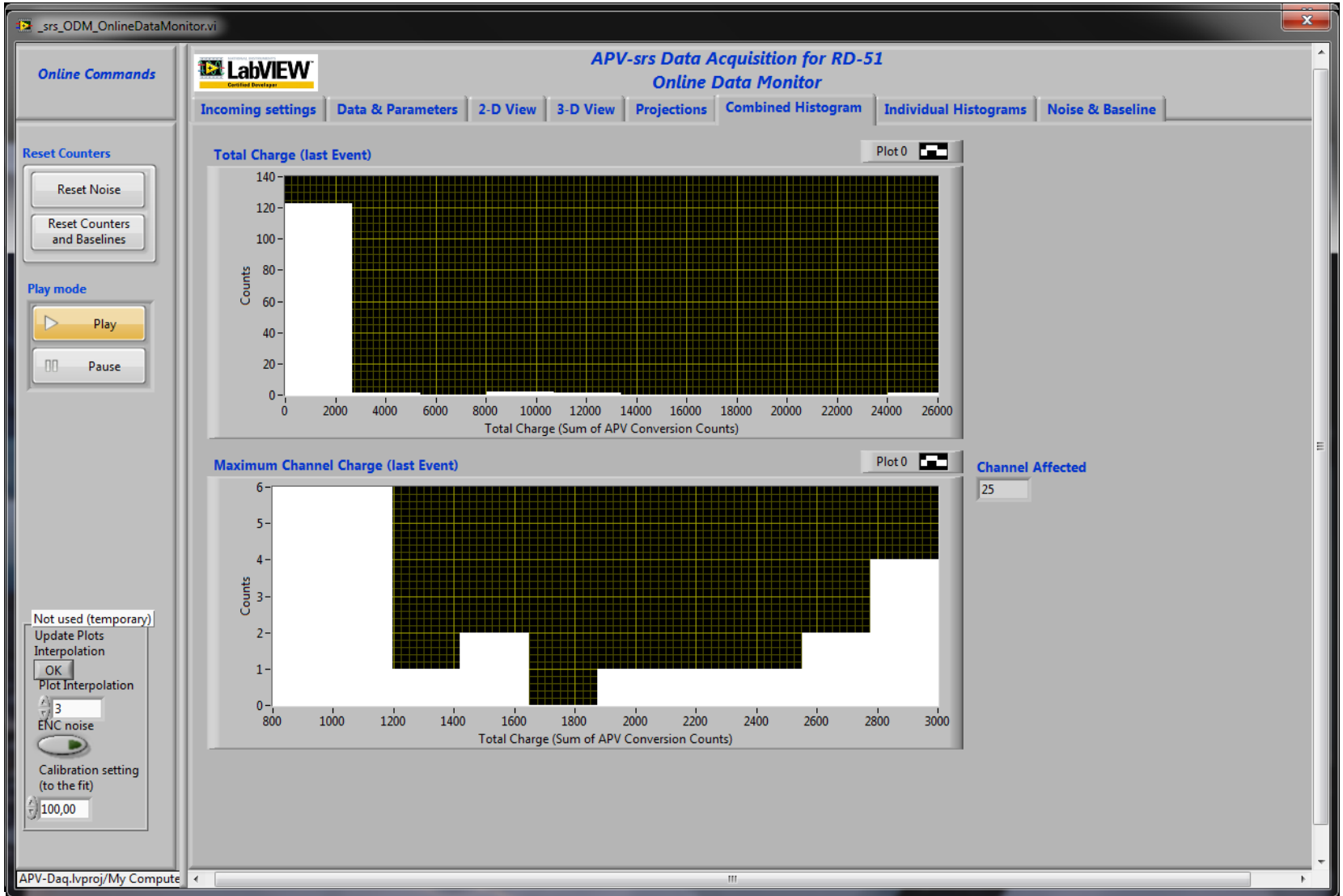
1: user sets a threshold for Multiplicity calculation using the mouse and graphical cursor

Amplitude vs. Sample index (i.e. time) view

2: the Multiplicity of hitted strips or pads is shown here. # of chn. over thresh., central ch., higher and lower chns. are shown.

Online Data Monitor: other stuffs

Combined Histograms: total charge



Datafile Dump

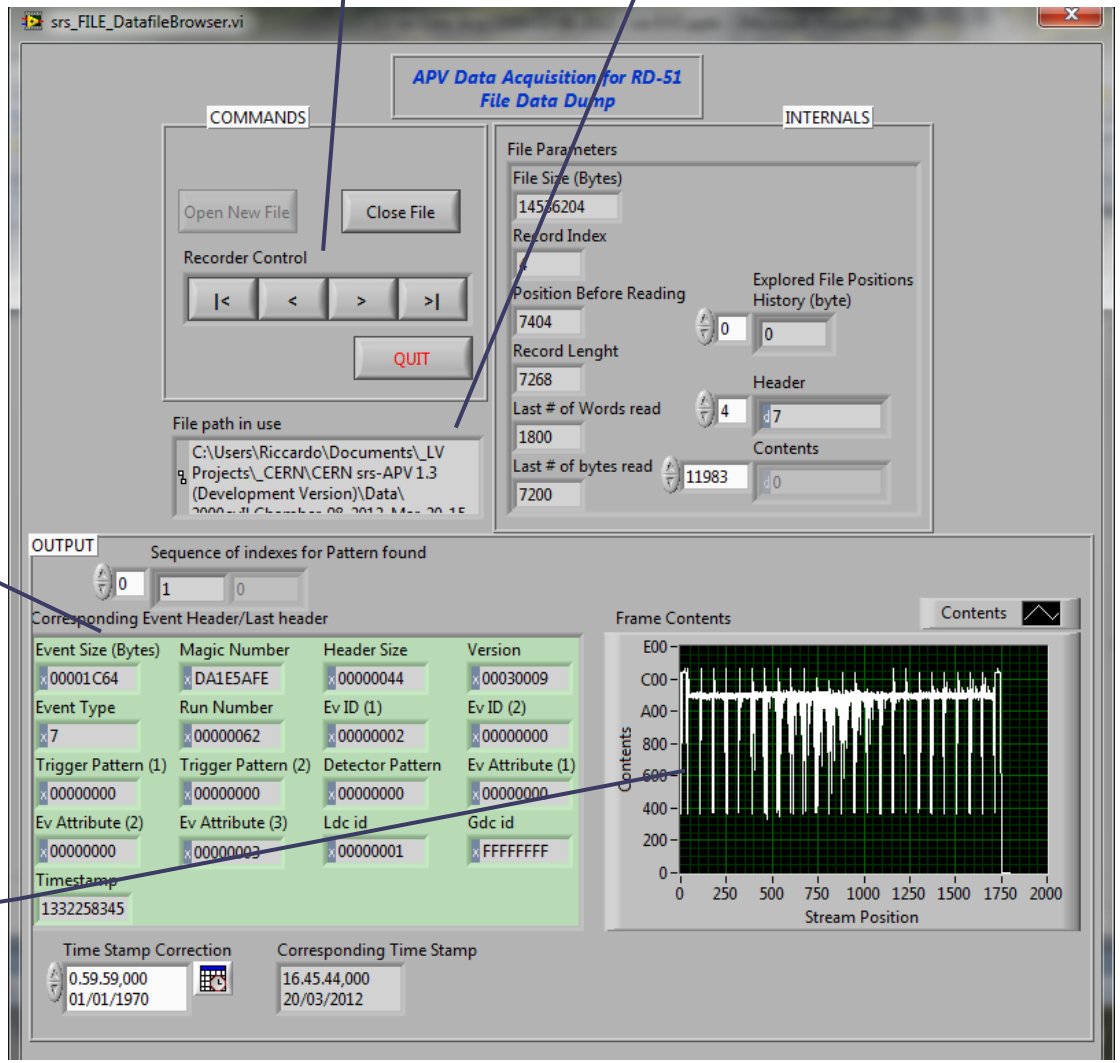
- Saved files can be inspected thanks to a specific program.
- Accessible from the Main Panel
- Very interactive, “recorder” style
- Graphical representation of data

“Recorder” control

Data file under inspection

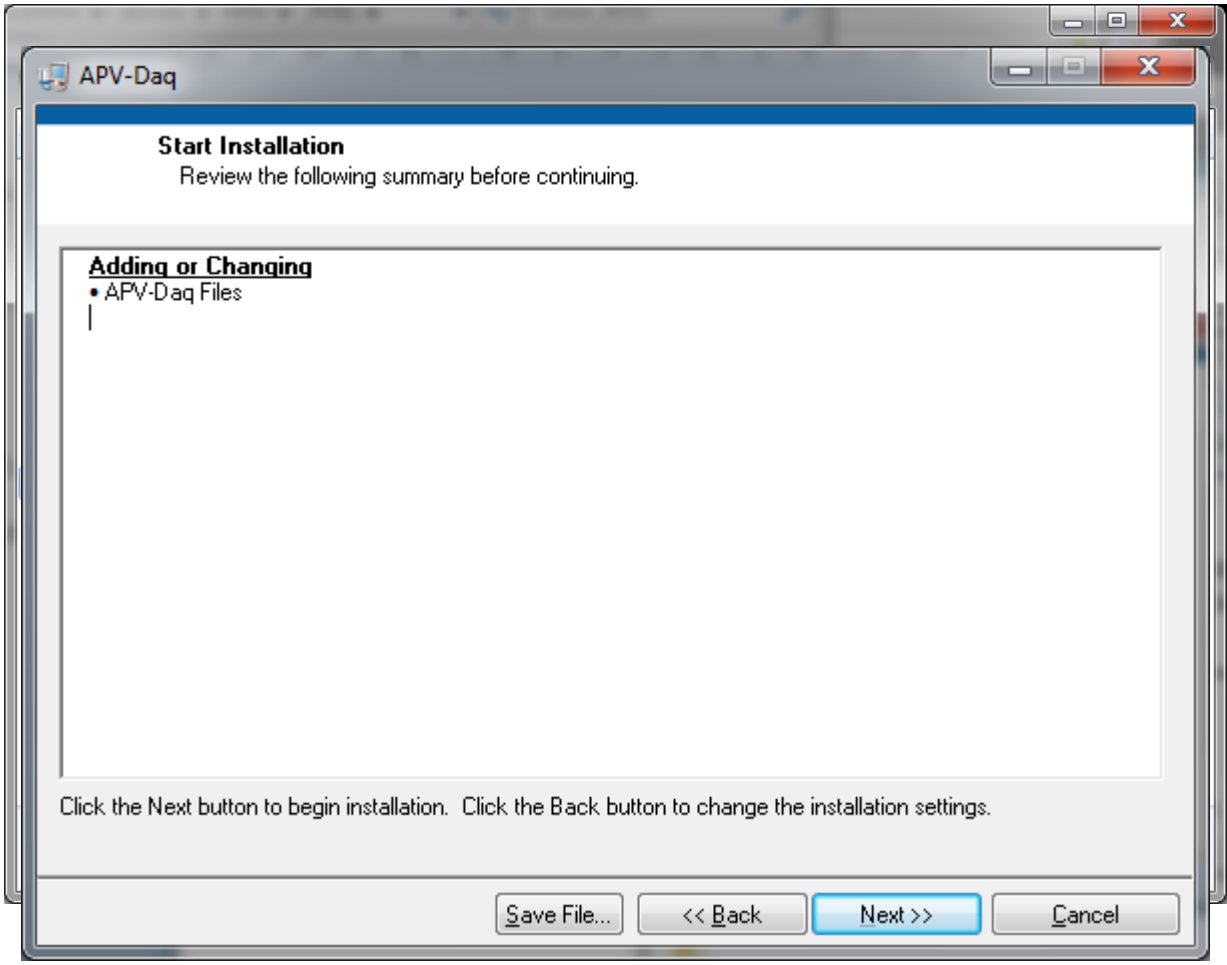
Event Header

Event Dump



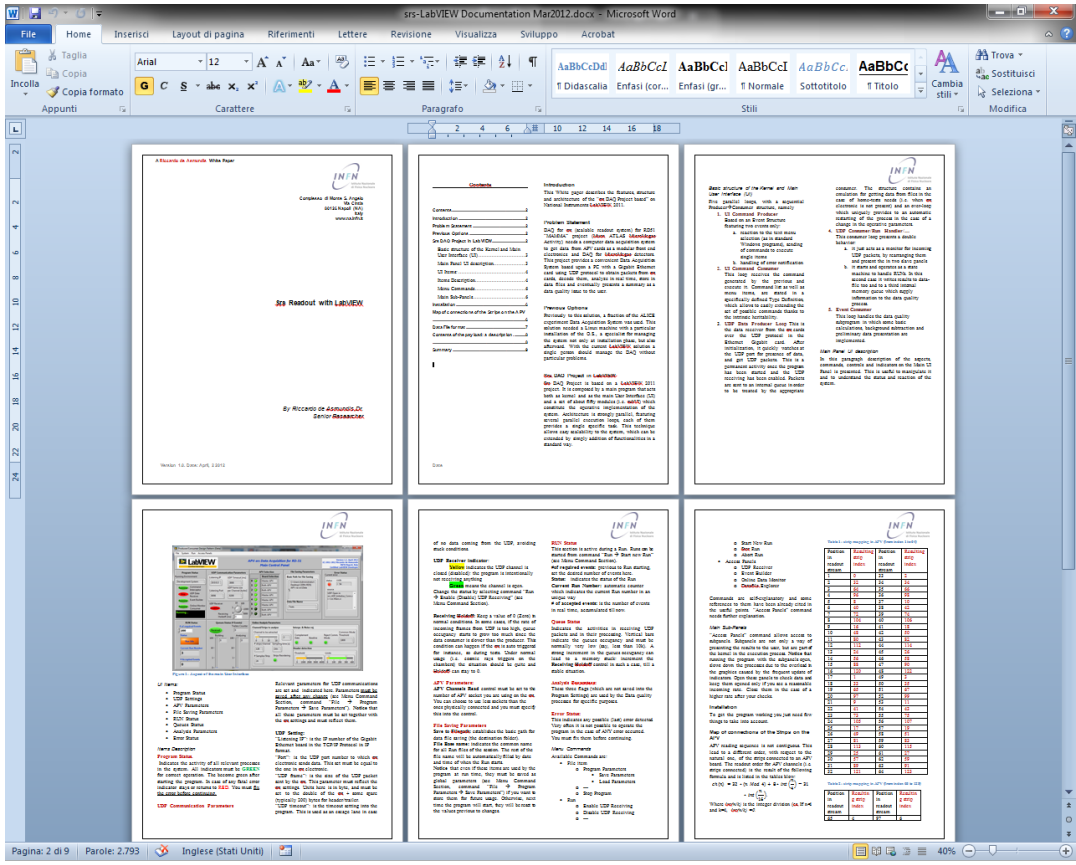
Standalone version

- Ready
- Easily portable
- Standard, professional Installation Program
- Needs LV 2011 Runtime Engine (can be embedded in the installation program)



Documentation

- A Word «White Paper» is under writing
- From details of program structure to data file format.
- From GUI description and instruction to installation procedure
- … to be completed !



Immediate further development

- Fully integrate the srs_SlowMonitor as a transparent part in the GUI.
  - Use of simple, direct, smart setting windows
  - Leave the current Slow Monitor as “expert” view.

LabVIEW RD51-srs:cnclusions & perspectives

- Smart
  - Not big in Files and Modules occupancy
  - Standalone version available (Pen Drive transportable, 166 MB with installer)
- Flexible
  - Able to acquire a full Fec (16 APV). Extensible for more Fecs.
- Portable
  - Easily portable on different machines and Operating System (standalone and installer are platform dependent)
- Scalable
  - Relatively easy for developing of new features
- Fast
  - Able to handle different parallel processes with fine priorities tuning
- Compatible
  - Data file format compatible with existing analysis

Available from now for daily laboratory usage or Test Beams.
Looking for Beta tester !