Use of the TINE Archiving Tools at PITZ

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Travelling Salesman, or Missionary?

Control-System Archiving Basics

Data Storage: Who, what and where?
Data Browsing: where to click to find ‘em?
Data Display (Basics):
Data Display (Advanced):

I’ll try to illustrate these ideas with use-cases… to help you compare these tools with the one you are using, to help you see solutions to your “archiving problems”

Data Storage: Who?

A Fundamental Right of the Uses of the Control System:

The **Controls Group** stores EVERYTHING you need!

You are allowed to write your own clients to collect data, but… do want to?

Data Storage: What?

Store everything as often as you might need it, within reason….
Lieber zu viel als zu wenig…

If it was worth the time and money to build it, it is worth the disk space to store it's status.

I'm not an expert here: DOOCS Local-Histories have limitations in format types and the Idea of the "FLASH DAQ" is to store really truly everything in "one place"

The TINE Archiving is oriented on filtering, and a selection of tools are available to store data with different "strategies" so the choice/requirements for "how much data" influences the choice of tool to use.

Not just "floating points numbers": text, bits, images, ….

Data Storage: Where?

Central and/or **Local**?
Central: “Middle Layer” collects and stores data “centrally”
Permanent, backed-up, fast, …..
Local: Front-End server stores the data “itself”
In memory or on disk, flexible, quantity limited by disk space

Data from both sources can be displayed in the same application!

Vacuum, Pandora, PETRA Diagnostics…

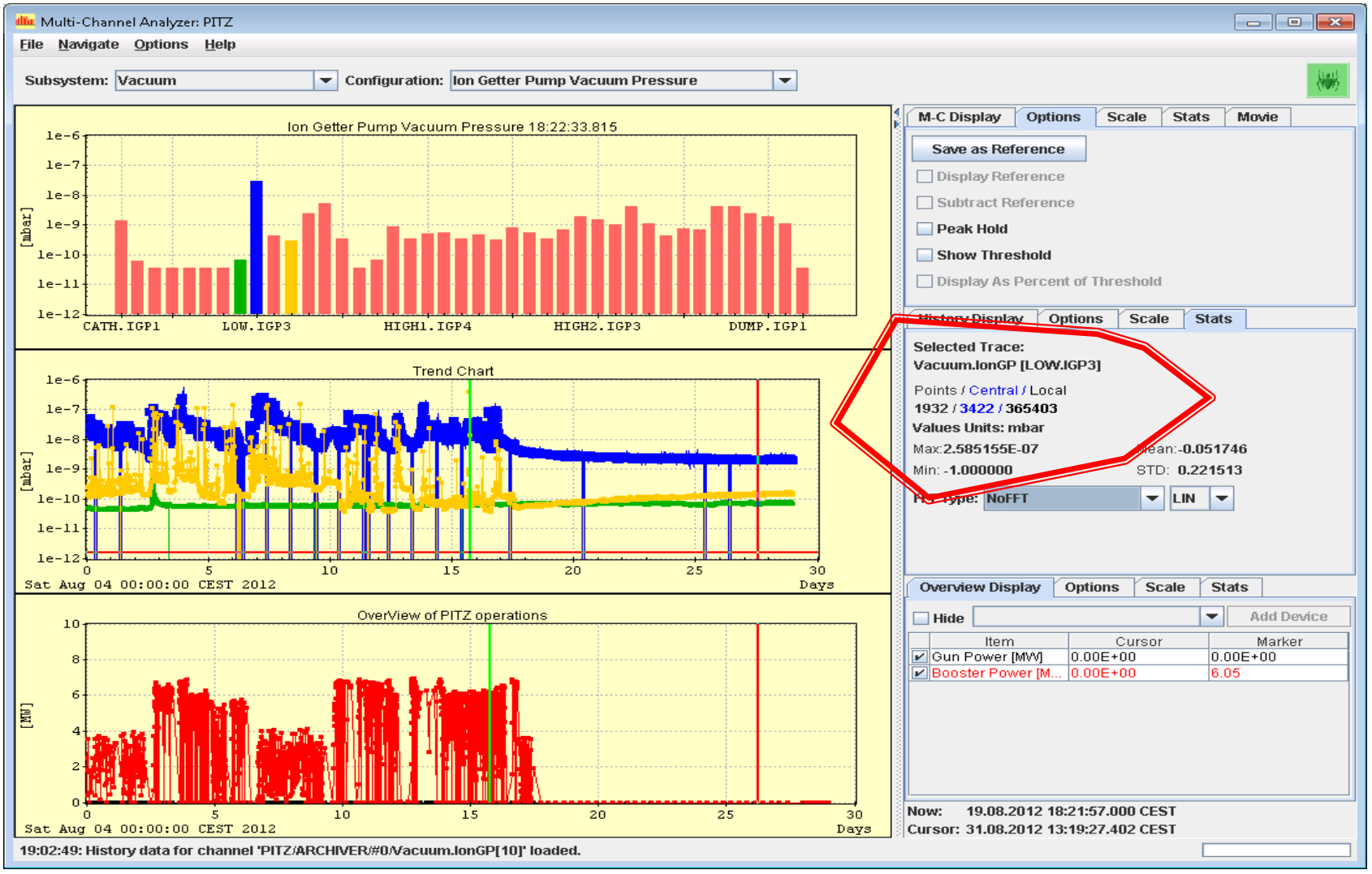
Events: Collect data which belong “together”
Trip of an RF Station,
Documentation of accelerator Status
Alarm System:

Optimization: Store the same data with different tools?!

Central and Local Data Storage: Vacuum Data

Vacuum Data: 3422 points in central storage, 365k points in local storage.

Plot shows only 1932 points from central. Note: Both data sources are “available” in this App!

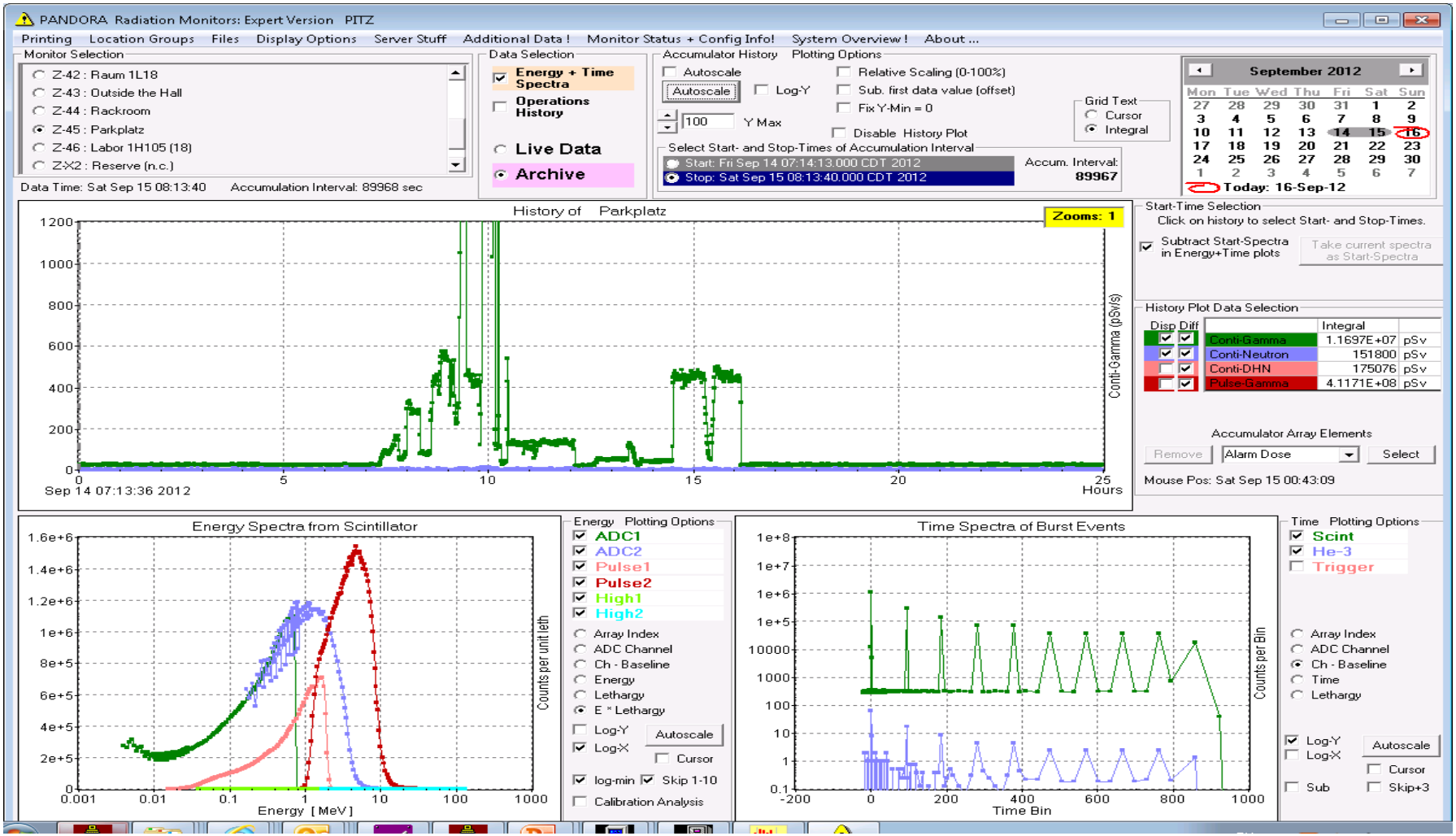


Central and Local Data Storage: Pandora Radiation Monitors

Pandoras: “Machine Critical” parameters (dose rates, etc) are stored centrally.

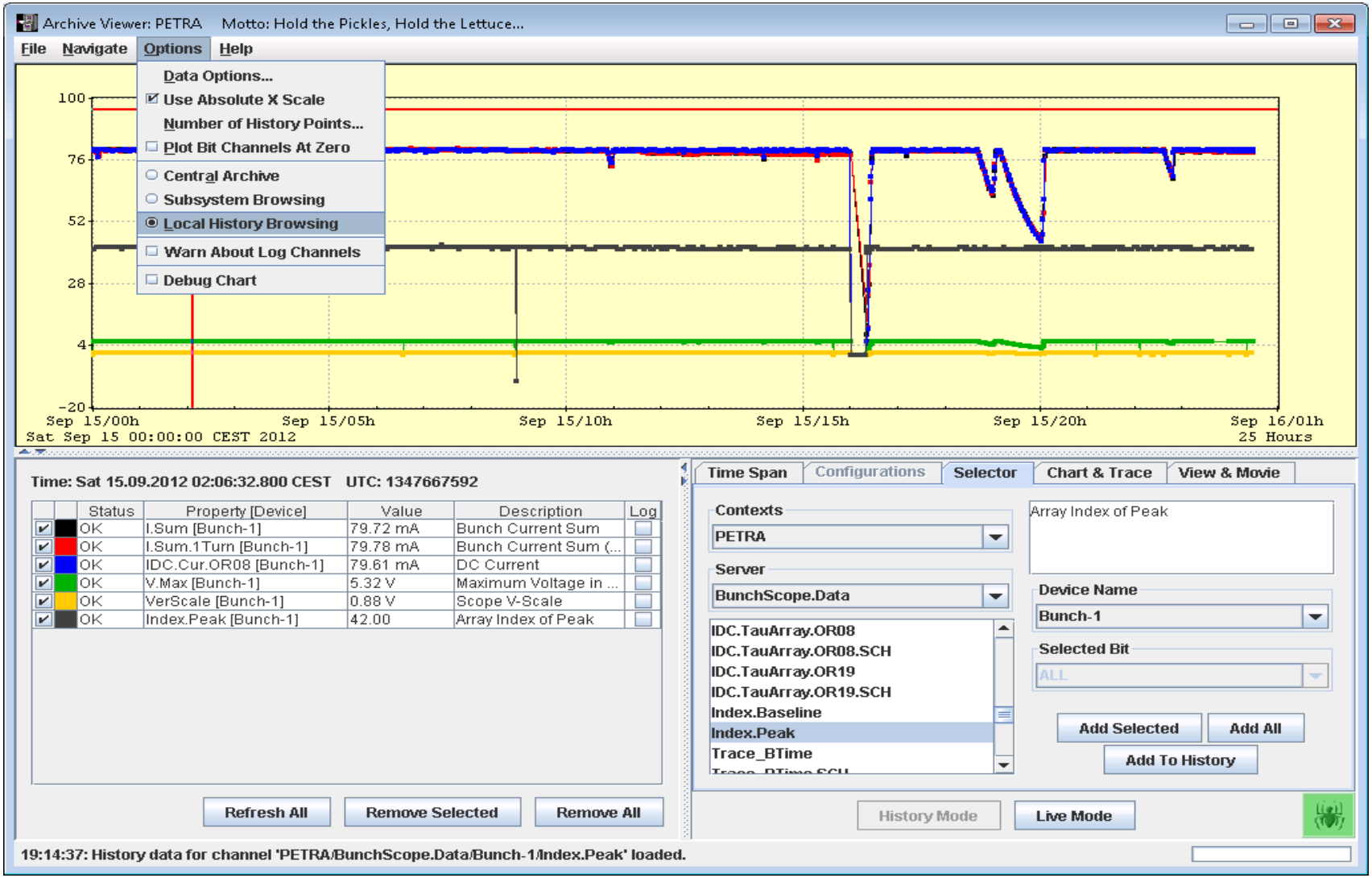
Complete data sets for analysis [Energy and time spectra] are stored locally: >~100 GBytes.

The last few months is kept; important time periods can be saved.



Central and Local Archiving: Diagnostics Monitoring, debugging, etc.

The “official” PETRA3 bunch currents measured with the LeCroy scope are stored centrally.
Extra data for testing new calculations and for monitoring are only stored locally.
View all data with the same Application! “Point” the viewer to your local-history source!



Locating the Data: Data Browsing

DOOCS: locate a parameter in a display and click to open its history

With a Central Storage, you need to browse through all the names of all the properties (how many individual channels In PITZ?)

To help speed up the search:
(1) Collect and store as "Multi-Channel" Arrays (array of devices with the same property)

(2) Need new names! (think of this as an opportunity!)
For example, the Property "P" from ion getter pumps, and the property "P" from TPGs!
Pressure.IonGP, Pressure.TPG (why did I use "Vacuum.TPG"?)

Are the names "descriptive" and "clear"?
Booster Water Temperature: TF348 In the DDD display, you might find "Gehause"…

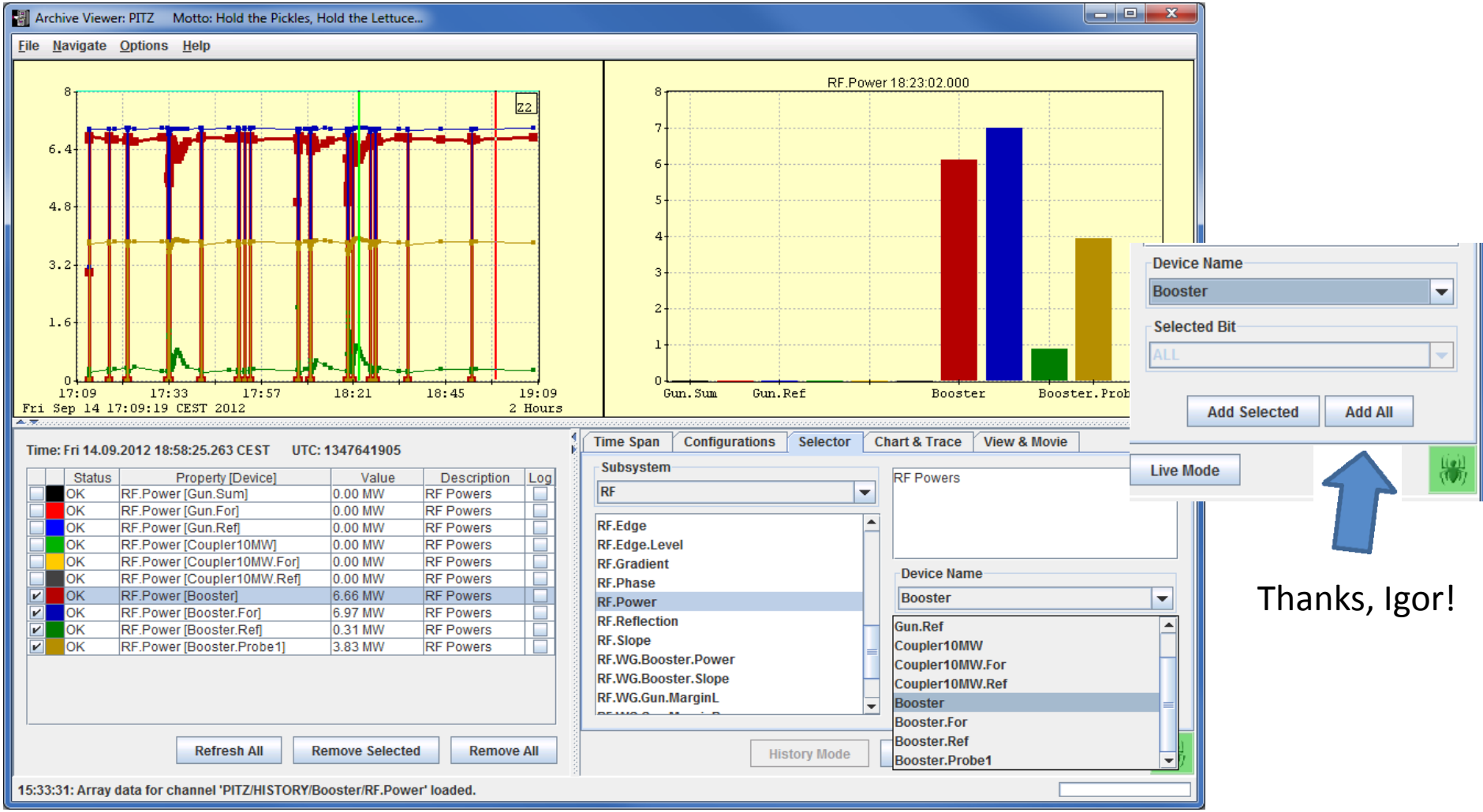
Currently the PITZ archive has 107 keywords….
(3) Collect properties in "Subsystems" to "cut to the chase"
All, Vacuum, Laser. Klystrons, RF, …. as many as you would like…

(4) Events: browse through an Event-List and select the property…

Browsing Multi-Channel Arrays

Subsystem **RF** → Property **RF.Power** → Device **Booster**

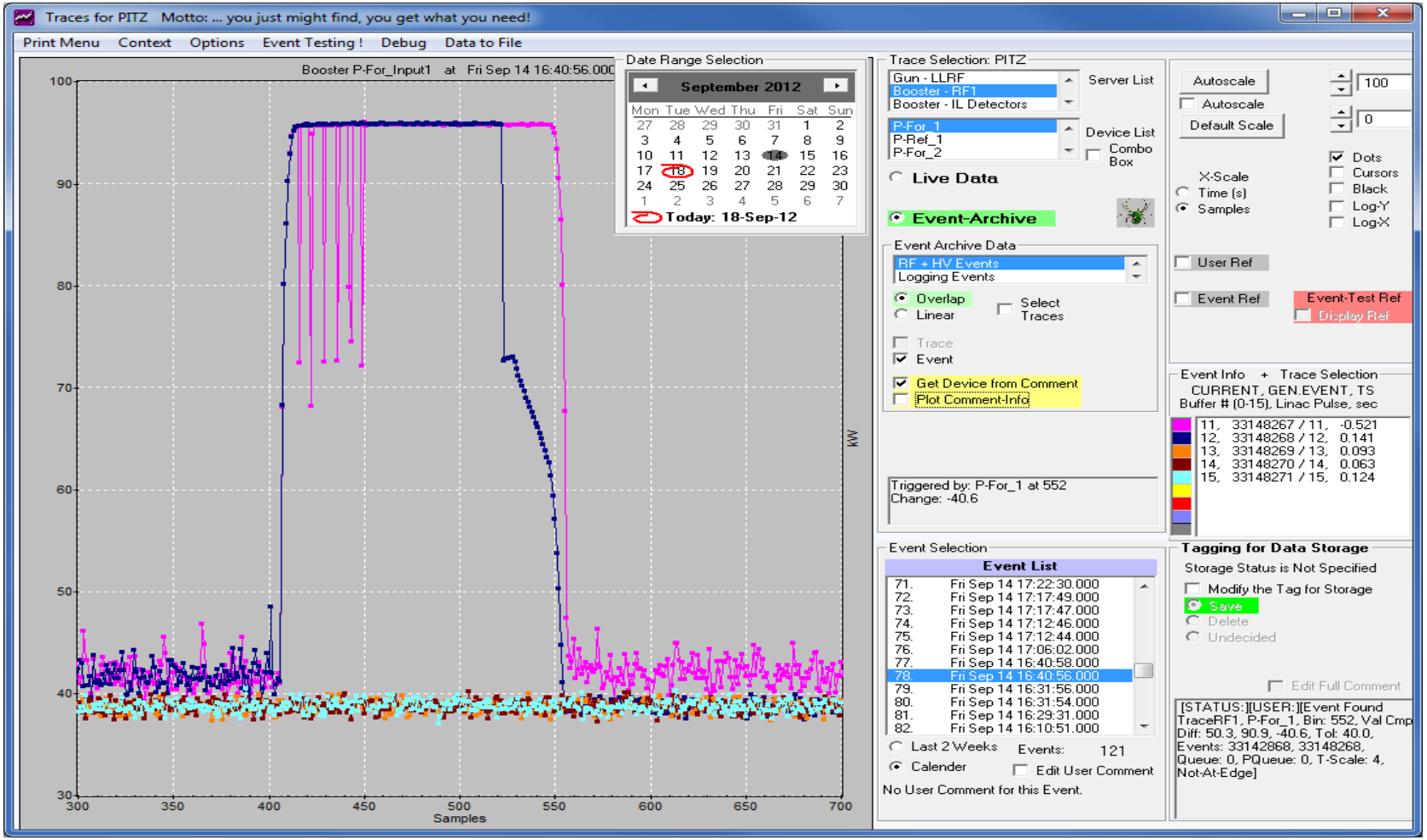
The data is stored as an array – select a time, get the values of all elements of the array



Thanks, Igor!

Browsing Events

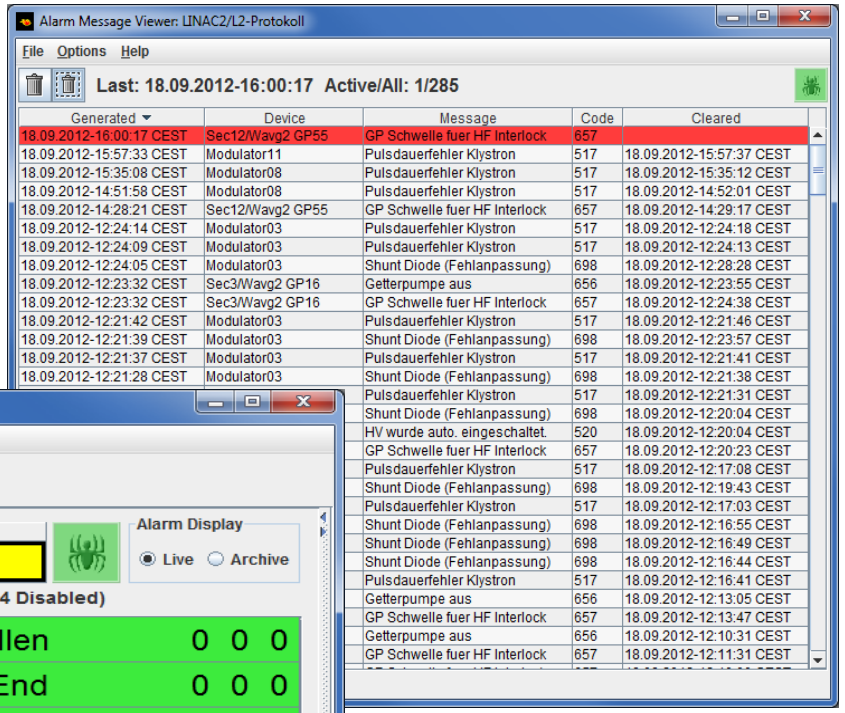
Looking for “events”: 121 RF Events on September 14

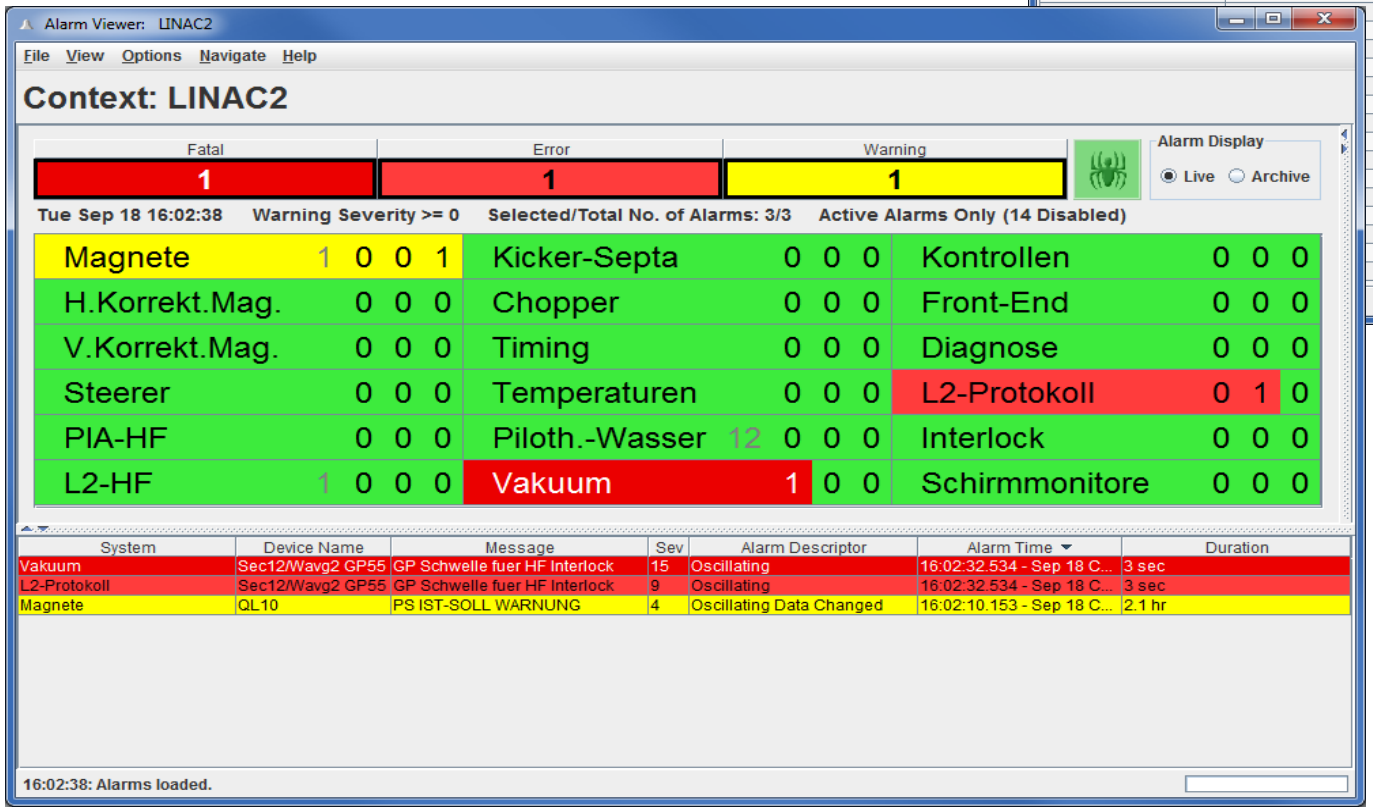


Browsing Events: Alarms

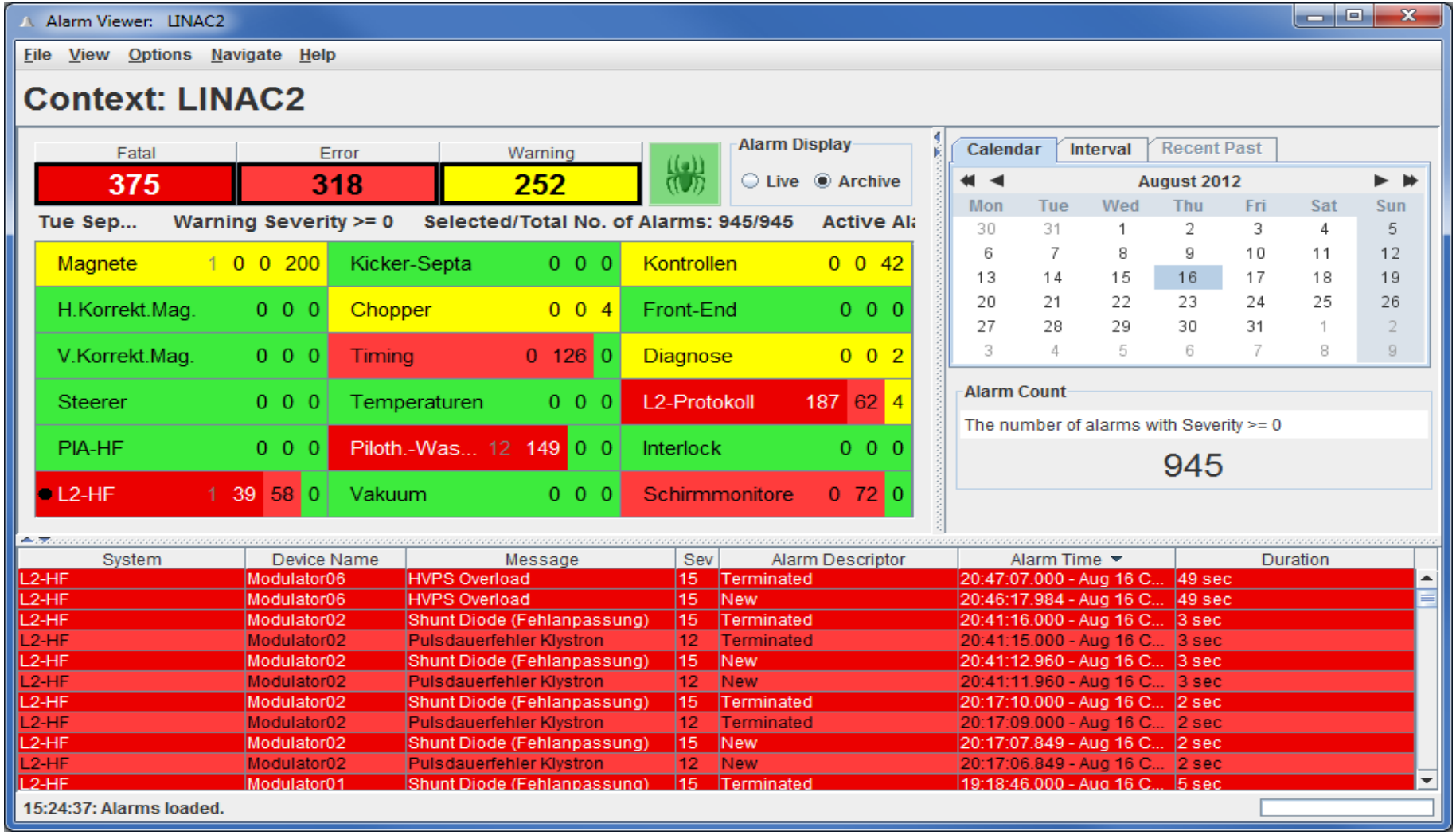
Live alarms in “FIFO” Display (“now” is at the top)
(red entries: “not cleared”)

Archive display with subsystems



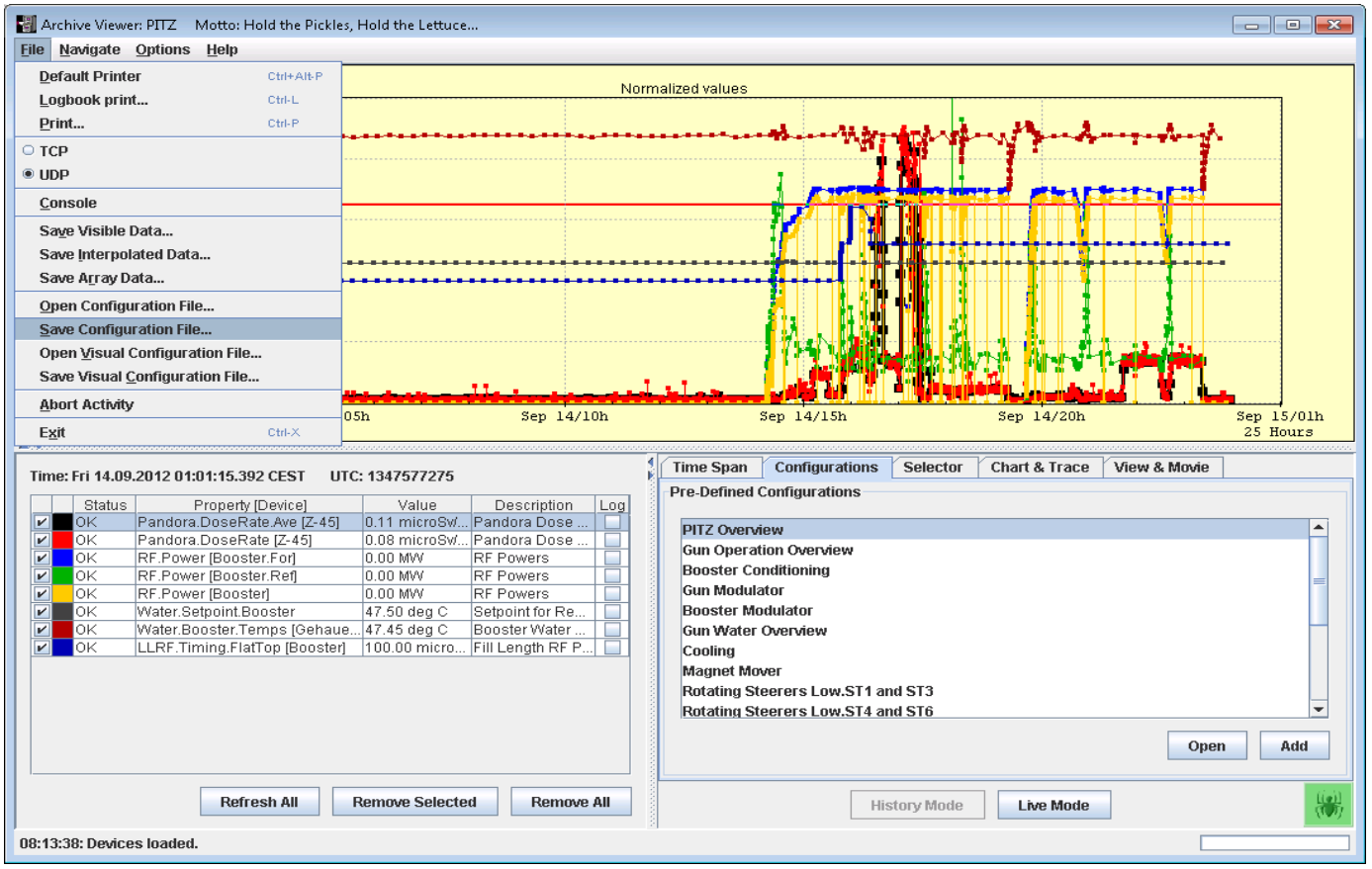


Browsing Events: Alarm Archive



Re-Browsing: Configurations!

You have found interesting channels, and would like to view them periodically?
Without having to search for them again? Save the selection in a Configuration!



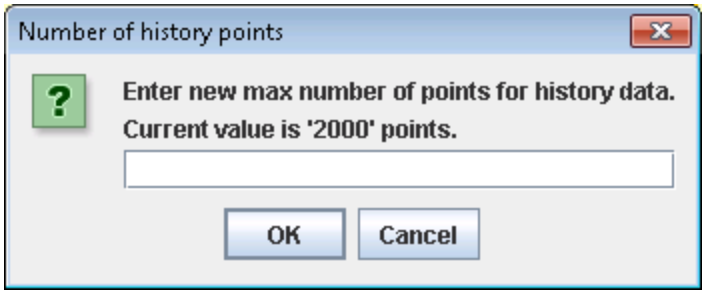
Data Retrieval

On-line: quick viewing using General-Purpose Applications, or write your own (in Matlab …)

Off-line: Use your own analysis programs. Use the general purpose Application to find the data you want, then store the data to file

(Take a peek at the menu on the previous slide…)

Note that the data in the viewer may not be ALL the data archived (see vacuum slide). You can increase the maximum data-size collected by the Viewer:



Saving Data from the Application to a File

Save Visible data: Save the (Time Stamp, Data) for each data point of each property
(The properties are archived asynchronously)

	A	B	C	D	E	F	G	H
1	TimeStamp	TimeText	RF.Power/Booster (MW)	TimeStamp	TimeText	RF.Power/Booster.For (MW)	TimeStam	TimeT
2	1347629741	14.09.2012 15:35:41.000	6.607311249	1347629741	14.09.2012 15:35:41.000	6.973038673	1.35E+09	14.09.
3	1347629804	14.09.2012 15:36:44.000	6.602902889	1347629804	14.09.2012 15:36:44.000	6.962097168	1.35E+09	14.09.
4	1347629805	14.09.2012 15:36:45.000	0	1347629805	14.09.2012 15:36:45.000	0	1.35E+09	14.09.
5	1347629806	14.09.2012 15:36:46.000	0	1347629806	14.09.2012 15:36:46.000	0	1.35E+09	14.09.
6	1347629807	14.09.2012 15:36:47.000	6.707049847	1347629807	14.09.2012 15:36:47.000	6.935323715	1.35E+09	14.09.
7	1347629842	14.09.2012 15:37:22.000	6.63373518	1347629842	14.09.2012 15:37:22.000	6.962427139	1.35E+09	14.09.
8	1347630268	14.09.2012 15:44:28.000	6.657970428	1347630268	14.09.2012 15:44:28.000	6.959226131	1.35E+09	14.09.
9	1347630269	14.09.2012 15:44:29.000	0	1347630269	14.09.2012 15:44:29.000	0	1.35E+09	14.09.

Pitz-File

Save Interpolated Data: One file with Timestamp, Data1, Data2, Data3, ..
The time stamps of all data collected; and the values of each property interpolated

	A	B	C	D	E	F	G	H	I
1	TimeStamp	TimeText	RF.Power/Booster (MW)	RF.Power/Boost	RF.Power/B	LLRF.Amplit	LLRF.Timing.Fla	Vacuum.IonGP/BC	Vacuum.I
2	1347629639	14.09.2012 15:33:58.615	6.614475533	6.990820356	0.37634469	65	99.96790146	7.14E-11	1.26E-09
3	1347629645	14.09.2012 15:34:04.637	6.61405415	6.989774487	0.37572023	65	99.97522749	8.05E-11	1.05E-09
4	1347629655	14.09.2012 15:34:14.683	6.613351191	6.988029752	0.37467848	65	99.98744891	7.58E-11	1.05E-09
5	1347629662	14.09.2012 15:34:21.610	6.612866482	6.986826707	0.37396017	65	99.99587591	7.14E-11	1.26E-09
6	1347629665	14.09.2012 15:34:25.000	6.61262927	6.98623795	0.37360864	65	100	6.91E-11	1.22E-09
7	1347629667	14.09.2012 15:34:27.000	6.612489322	6.9858906	0.37340124	65	100.0024331	6.77E-11	1.20E-09
8	1347629668	14.09.2012 15:34:27.647	6.612444049	6.985778233	0.37333415	65	100.0032202	6.73E-11	1.19E-09
9	1347629676	14.09.2012 15:34:35.619	6.611886216	6.984393698	0.37250747	65	100.0129185	6.73E-11	1.26E-09

Pitz-File-Interpolated

Display: Advanced

Doing “off-line” analysis “on-line”
(use general purpose applications to answer your questions…)

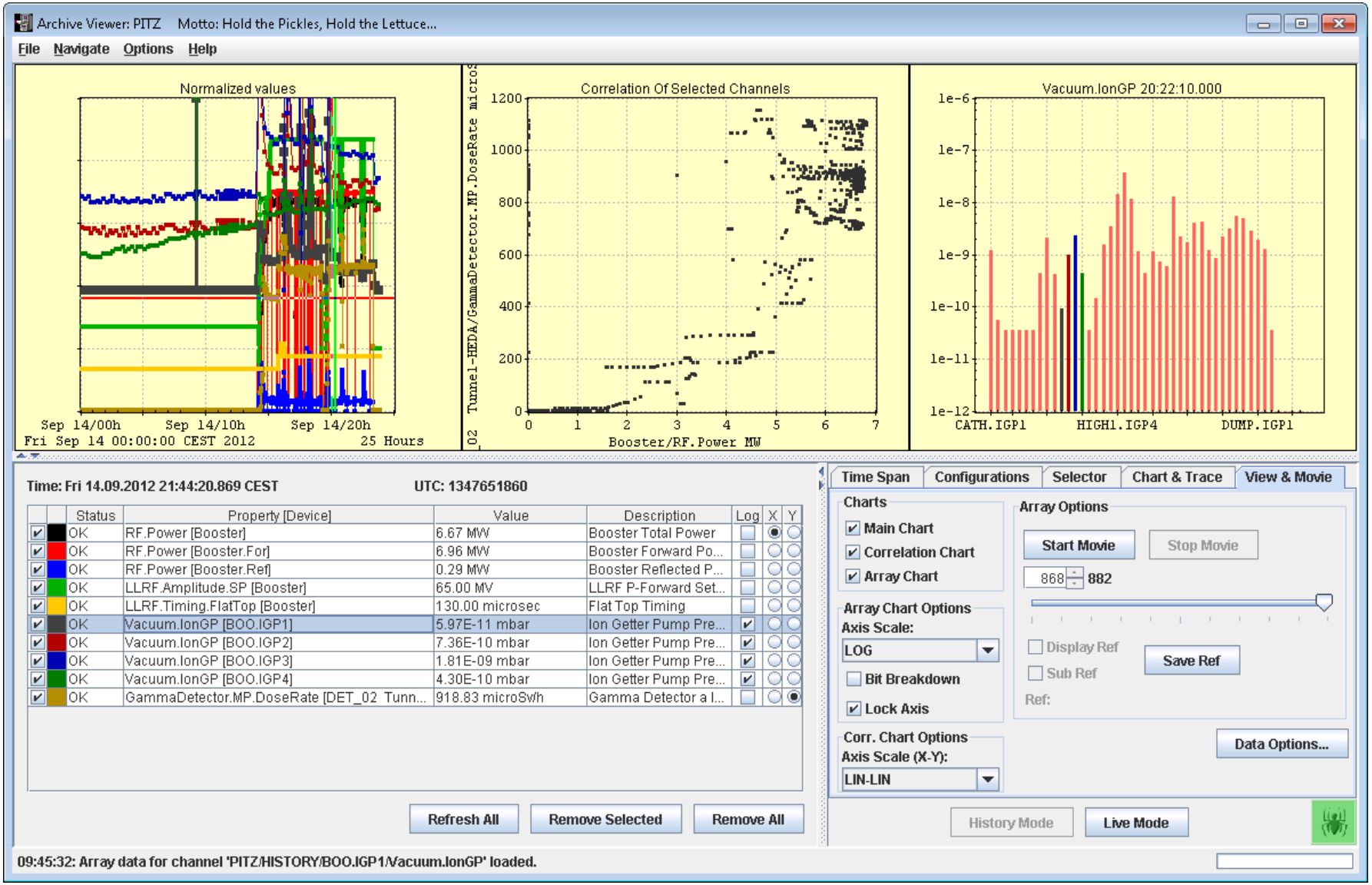
Display an array?

Multi-Channel (Vacuum readings) MCA Viewer

“”pulse” (rf) Scope Trace Viewer

“Movies”, Correlations, Annotations, ….

Main-, Correlation- and Array-Plots



Histories of Apples and Oranges