
The HELENA and TRACE Front-End Electronics and DAQ at AGATA

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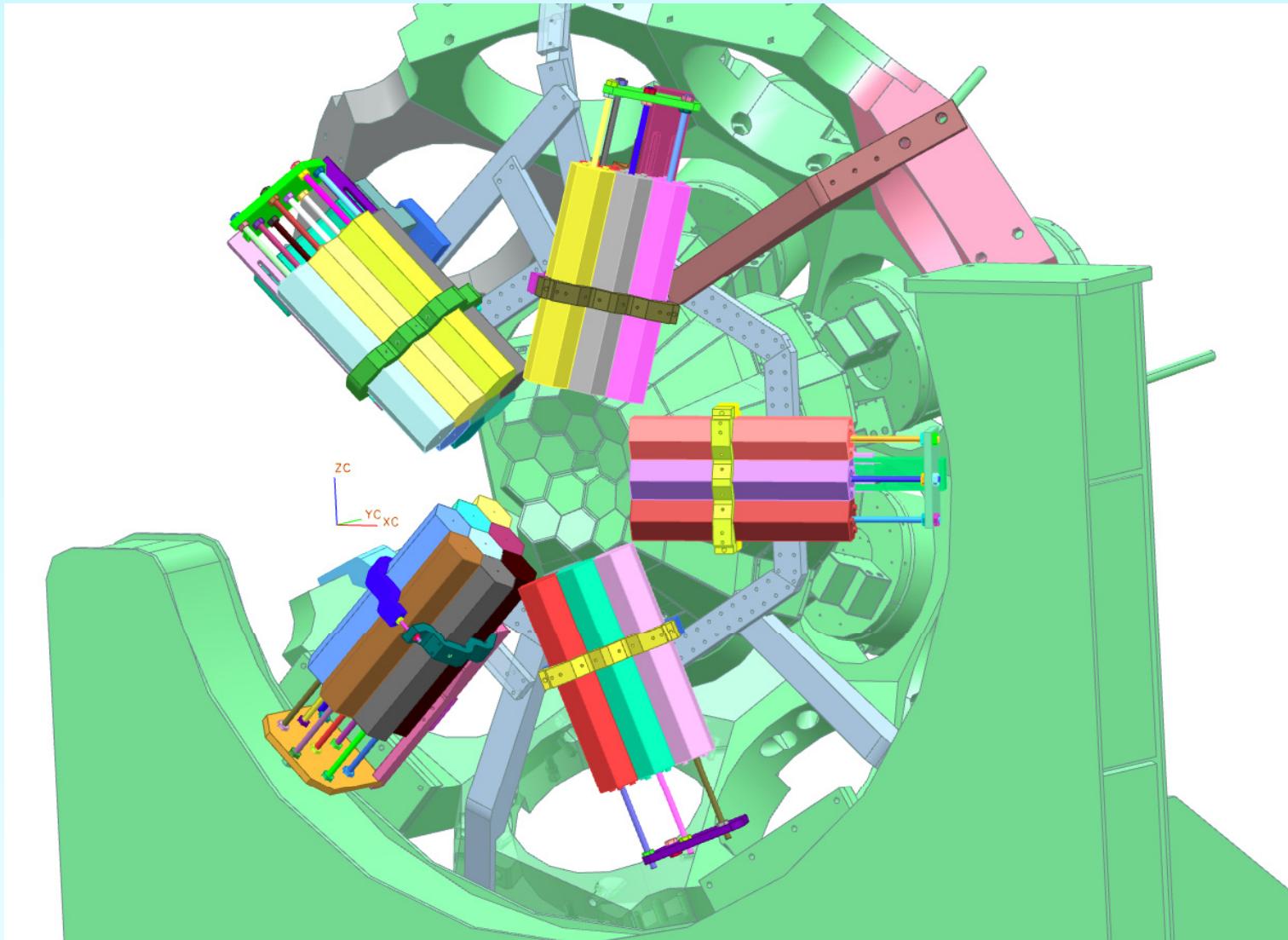
Outline

- **HELENA detectors**
- **HELENA Signal processing**
- **HELENA & TRACE VME Front-End Electronics**
- **Data Acquisition**
- **Conclusion**

HELENA is an array of 3"x 3" hexagonal BaF₂ detectors

- 27 of them can be inserted between the AGATA flanges and PRISMA first quadrupole
 - Time (< 1ns)
 - Low background, lifetime measurements
 - Energy (Fast, Slow)
 - High efficiency low resolution spectroscopy (FWHM = 12-17 % at 662 KeV)
 - Multiplicity filter
 - Selection of reaction mechanism
 - High Spin / Low Spin discrimination
 - Particle identification (alpha, neutron, gamma)
- They are grouped in 5 clusters of respectively 8, 8, 4, 4, 3 single detectors.
- The total solid angle covered by the HELENA array at 15 cm from the target will be about 25% of the 4π and the total efficiency will be about 16% at 500 KeV.
- Each of the 5 HELENA's clusters will be mechanical held on the hexagonal frame with regulating support allowing all necessary adjustments.
- Details in Million & Coelli presentations at:
8th AGATA WEEK
University of Cologne, Germany - March 31st 2009

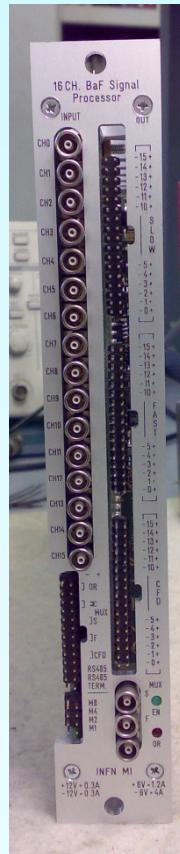
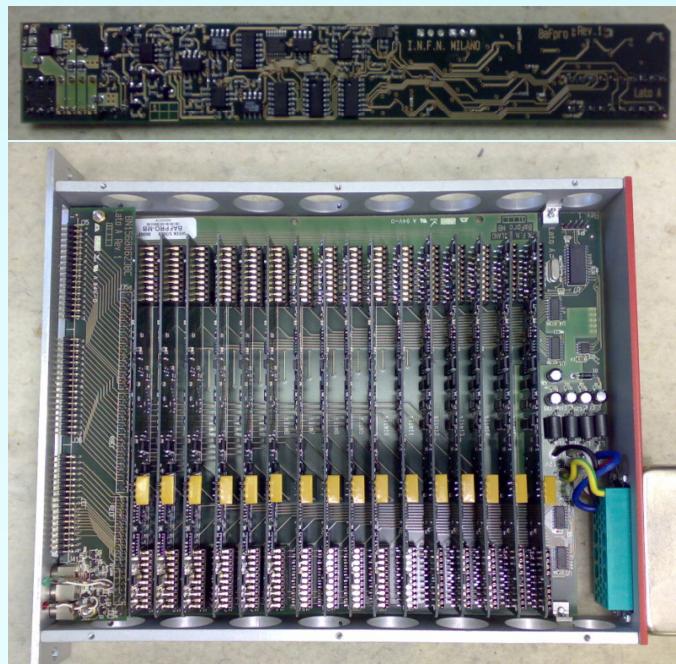
mechanical solution for HELENA detectors



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HELENA Signal processing

- NIM standard module
- 16 channels
- Fast output = $2\mu\text{s}$ Time to peak
- Energy output = $2\mu\text{s}$ Time to peak
- CFD resolution < 100pS
- CFD OR output
- Multiplicity Output



- RS485 dedicated software control
- Details in Boiano C:
 - IEEE NSS 2008 Dresden N30-46
 - TNS ISSN 0018-9499

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File Modifica Visualizza Chiama Trasferimento ?
Insert a valid command!
BAF PRO 16 - INFN MILANO - Rev.1.2
Module 9
CH 0 -> Fst_G=0 Fst_g=197 Slw_G=2 Slw_g=197 CFD_Th= 5 CFD_Wdt= 5 CFD ON.
CH 1 -> Fst_G=0 Fst_g=197 Slw_G=2 Slw_g=197 CFD_Th= 5 CFD_Wdt= 5 CFD ON.
CH 2 -> Fst_G=0 Fst_g=197 Slw_G=2 Slw_g=197 CFD_Th= 5 CFD_Wdt= 5 CFD ON.
CH 3 -> Fst_G=0 Fst_g=197 Slw_G=2 Slw_g=197 CFD_Th= 5 CFD_Wdt= 5 CFD ON.
CH 4 -> Fst_G=0 Fst_g=197 Slw_G=2 Slw_g=197 CFD_Th= 5 CFD_Wdt= 5 CFD ON.
CH 5 -> Fst_G=0 Fst_g=197 Slw_G=2 Slw_g=197 CFD_Th= 5 CFD_Wdt= 5 CFD ON.
CH 6 -> Fst_G=0 Fst_g=197 Slw_G=2 Slw_g=197 CFD_Th= 5 CFD_Wdt= 5 CFD ON.
CH 7 -> Fst_G=0 Fst_g=197 Slw_G=2 Slw_g=197 CFD_Th= 5 CFD_Wdt= 5 CFD ON.
CH 8 -> Fst_G=0 Fst_g=197 Slw_G=2 Slw_g=197 CFD_Th= 5 CFD_Wdt= 5 CFD ON.
CH 9 -> Fst_G=0 Fst_g=197 Slw_G=2 Slw_g=197 CFD_Th= 5 CFD_Wdt= 5 CFD ON.
CH10 -> Fst_G=0 Fst_g=197 Slw_G=2 Slw_g=197 CFD_Th= 5 CFD_Wdt= 5 CFD ON.
CH11 -> Fst_G=0 Fst_g=197 Slw_G=2 Slw_g=197 CFD_Th= 5 CFD_Wdt= 5 CFD ON.
CH12 -> Fst_G=0 Fst_g=197 Slw_G=2 Slw_g=197 CFD_Th= 5 CFD_Wdt= 5 CFD ON.
CH13 -> Fst_G=0 Fst_g=197 Slw_G=2 Slw_g=197 CFD_Th= 5 CFD_Wdt= 5 CFD ON.
CH14 -> Fst_G=0 Fst_g=197 Slw_G=2 Slw_g=197 CFD_Th= 5 CFD_Wdt= 5 CFD ON.
CH15 -> Fst_G=0 Fst_g=197 Slw_G=2 Slw_g=197 CFD_Th= 5 CFD_Wdt= 5 CFD ON.

Command Key
CH=N CFTh=T CFWdt=W Slw_G=S Slw_g=s Fst_G=f Fst_g=f CFDds=D
UPDATE=U1 HELP=H1 Mod=M eXport=X1

Connesso a 1.19.27 Rilev. aut. 9600 8-N-1 SCORR MAIUSC NUM Acquisisci Eco stampante
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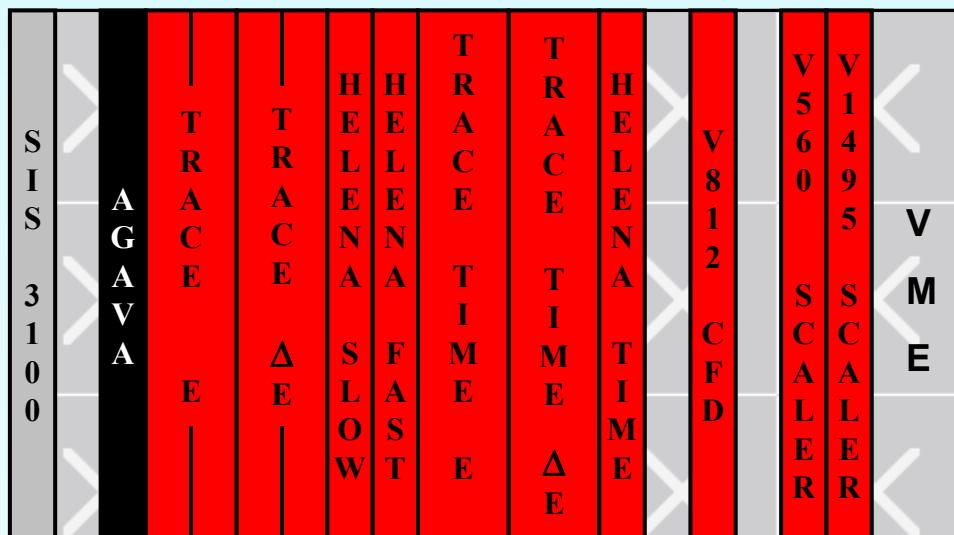
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HELENA & TRACE VME Front-End Electronics

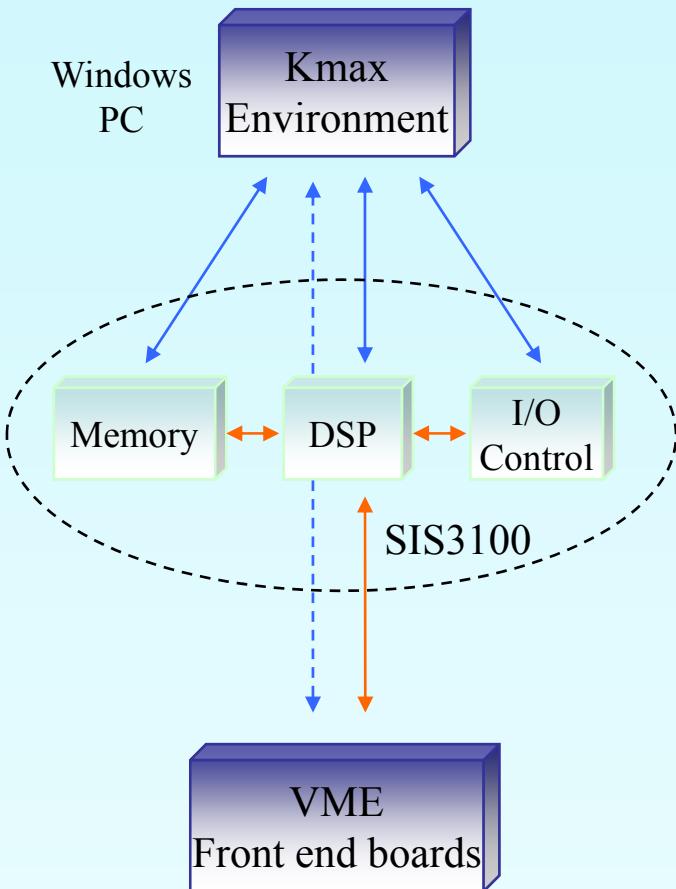
Trace E & ΔE channels	= 120
Trace Timing channels	= 120
HELENA Fast channels	= 27
HELENA Slow channels	= 27
HELENA Timing channels	= 27
3 Big LaBr₃ E₁, E₂ & T	= 9
<hr/>	
	≈ 330

V785: 32 channels ADC	
V878: 32 channels ADC	6 ADC's
V775: 32 channels TDC	
V879: 32 channels TDC	5 TDC's
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V812: 16 channels CFD	
V560: 16 channels Scalers	
V1495: 128 channels Scalers	

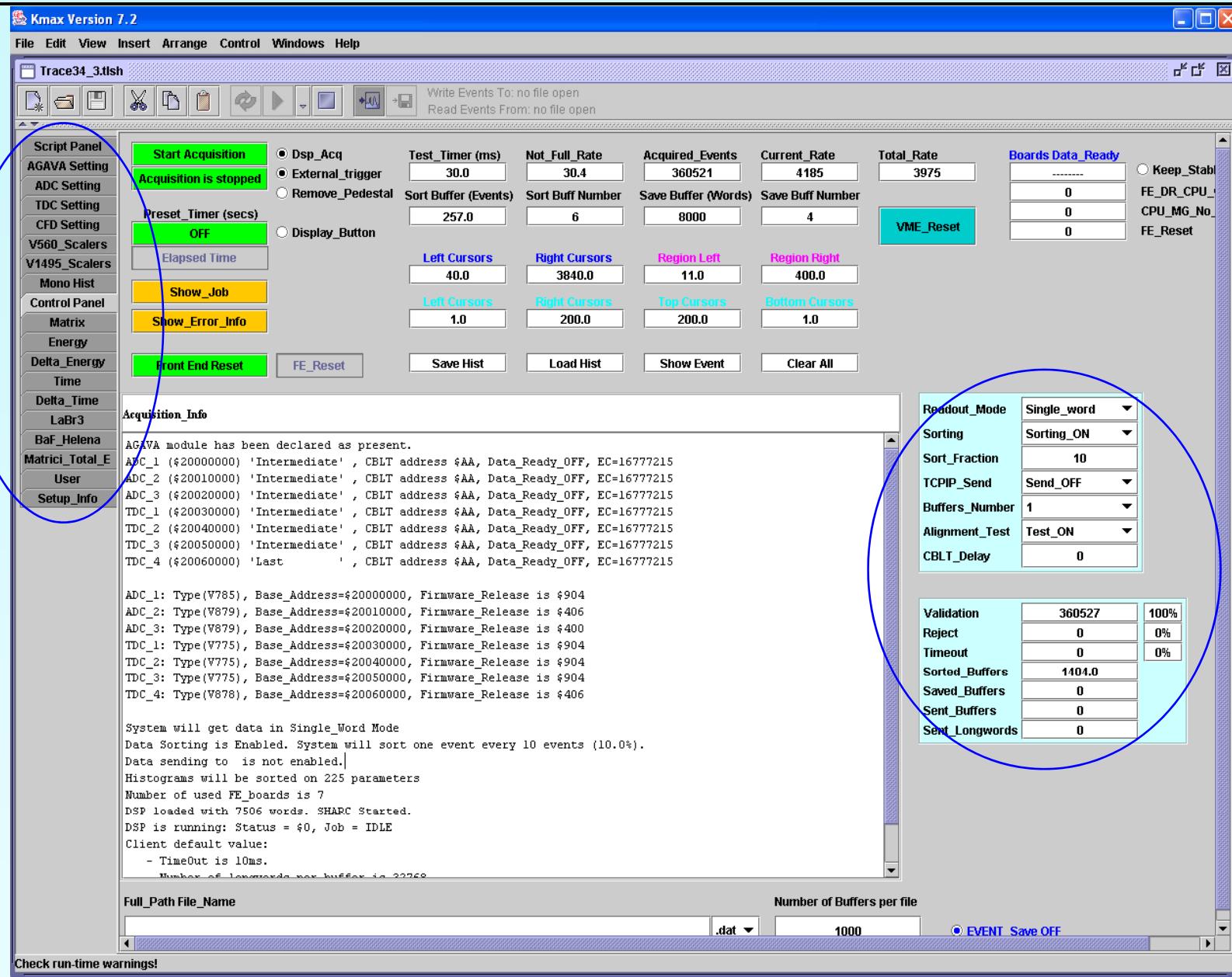


- Struck board with optical link with DSP & Memory
- Based on KMAX in a Windows Environment

Software organization

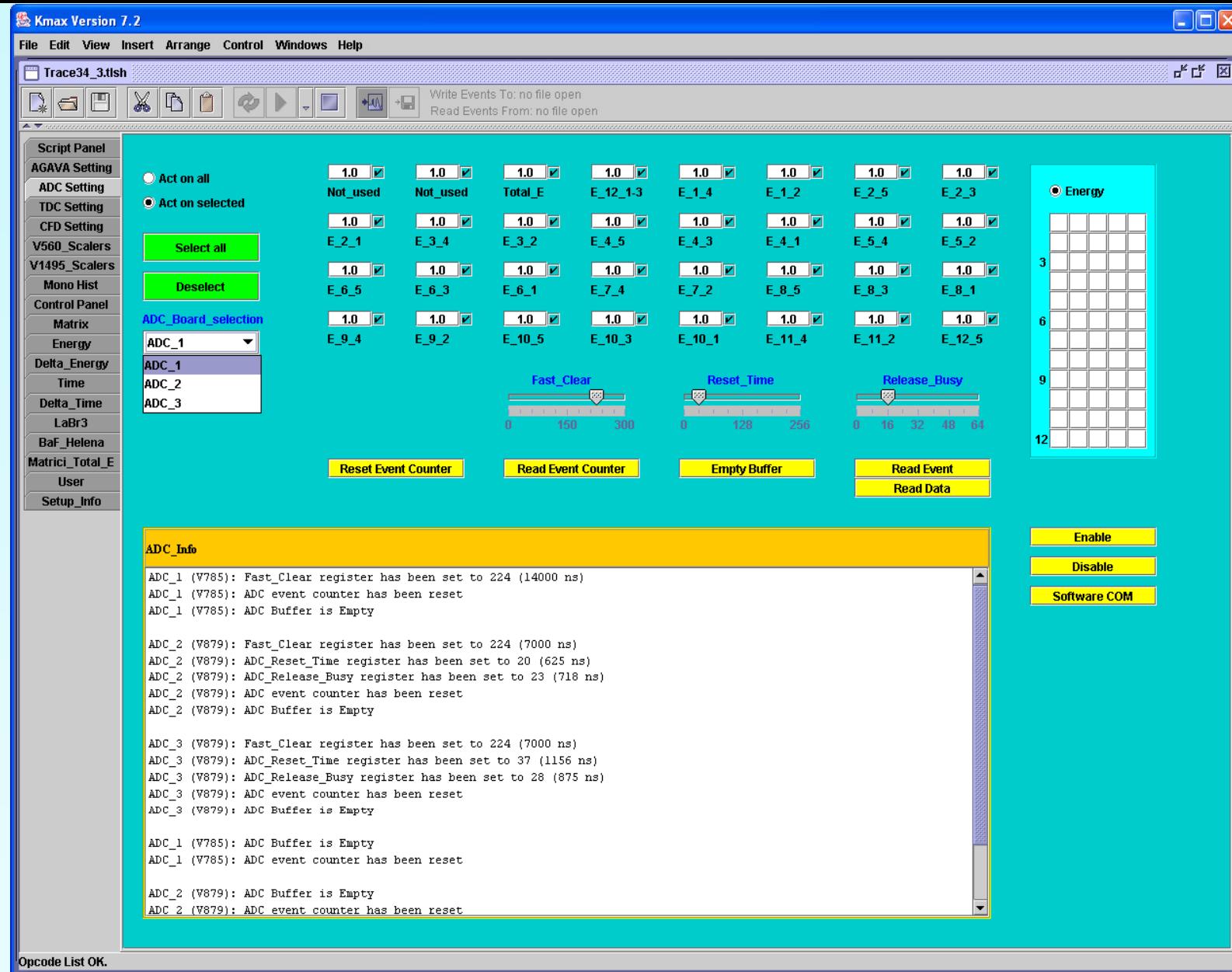


- SIS1100/3100 1 Gbit/s optical pci-to-VME interface
 - Java Application
 - Graphical User Interface
 - Local sorting & saving
 - TCPIP data transfer to Narval actor
-
- Handles AGAVA trigger signals
 - Front-end readout
 - Multiple buffers
 - Client/Server Architecture
-
- Direct Kmax interface to all the VME boards: front-end setting & slow control



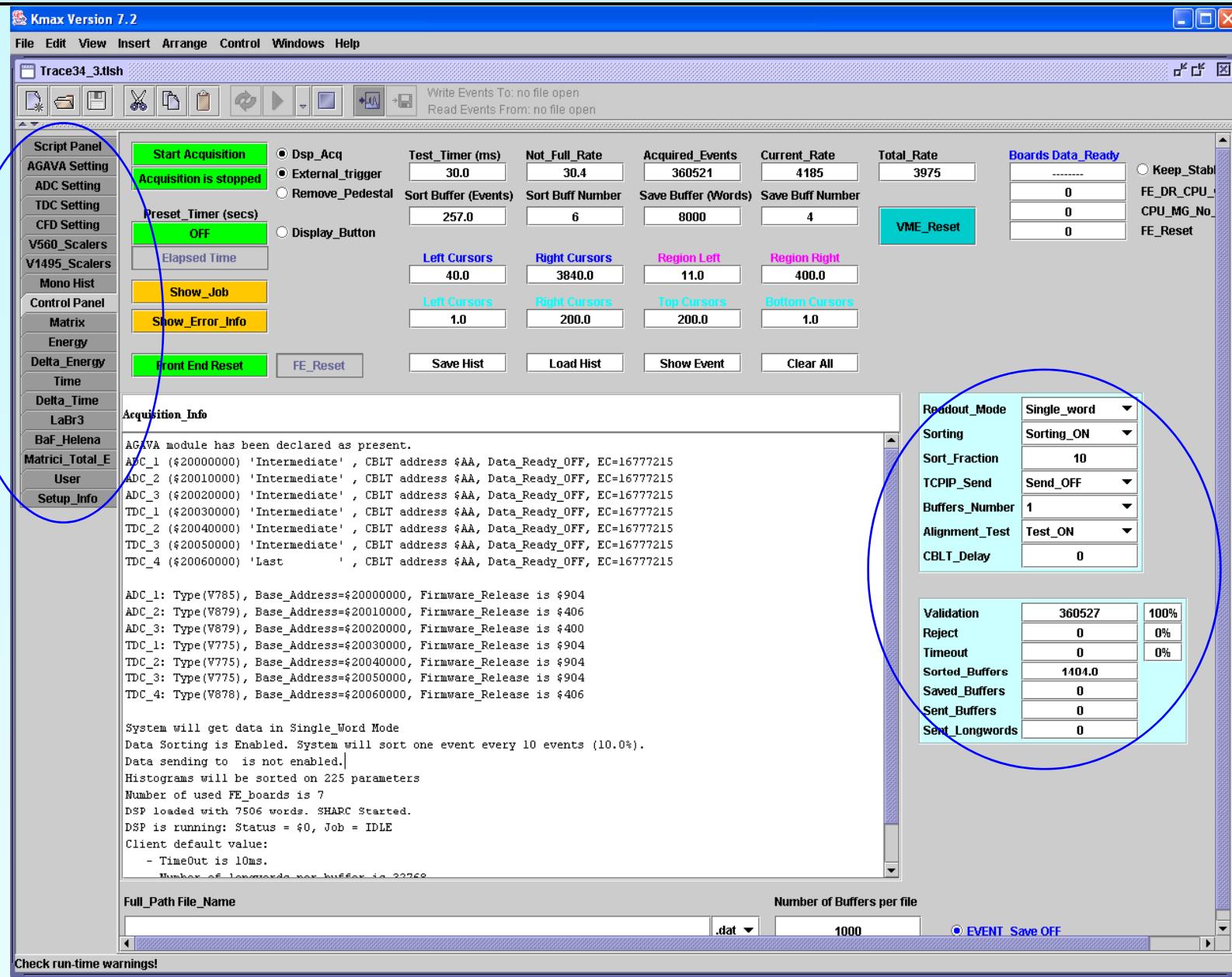
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Readout_Mode	Single_word
Sorting	Sorting_ON
Sort_Fraction	10
TCPIP_Send	Send_OFF
Buffers_Number	1
Alignment_Test	Test_ON
CBLT_Delay	0
Validation	360527
Reject	0
Timeout	0
Sorted_Buffers	1404.0
Saved_Buffers	0
Sent_Buffers	0
Sent_Longwords	0

Conclusion:

- HELENA detector ready and can be available for any experiment that will ask for it
- HELENA and TRACE Front-End electronics and acquisition system has been used in June without AGATA
- AGAVA and TCPIP data sending already integrated in the system (need to be fully tested)
- Good performance acquisition system
 - can be used as a stand alone system
 - online slow control
 - local sorting or saving

Thank you!
