

Ocsilloscope Software and Slow Control

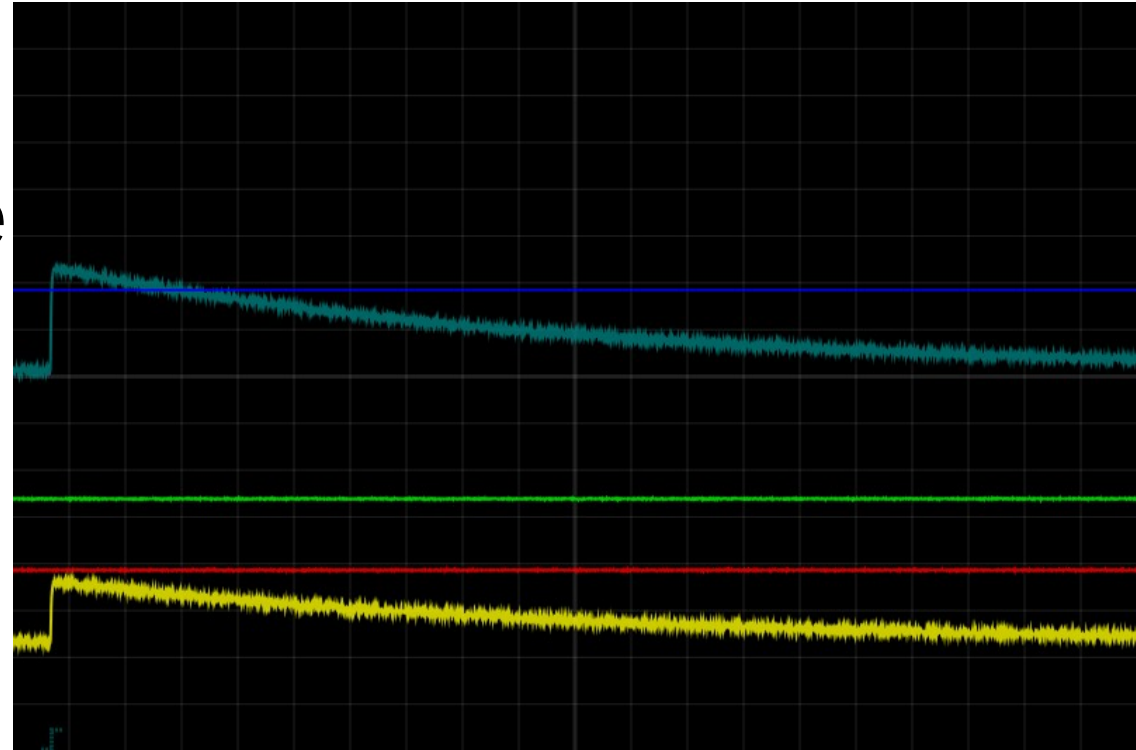
AGATA Week 2025

Summary: oscilloscope and slow control

- Monitor signals coming through inspection links
- Oscilloscope functionalities from slow control
 - monitor modes and channels selection
- Signal values and interpretation
- Trigger window mode
- Data dumps (save, load, download)
- Actions embedded (python functions)
- Results, relaunch and history, documentation
- Console
- Topology manager

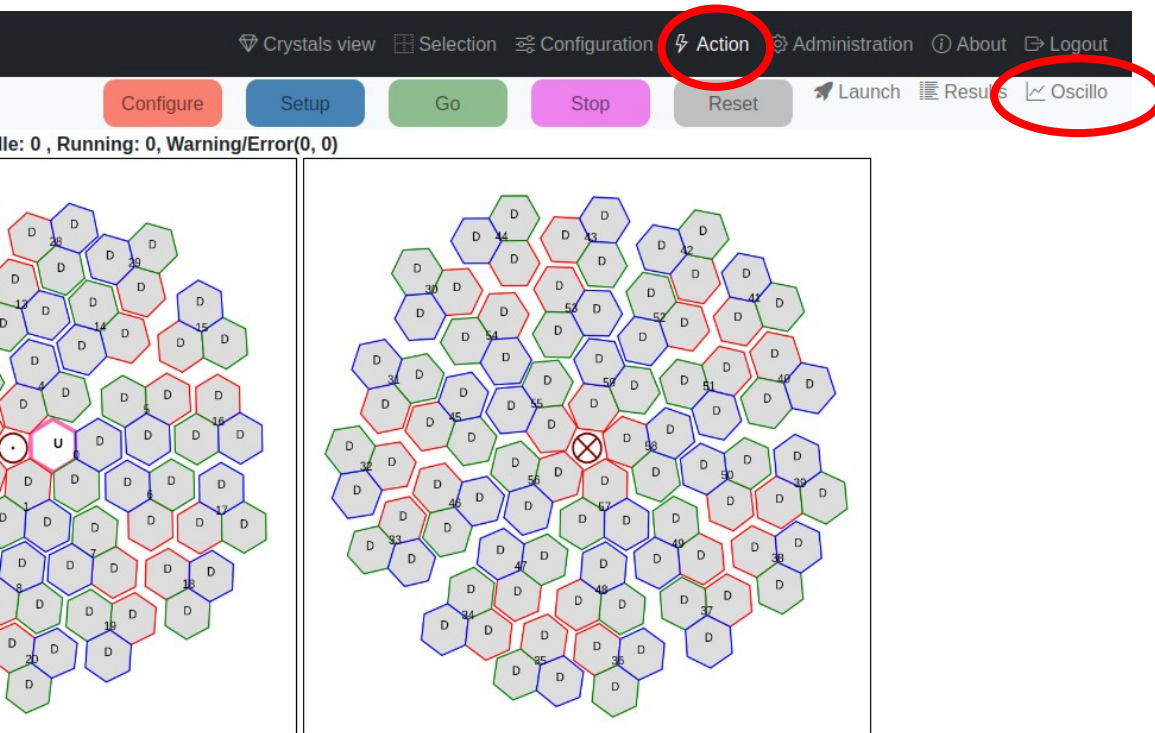
Signal monitoring

- Actual monitor signals displayed from STARE links
- UDP packets received
- Headers removed in line
- Decoding in Javascript
- Installed at:
 - LNL : **c6400-20**
 - 1 network links
 - 2 inspection links
 - 4 channels by link
 - IJCLab : **agata-slow-control**



Launch Oscilloscope from Slow Control

- Select crystals/STARE
- Action > Oscillo
- Choose network link, mode, channels



Select channels to inspect

Frame size: 10240

Selected crystals	Select channels
stare.0	☒ 1st Link ☐ 2nd Link
	☐ Channel 2 over 32bits ☐ Channel 2 over 32bits
	0: ☒ 1: ☒ 2: ☒ 3: ☒ 0: ☐ 1: ☐ 2: ☐ 3: ☐

OK

Monitor modes

- PACE_QuadLink_start selects the content of inspection channels:
 - Network inspection link
 - Mode
 - Monitor mode
 - 1 or 4 Channel numbers (1 to 37)

Select channels to inspect

Frame size: 10240

Selected crystals: Select channels

stare.0	☒ 1st Link ☐ 2nd Link	☐ Channel 2 over 32bits	0: ☒ 1: ☒ 2: ☒ 3: ☒	Mode: Monitor	Monitor: Samples	1	2	36	37	QuadLink
		☐ Channel 2 over 32bits	0: ☐ 1: ☐ 2: ☐ 3: ☐	Mode: Monitor	Monitor: Samples					QuadLink

OK

stare.0:
Running in mode **mon** on link 0 2a
Monitor set to 0
PACE System Read: 0xffff
CODE: 0xffff Send QuadLink_stop to end stream
Monitoring Samples for channels 1, 2, 36, 37
Packager Set

Monitor

- Simulator
- Timer 4k
- Call 4k
- Local Trigger 4k
- Global Trigger 4k
- Timer Data
- callData
- l trigData
- trigData

Samples

- MWD
- CFD
- Event
- Mixed 2ch
- Mixed 1ch

Signal values and cursors

- ADC values displayed on vertical cursor
- Signal values interpretation
- Signed or unsigned values



Cursor Options

Horizontal : ☒

Vertical : ☒

Signal Values : ☒

Physical Units : ☐

Value :

Reset Cursors

(re) Trigger

- Allows to trig again incoming data
- Mode Edge or Window
 - Both can be set graphically



×

Trigger options

Trigger active ☒

Trigger mode
Window-Trigger ▼

Trigger channel
Channel 1 ▼

Trigger slope
Both ▼

Trigger level (mV)
500 ▲▼

Window level min (mV)
3465.7 ▲▼

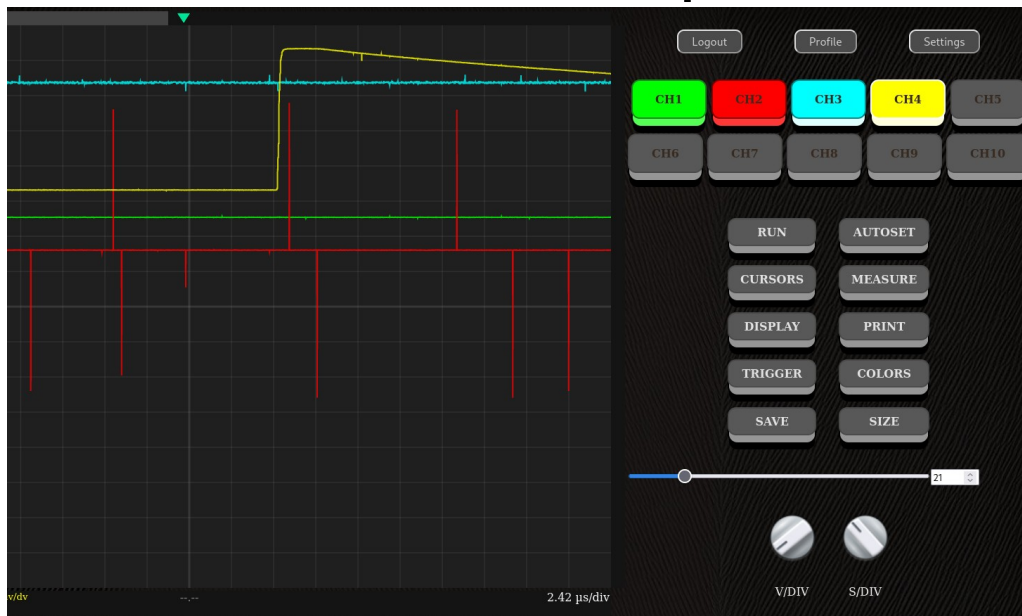
Window level max (mV)
3745.1 ▲▼

Hold off (s)
600 ▲▼

Apply Trigger Settings

Data dumps

- Upload data dump files, previous ones available
- Size of dumped data in Oscillo screen
- Download dumped data



Mode :

Real-Time
File

Number of Channels:

4

Samples per frame:

10240

or select an available one: raw_data-mi961_ai.dat

Start Capture

Download

You've currently selected the 'file' option.

Please select here above a file with an extension .osc or .dat to read

Actions list

- J. Collado's software embedded (branch py3)
- Version and date of classes displayed
- Organized by python classes
- Help of functions in tooltips

Configure Setup Go Stop Reset Launch Results Oscilloscope

Actions for card stare.18

Action class:

- pace_call
- pace_basic
- pace_gts
- pace_recv
- pace_dtp
- pace_read**
- pace_mon
- pace_sc
- stare
- cmd_test

PACE_LT_fixRdy	PACE_LT_hold	PACE_LT_rst	PACE_LT_stat
PACE_LT_triggOffset	PACE_QuadLink_IDLE	PACE_QuadLink_rst	PACE_QuadLink_run
PACE_QuadLink_runOne	PACE_QuadLink_start	PACE_QuadLink_stat	PACE_QuadLink_stop
PACE_SPC_gain	PACE_SPC_local	PACE_SPC_read	PACE_SPC_reset

Set the spectra reading: read [channel][local]
channel: select the channel to read
local: if written, reads the spectra data:
loc > local read
rem > remote read
mon > read from monitor

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Ph2_PACE_CMD version: v30.280 (2025-09-10)
http://localhost:8000/action_list/#

Actions documentation

- Actions help in tooltips or separate page

PACE_LT_hold	PACE_LT_rst	PACE_LT_stat
PACE_QuadLink_IDLE	PACE_QuadLink_rst	PACE_QuadLink_run
PACE_QuadLink_start	PACE_QuadLink_stat	PACE_QuadLink_stop

```

PACE packager autoconfig
start [link][mode][a0][channel?]
link: 0-2
mode: timer4k - 4k samples Mid Trace, Timer Based on a0 value for selected Channel
call4k - 4k samples Mid Trace, Call Slow control, times a0 for selected Channel
ltrig4k - 4k samples Mid Trace, trigger from Local Trigger for selected Channel
trig4k - 4k samples Mid Trace, trigger from Global Trigger for selected Channel
timerDat - Data 100s per channel (38), Timer based on a0 value
callDat - Data 100s per channel (38), Call Slow control, times a0
ltrigDat - Data 100s per channel (38), trigger frin local Trigger [LT module]
trigDat - Data 100s per channel (38), trigger from Local Trigger
mon - Start Monitor System a0 mode, a1 ch1 or ch1.ch2.ch3.ch4
simul - Counter simulator for STARE tests
Advanced mode:
timer8k - (2 package) 8k samples Mid Trace, Timer Based on a0 value for selected Channel
call8k - (2 package) 8k samples Mid Trace, Call Slow control, times a0 for selected Channel
ltrig8k - (2 package) 8k samples Mid Trace, trigger from Local Trigger for selected Channel
trig8k - (2 package) 8k samples Mid Trace, trigger from Global Trigger for selected Channel
timerDat200 - (2 package) Data 200s per channel (38), Timer based on a0 value
callDat200 - (2 package) Data 200s per channel (38), Call Slow control, times a0
ltrigDat200 - (2 package) Data 200s per channel (38), trigger frin local Trigger [LT module]
trigDat200 - (2 package) Data 200s per channel (38), trigger from Local Trigger
call4x1k - 4x1k samples Mid Trace, Timer Based on a0 value for 4 selected Channel ch0.ch1.ch2.ch3
timer4x1k - 4x1k samples Mid Trace, Call Slow control, times a0 for 4 selected Channel ch0.ch1.ch2.ch3
ltrig4x1k - 4x1k samples Mid Trace, trigger from Local Trigger for 4 selected Channel ch0.ch1.ch2.ch3
trig4x1k - 4x1k samples Mid Trace, trigger from Global Trigger for 4 selected Channel ch0.ch1.ch2.ch3
timer100k - [TBD] (multi package) 100k samples Mid Trace, Timer Based on a0 value for selected Channel
call100k - [TBD] (multi package) 100k samples Mid Trace, Call Slow control, times a0 for selected Channel
ltrig100k - [TBD] (multi package) 100k samples Mid Trace, trigger from Local Trigger for selected Channel
trig100k - [TBD] (multi package) 100k samples Mid Trace, trigger from Global Trigger for selected Channel
timerSpc100 - Timer called packages of all channels 100bin spectra (fast check)
callSpc100 - Run (Slow Control) called packages of all channels 100bin spectra (fast check)
spc4k - Run (Slow Control) called packages of selected channel 4kbin spectra
spc8k - (2 package) Run (Slow Control) called packages of selected channel 8kbin spectra
idle - Force to send an IDLE package (DEBUG ONLY - No DSB)
error - Force to send an ERROR package (DEBUG ONLY - No DSB)
off - Force to send an SYSTEMOFF package (DEBUG ONLY - No DSB)
a0: Run Times / Timer
Channel: Selected Channel ch1 or ch1.Ch2.Ch3.Ch4
--- Monitor modes:
s: samples m:mwd t:cfd e:event m0:mixed 2ch m1:mixed 1ch
  
```

Configure
Setup
Go
Stop
Reset
Launch
Results
Oscillo

Action result of

```

help_PACE_QuadLink_start:
PACE packager autoconfig
start [link][mode][a0][channel?]
link: 0-2
mode: timer4k - 4k samples Mid Trace, Timer Based on a0 value for selected Channel
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trig4x1k - 4x1k samples Mid Trace, trigger from Global Trigger for 4 selected Channel ch0.ch1.ch2.ch3
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a0: Run Times / Timer
Channel: Selected Channel ch1 or ch1.Ch2.Ch3.Ch4
--- Monitor modes:
s: samples m:mwd t:cfd e:event m0:mixed 2ch m1:mixed 1ch
  
```

Actions history and relaunch

- History of all launched actions
- Output stored
- Relaunch link

(on selected crystals)

Slow Control

Crystals view Selection Configuration Action Administration About Logout

Configure Setup Go Stop Reset Launch Results Oscillo

Action results for card stare.18

Date	Time	Card	Action	Result 
2025-09-12	12:32:35	stare.18(18)	PACE_QuadLink_start 0 trigDat 0	Running in mode trigDat on link 0 1a Packager configured on Aurora Channel 0 Global Trigger mode enabled - Output 38x100s data ADF on all channels CODE: 0xda03 Packager Set
2025-09-12	12:32:32	stare.18(18)	PACE_QuadLink_start 0 trigDat	
2025-09-12	12:32:28	stare.18(18)	PACE_QuadLink_start 0 ltrigDat	
2025-09-12	12:32:25	stare.18(18)	PACE_QuadLink_start 0 callDat	
2025-09-12	12:32:15	stare.18(18)	PACE_QuadLink_start 0 timerDat	
2025-09-12	12:32:11	stare.18(18)	PACE_QuadLink_start 0 trig4k	
2025-09-12	12:32:06	stare.18(18)	PACE_QuadLink_start 0 ltrig4k	
2025-09-12	12:32:01	stare.18(18)	PACE_QuadLink_start 0 call4k	
2025-09-12	12:31:52	stare.18(18)	PACE_QuadLink_start 0 ltrig4k	
2025-09-12	12:31:48	stare.18(18)	PACE_QuadLink_start 0 call4k	
2025-09-12	12:31:45	stare.18(18)	PACE_QuadLink_start 0 timer4k	
2025-09-12	12:31:40	stare.18(18)	PACE_QuadLink_start 0 simul	
2025-09-12	12:31:35	stare.18(18)	PACE_QuadLink_start 0 simul 1	
2025-09-12	12:31:31	stare.18(18)	PACE_QuadLink_start 0 mon s 1	
2025-09-12	12:28:49	stare.18(18)	PACE_QuadLink_start 0 timerDat s 1	

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Console

- Based on Python console
- History (same as Slow Control one)
- Access to database objects
 - Card, CardSelection, Configuration, HistoryResult, MonitorPeriod, Parameter, ParameterGroup, ParameterSelection, Value, User
- Get and Set card parameter values
- Launch actions on cards
- Default card and action names
- Access to individual card functions with autocompletion (no history)

Examples:

```
> csl.launchActionCard(...)
> csl.history()
> csl.getParamValue(...)
> csl.setDefaultCard(0, 'A')
> csl.setDefaultAction(...)
> csl.quickLaunch()
> c=getCardCmd(0, 'A')
> c.help_PACE_init()
```

Interface with TopologyManager

- TM information about available STARE cards

```
{
  "connections": [
    {
      "id": "stare.0",
      "uri": "chtcp-2.0://10.81.17.221:10203?target=10.81.17.157:50001",
      "address_table": "file:///... /Stare_Utility/STARE.xml",
      "cluster": "ATC01",
      "position": 11,
      "crystal": "A", ...
      "host1": "10.10.1.6", "port1": 5001,
      "host2": "10.10.5.6", "port2": 5001
    },
    ...
  ]
}
```

controlhub IP

card IP

- Loaded at startup, reloaded manually

- Handle input data from several cards simultaneously
- Triggered point at same X coordinate
- Use correct signal values bit interpretation depending on monitor mode
- Version number of STARE functions

Thank you for your attention

