

Triggers and DAQ

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April 14, 2024

- Status (fully working aspects may not be mentioned)
 - Trigger & associated firmware
 - DAQ - Trigger issues
 - DAQ - CDAS issues
- Code availability
- Documentation

UUB Trigger & Other Firmware Status

Trigger	Firmware	Ref. code	Offline sim.	Field	<i>Implemented & deployed</i> <i>Development - not deployed</i>
Compat. SB	✓ = ✓ = ✓	✓	None serious		
Compat. ToT	✓ = ✓ = ✓	✓	None serious		
Compat. ToTD	≈ ✓ = ✓ = ✓	×	Noise bursts ¹		
Compat MoPS	≈ ✓ = ✓ = ✓	×	Noise bursts ¹		
UMD	✓ = ✓ = ✓				
RD	✓	✓	Noise ²		
Direct Light	✓ = ✓ = ✓	N/A	Tuning with sims & randoms		
ElectroMagnetic	✓ = ✓ = ✓	N/A	Tuning with sims & randoms		
Baseline calc.	≈ ✓	N/A	N/A	≈ ✓	Sometimes returns bad values
SSD	✓ = ✓ = ✓	≈ ✓	Baseline oscillations		

¹Trace cleaning testing underway; possible CDAS modifications to alleviate

²Work to try to handle bursts in progress; shift of readout time in FPGA but not yet in field

DAQ/Trigger Issues

Code is in large part working well. Only issues are mentioned here.

Item	Test	Field	Moderate issue
			More serious issue
Compatibility triggers	✓	✓	Some MoPS & ToTD parameters not correct in field; error in multiplicity when only 2 working PMTs
Baselines	✓	✓	Baseline calculation from traces in test ³
SPMT calibration	✓	✓	
LPMT VEM _{pk} calibrations	✓	≈ ✓	Filtered signals for trigger settings ⁴
WCD calibration histograms	≈ ✓	≈ ✓	3 fold UUB vs 1 fold
SSD calibration	✓	no	Development underway
Stability	×	≈ ✓	DAQ stops ≈ once per hour

³FPGA baseline calculation is at trigger point & subject to sag, also sometimes incorrect values returned.

⁴See baseline comments

DAQ/CDAS Issues

Item	Test	Field	<i>Moderate issue</i> <i>More serious issue</i>
Leeds radio	✓	≈ ✓	Issues joining short packets
Slow control monitoring	✓	≈ ✓	Some conversions to be updated in CDAS
RD Monitoring	≈ ✓	≈ ✓	Implemented in DAQ but not CDAS
Other monitoring	✓	✓	
lk	✓	N/A	Delayed messages ≈20 seconds
Campus OS	✓	N/A	OS version beyond end of life
Pm	✓	N/A	Pm sometimes gets stuck
T2 Trigger bits	≈ ✓	≈ ✓	Need to modify for new triggers
LPMT VEM _{charge}	✓	≈ ✓	Fixed online VEM _{charge} not enabled in field

See <https://www.auger.unam.mx/AugerWiki/CDAS-DAQ> for additional information.

Code Availability

- All code is stored in the Auger KIT GitLab at `git@gitlab.iap.kit.edu:auger-observatory/sde/uub`

Item	Location	Comments
Trigger code	<code>~/firmware/trigger</code>	
FPGA bitstream releases	<code>~/firmware/packaged_releases</code>	Contains pre-built trigger bitstreams and important header files for the UUB
Slow Control	<code>~/firmware/slow_control</code>	
DAQ	<code>~/daq</code>	
CDAS	<code>~/../CDAS/daq</code>	
UUB operating system	<code>~/uub-integration</code>	Contains pre-built system for the UUB
RD	<code>~/rd</code>	
Assorted Linux apps	<code>~/linux_apps</code>	Various useful applications
Other	<code>~/uboot, ~/petalinux</code>	Code needed for building the Auger linux

- The documentation consists of
 - ① README files located in the directory trees
 - ② Comments in the source code
 - ③ Specific more detailed documentation files described in the table below
 - ① The first 4 documents are in the Auger KIT GitLab at git@gitlab.iap.kit.edu:auger-observatory/sde/uub/firmware/trigger/docs/
 - ② The 5th document is in the Auger KIT GitLab at git@gitlab.iap.kit.edu:auger-observatory/sde/uub/uub-integration/

Description	File name
UMD interface specification	AMIGA_T3.pdf
Time tagging module specification	Time_Tagging_Module_Specification_SDE_Upgrade_Version_3.pdf
The register interface for the triggers	SDE_PLD_Firmware_Specs.pdf
A short guide to rebuilding the firmware	building_firmware.pdf
A detailed manual on installing or recovering the Auger specific Linux	uub_manual_2_4.pdf