

HPS 2019 run DAQ status and performance

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HPS DAQ & Trigger Requirements

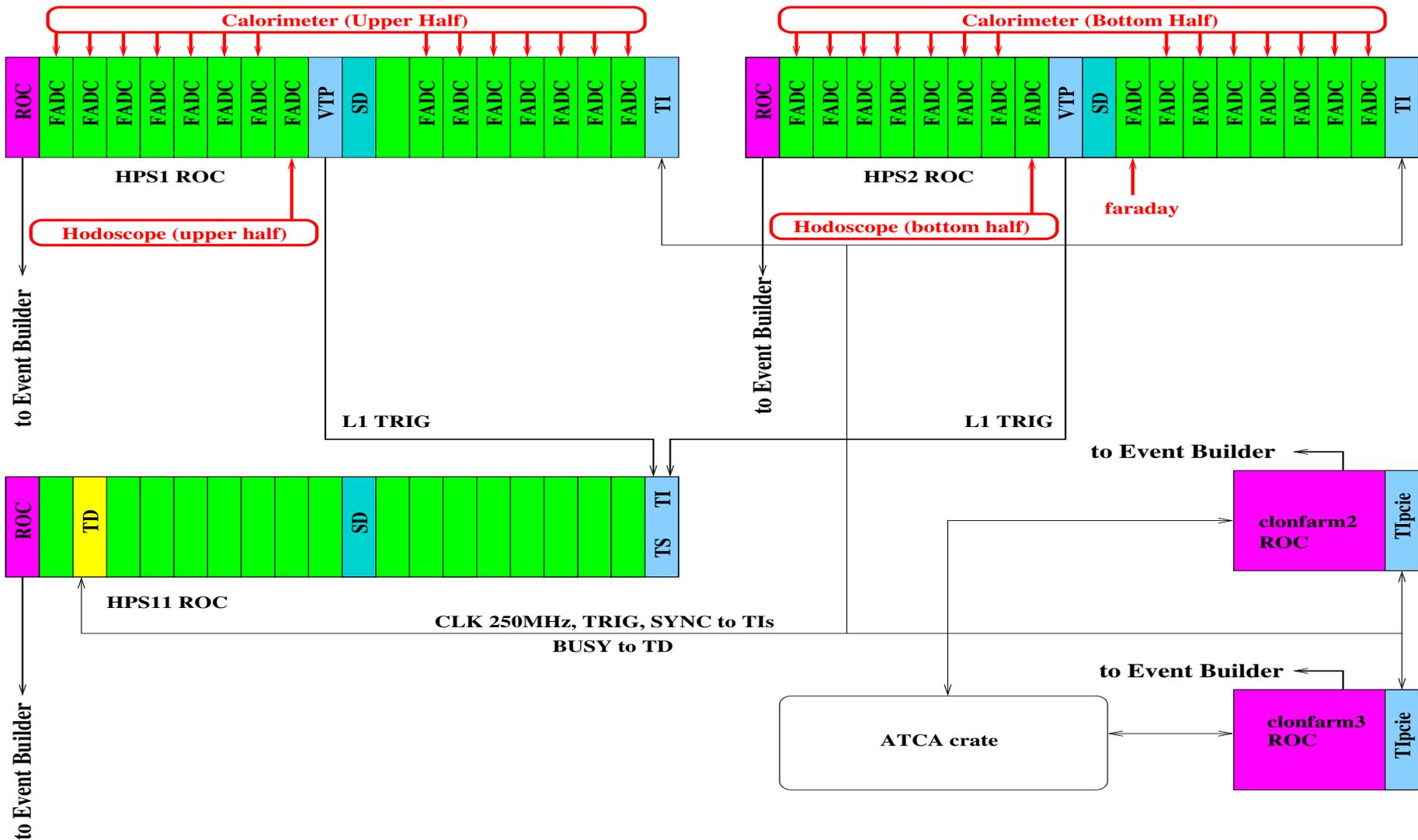
20kHz event rate

100MB/s data rate

>95% livetime

Achieved event rate 27kHz

HPS DAQ/Trigger Front-End Electronics



3 VXS crates, 2 servers, 1 ATCA crate, 7 Readout Controllers

HPS DAQ Status

- **Calorimeter Readout: 442 channels of 12bit 250MHz Flash ADCs**
- **Hodoscope Readout: 32 channels of 12bit 250MHz Flash ADCs**
- **CPU/VTP/TS/SD/TD trigger and signal distribution boards**
- **3 VXS crates**
- **2 servers with Tipcie cards for SVT readout**
- **SVT readout (front-end and ATCA blades)**

Back-end computing and software is CLAS12 facility: network, computing, DAQ software, data monitoring, messaging system, realtime database

HPS runcontrol

File Preference
RunControl

Run control Buttons

Control

Cancel

Reset

Disconnect

Transition

End Run

Static parameters

Database	Session	Configuration	rcServer
hpsrun	clashps	PROD66	clondaq3.jlab.org

Session status

Data file name
/data/stage_in/hps

Config file name
/usr/class2/release/1.4.0/parms/trigger/HPS/Run2019/hps_v6.cnf

Run status

Run number	Run status
9925	active
Start time	End time
Jul 21 22:03:25	

Limits

Events	KBytes
0	0

Run progress

Events this run: 2571742 Read From: ER66

Rates	Events/S	Rate (KB/S)
Integrated	10671.1286	32764.0580
Differential	11360.0000	110795.7280

```

INFO : clonfarm2 prestart.....
INFO : hps2vtp sys 0, mask 9
INFO : hps1vtp sys 0, mask 9
INFO : clonfarm2 sys 0, mask 9
INFO : hps2 sys 0, mask 9
INFO : hps1 sys 0, mask 9
INFO : hps11 prestart.....
INFO : hps11 sys 0, mask 9
INFO : transition Prestart succeeded !
INFO : ET66 go.....
INFO : ER66 go.....
INFO : EB66 go.....
INFO : hps2 go.....
INFO : hps1 go.....
INFO : hps2vtp go.....
INFO : hps1vtp go.....
INFO : clonfarm3 go.....
INFO : clonfarm2 go.....
INFO : hps11 go.....
INFO : transition Go succeeded !
                
```

Help
Statistics
Options
godaedit
dbedit
Files

Event Rate (Hz)

2 Sec. update

Data Rate (KB/Sec)

2 Sec. update

Event Size (Bytes)

2 Sec. update

Livetime (percent)

2 Sec. update

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Page 5

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HPS trigger

Run# 9882		HPS Triggers			07/20/2019 15:35:27	
Beam Currents (nA)		2C21: 51.28	FCup: 52.56	Livetime (%): 98.80		
#	Description	Raw Rate (Hz)	Prescaled Rate (Hz)	%	Prescale	
00	Single-0 Top	331965.0	0.0	0.0	0	
01	Single-1 Top	7695.0	0.0	0.0	0	
02	Single-2 Top	1725.0	1733.0	45.7	1	
03	Single-3 Top	1053.0	0.0	0.0	0	
04	Single-0 Bottom	3591944.0	0.0	0.0	0	
05	Single-1 Bottom	11395.0	0.0	0.0	0	
06	Single-2 Bottom	1896.0	1958.0	51.6	1	
07	Single-3 Bottom	1154.0	0.0	0.0	0	
08	Pair-0	2425.0	0.0	0.0	0	
09	Pair-1	12920.0	0.0	0.0	0	
10	Pair-2	10115.0	0.0	0.0	0	
11	Pair-3	2170.0	0.0	0.0	0	
12	LED	0.0	0.0	0.0	0	
13	Cosmic	0.0	0.0	0.0	0	
14	Hodoscope	792123.0	0.0	0.0	0	
15	Pulser	100.0	101.0	2.7	1	
16	Cluster Multiplicity-0	21641.0	0.0	0.0	0	
17	Cluster Multiplicity-1	697.0	0.0	0.0	0	
18	FEE Top	8297.0	0.0	0.0	0	
19	FEE Bottom	9159.0	0.0	0.0	0	
		Sum:	3792.00			
Front Panel (Hz):		Faraday Cup	0.0	N/A	0.0	
FADC Data Rate (MB/s):		hps1	3.19	hps2	4.98	

Main development for 2019 run

New trigger (Ben Raydo)

FADC firmware was upgraded to implement correct BUSY propagation, allowing to run above 30kHz

Tlpcie boards and Linux servers as ROCs: serious development was conducted, including some fixes during the run (clock rewiring, fiber contact losses); new board revision under development

SVT readout was redesigned to be used with Tlpci boards; in a future more work will be needed to make it more stable, currently all ATCA electronics back to SLAC

Software: new libraries for SVT and some CODA fixes; runtime database

DAQ Status and Performance

All planned work on JLAB side for DAQ and trigger was complete in time, including new trigger hardware and firmware, ECAL and Hodoscope readout and corresponding software, servers with Tlpci-based readout for SVT

Integration with SVT DAQ was not done in time, work was complete during first few weeks of the run, should do better planning in future

After SVT integration was complete, DAQ performed more or less as expected, with some reliability issues; SVT readout performance has a room for improvements (DAQ can run $>30\text{kHz}$ without SVT)

HPS DAQ and Trigger (except SVT part) will stay operational until next run; SVT part will need some work