
DAQ Status for HPS run

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HPS DAQ & Trigger Requirements

20kHz event rate

100MB/s data rate

>95% livetime

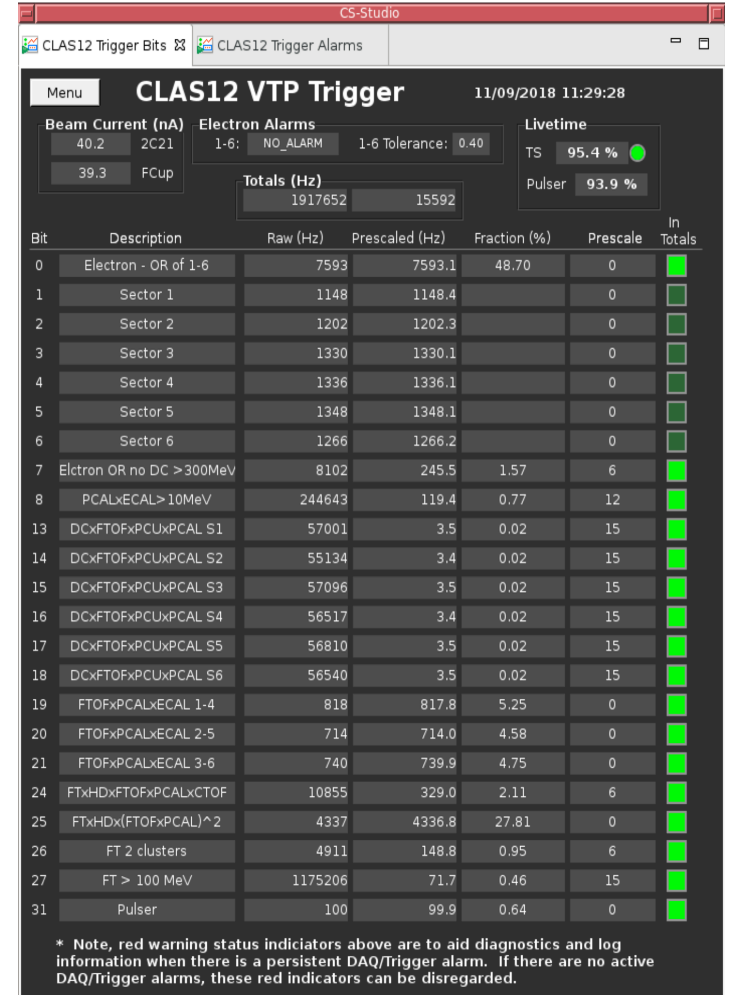
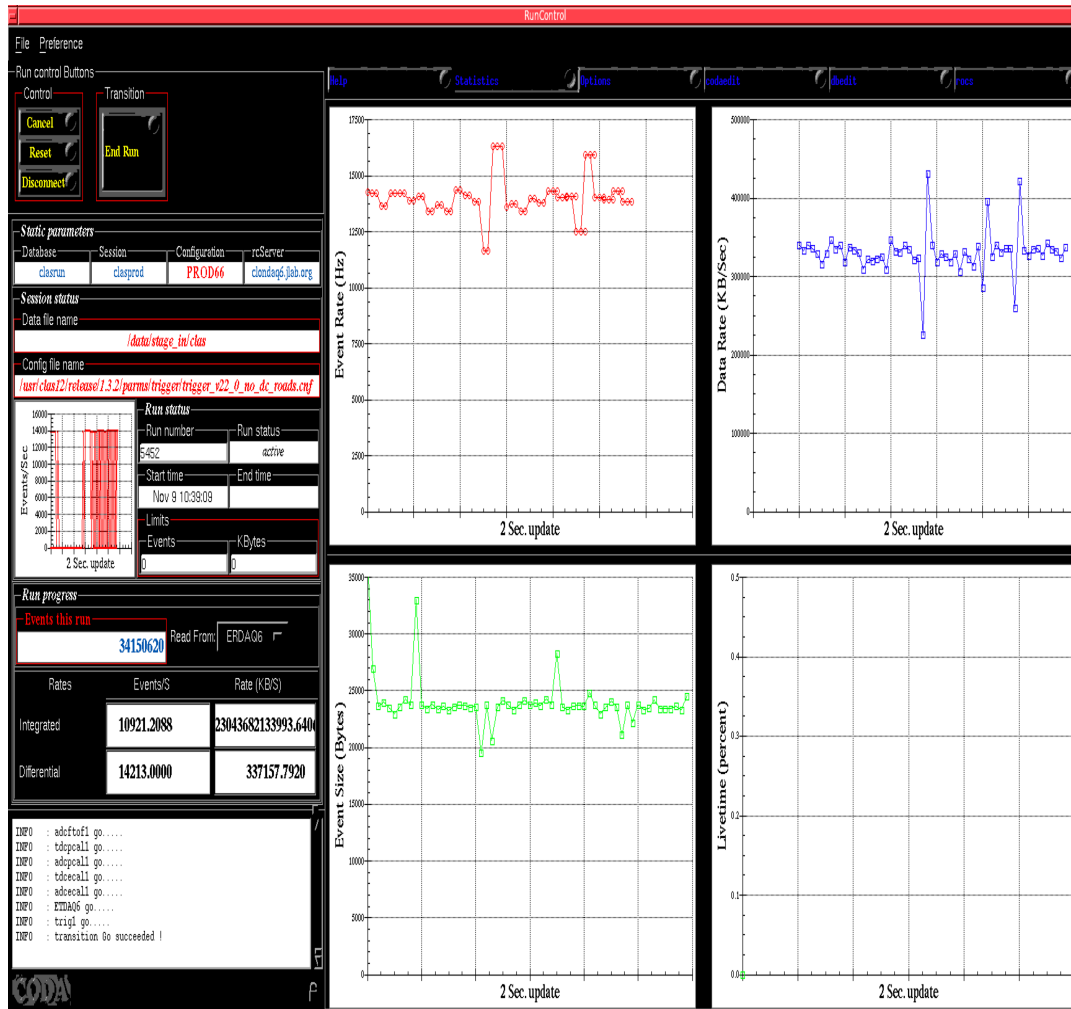
HPS experiment will be using CLAS12
DAQ & Trigger Facility at JLAB;
achieved CLAS12 performance:

20kHz event rate

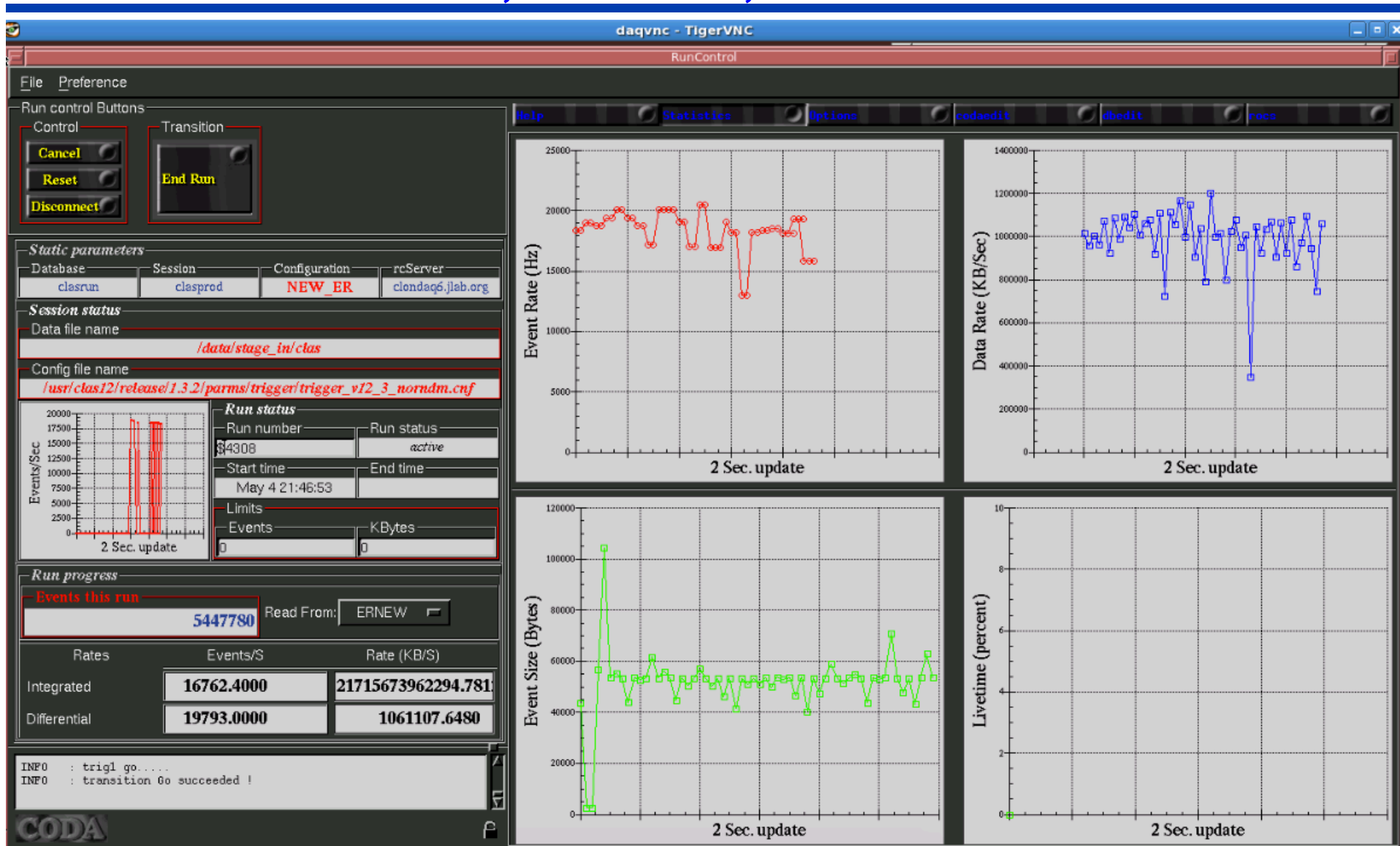
600MB/s data rate

>95% livetime

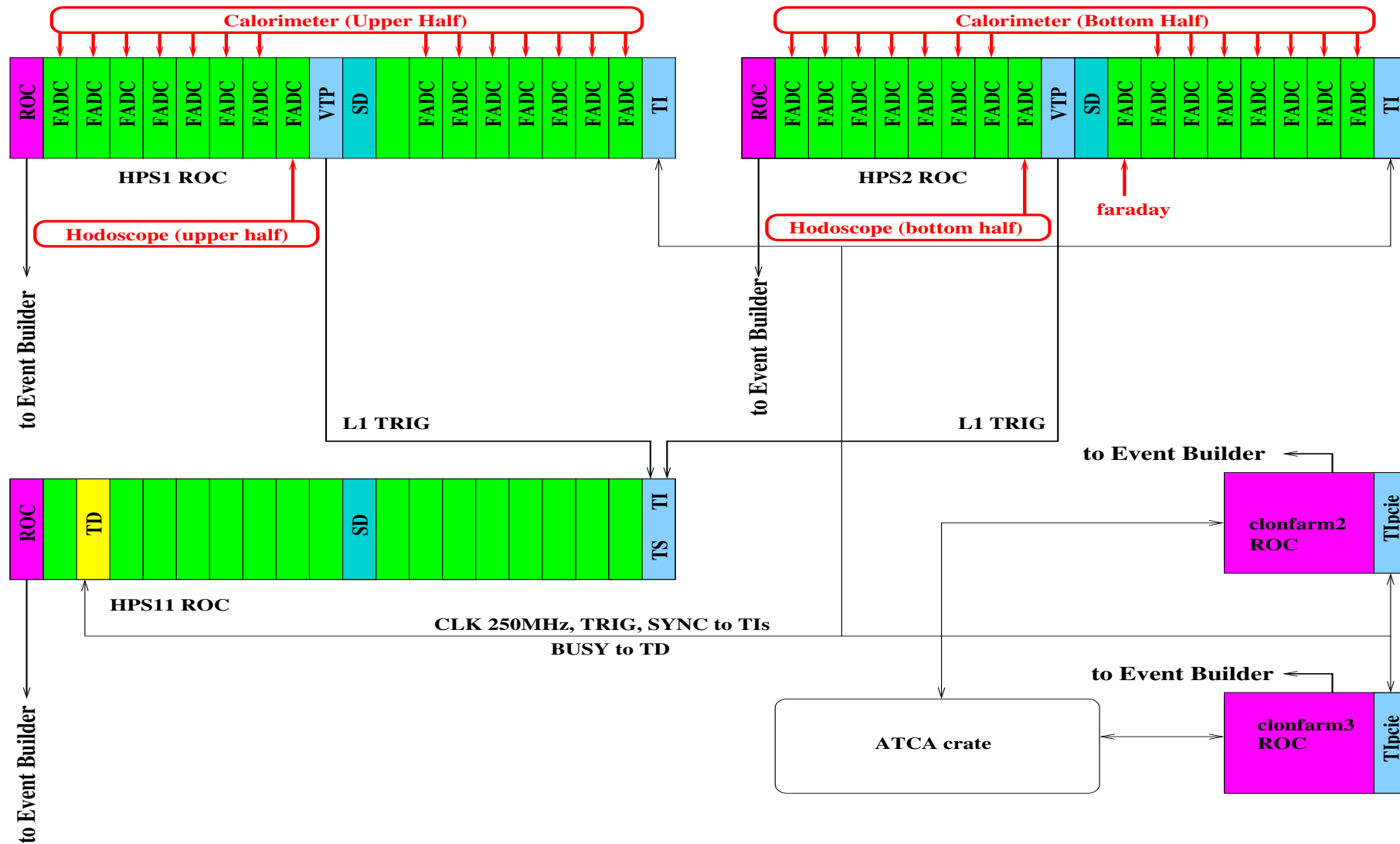
Typical CLAS12 DAQ performance: 40nA beam – 14kHz, 330MB/s, 95% livetime



CLAS12 50nA beam DAQ test (some prescales removed) – 20kHz, 1000MB/s, 88% livetime

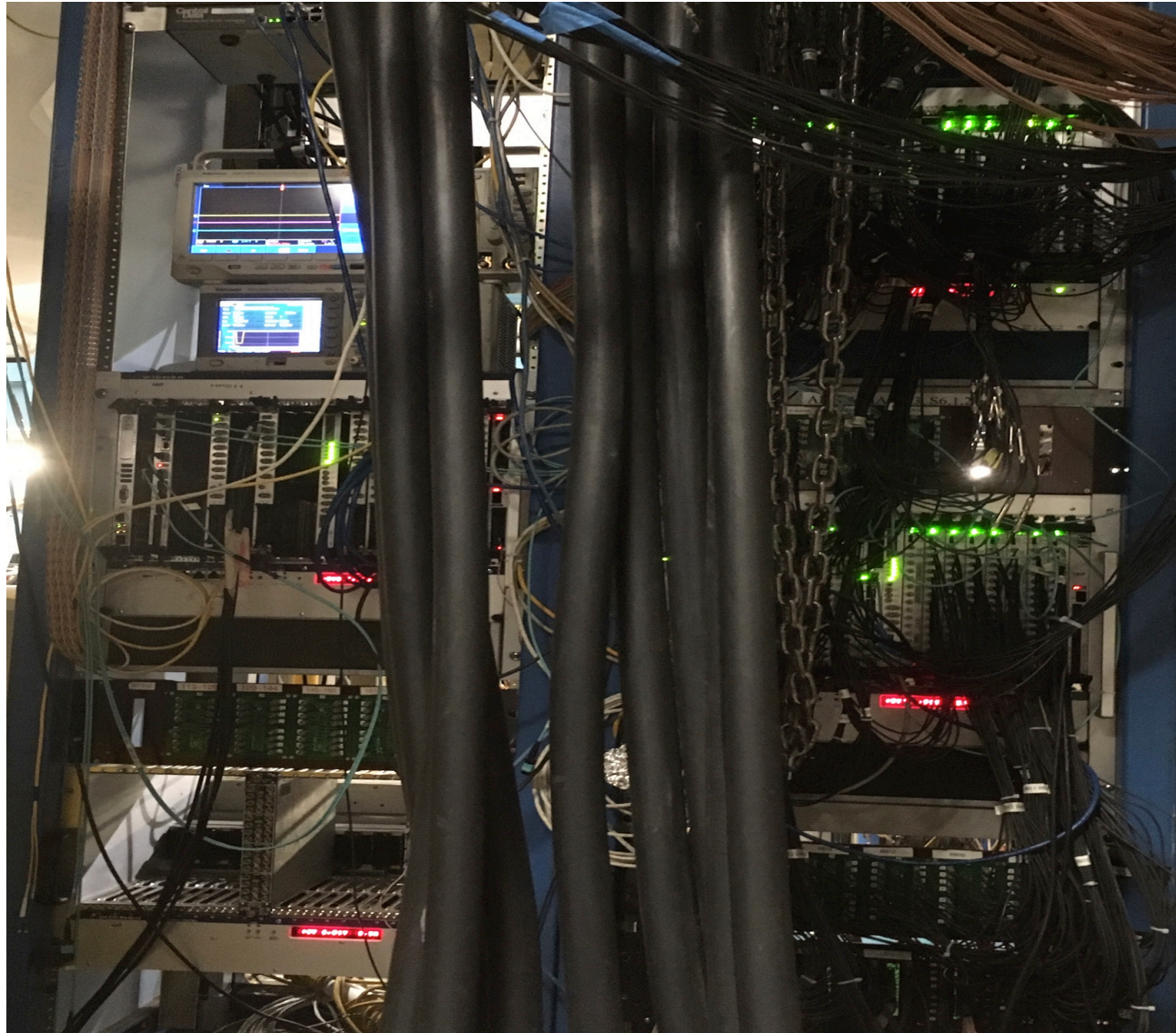


HPS DAQ/Trigger Front-End Electronics



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

DAQ/Trigger Electronics



DAQ/Trigger Electronics



DAQ/Trigger Electronics



Two main developments since Jan 2019

New trigger – Ben Raydo’s talk

Tlpcie boards and Linux servers as ROCs:

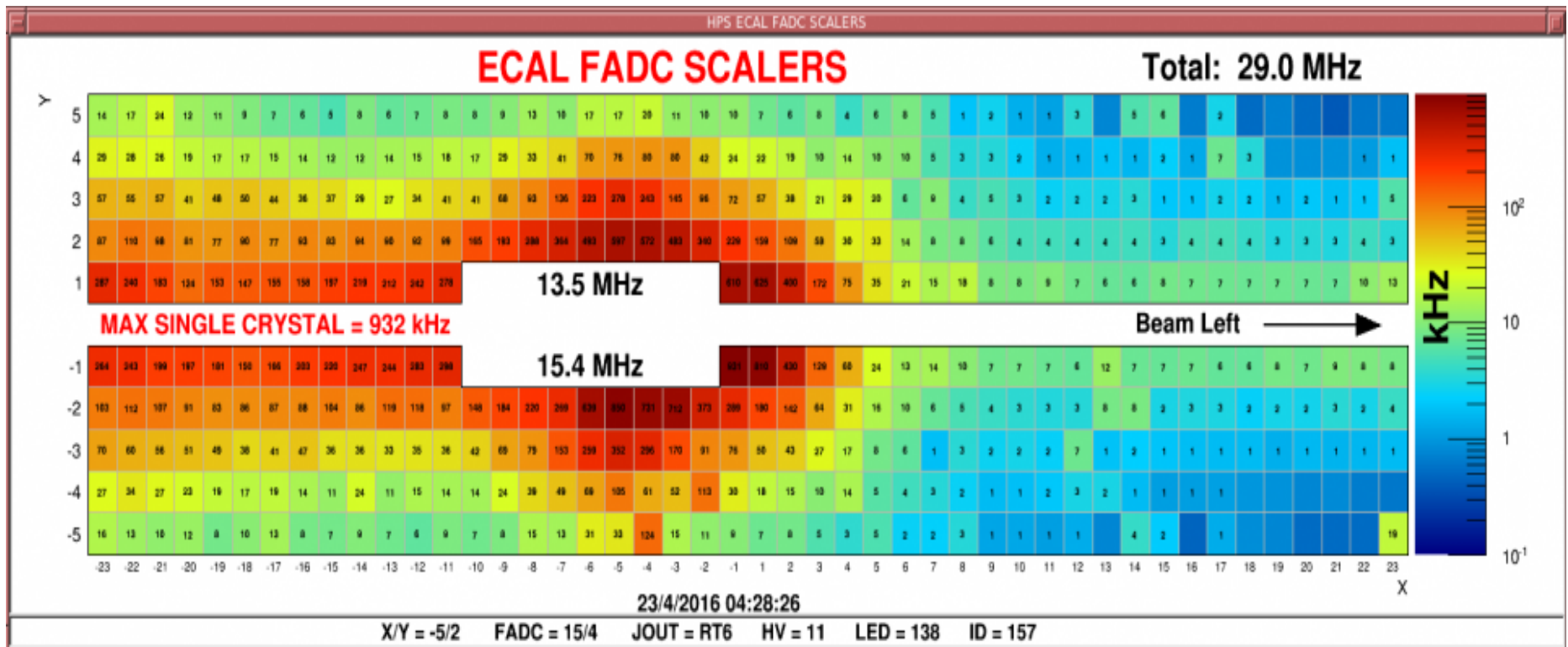
- **Tlpcie boards were used before, but we found it compatible with clondaq6 only**
- **Several weeks investigation lead to firmware bug fix and DELL servers compatibility list (R*30 and R*40 servers)**
- **Test setup (VME crate, VME CPU, VME TI, Tlpcie boards) was shipped to SLAC, assembled and commissioned**
- **SLAC account was established for Sergey, CODA was installed on test setup, allowing to develop SVT readout in SLAC**

DAQ software updates

- HPS will be using new release 1.4
- Recent GCC version 8.3 on SLAC request
- Several bugs fixed in CODA, 'mysql server gone away' problem addressed
- Ryan Herbst is installing needed libraries, when finished it will be systematized and included into standard installation procedures, currently may see 'not found libs' on some machines

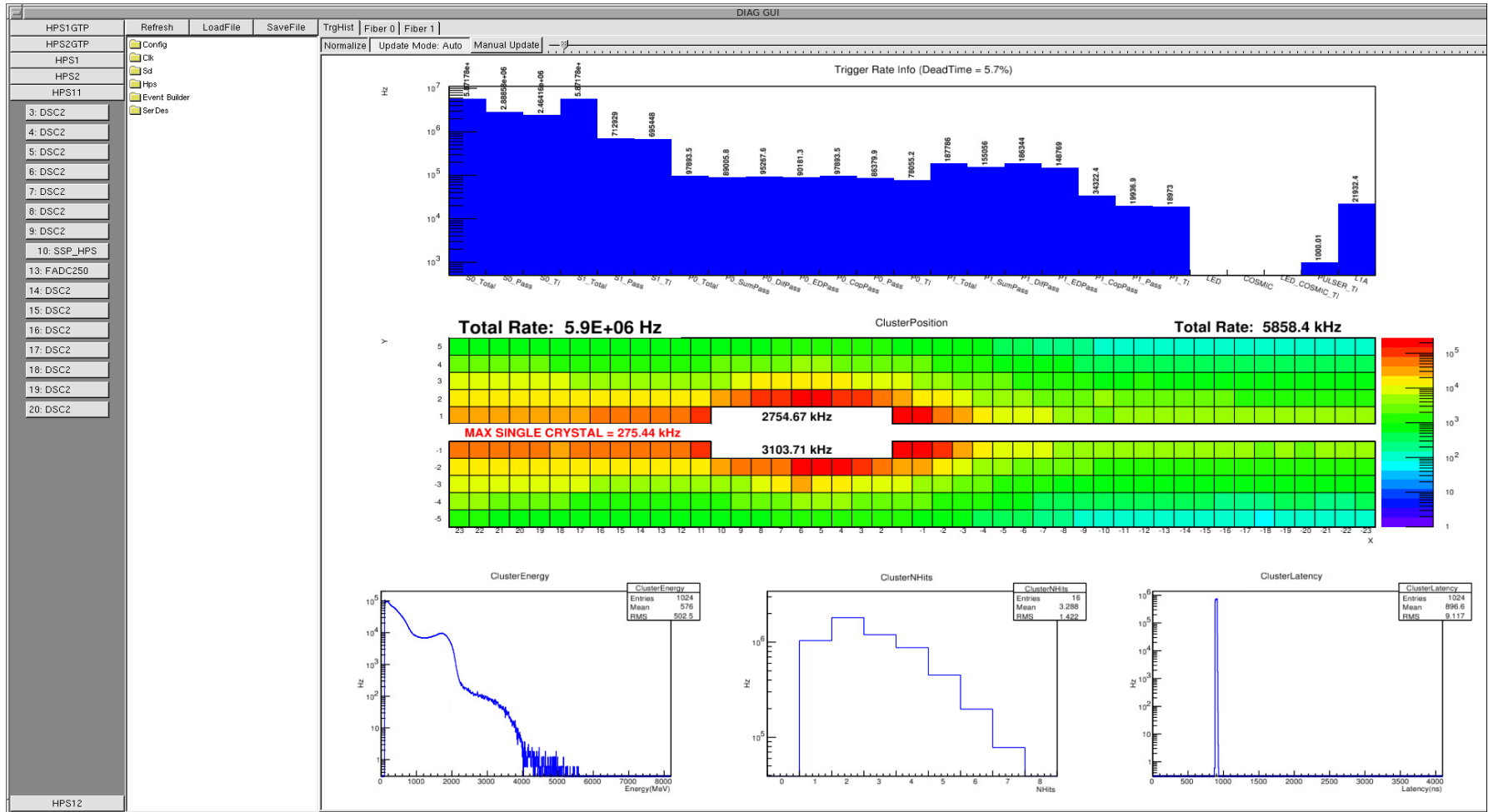
Monitoring examples

- ECAL FADC channel scalers
- Similar monitoring will be provided for hodoscope



Monitoring examples

- Trigger bits and term cut rates
- Trigger cluster positions, energy, number of hits



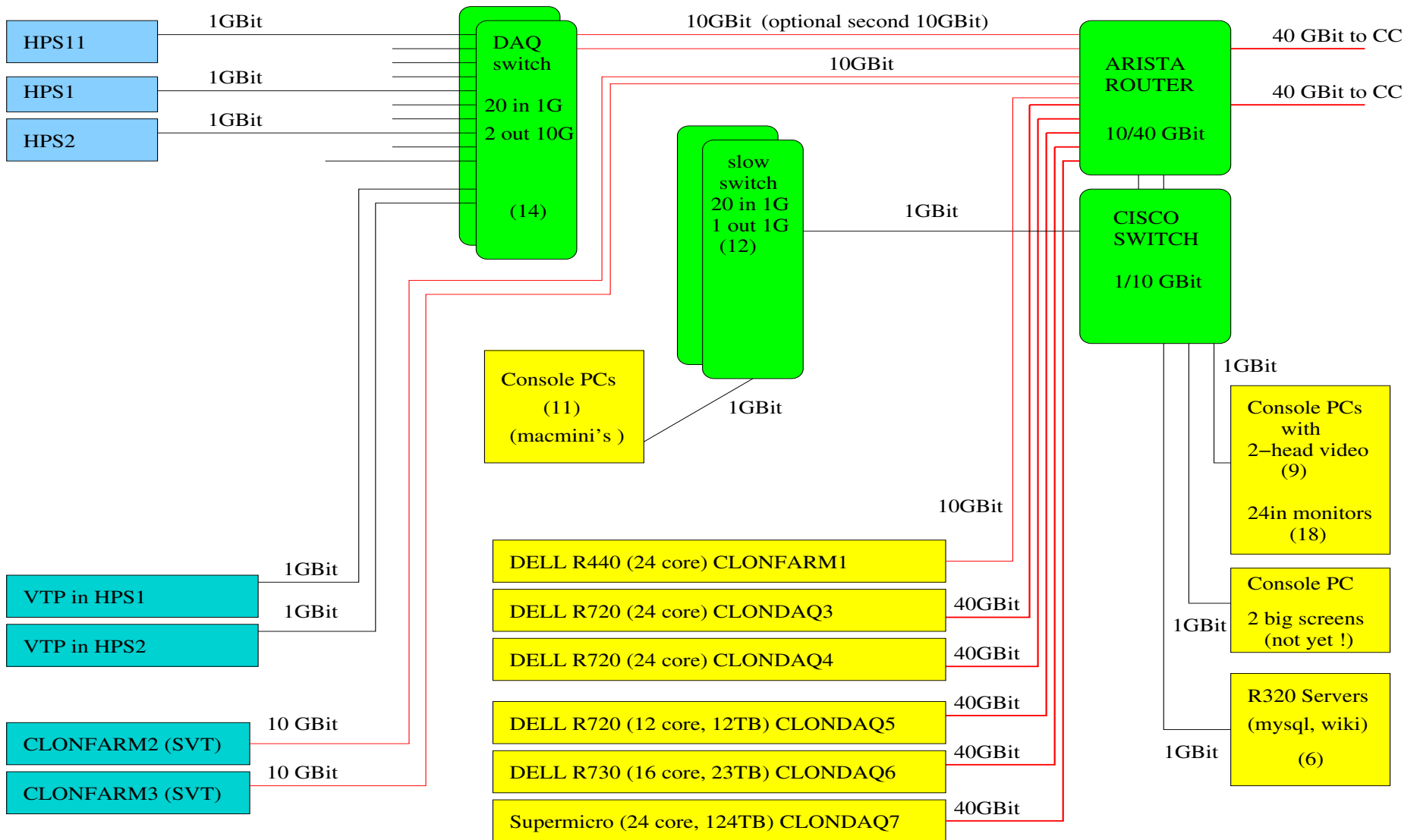
HPS DAQ Status

All front-end electronics installed:

- **Calorimeter Readout: 442 channels of 12bit 250MHz Flash ADCs**
- **Hodoscope Readout: 32 channels of 12bit 250MHz Flash ADCs (in hodoscope test setup)**
- **CPU/VTP/TS/SD/TD trigger and signal distribution boards**
- **3 VXS crates**
- **2 servers with Tipcie cards for SVT readout**
- **SVT integration: to be finished**
- **Have spares for all electronics in use**

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

DAQ network and computing



Data recording and online processing

Three DAQ servers (where event builder / event transfer / event recorder processes are running) are available, one of them will be used, others will be hot swap

Cronjobs are running on all three, will move data files to tape after 30 minutes of update time, after moving have to be recovered from computer center cache or tape

Five servers can be used for online data processing from ET system (100 cores/200 threads total); there is no special facility to run from data files online

Runtime database is available, have to be customized for HPS

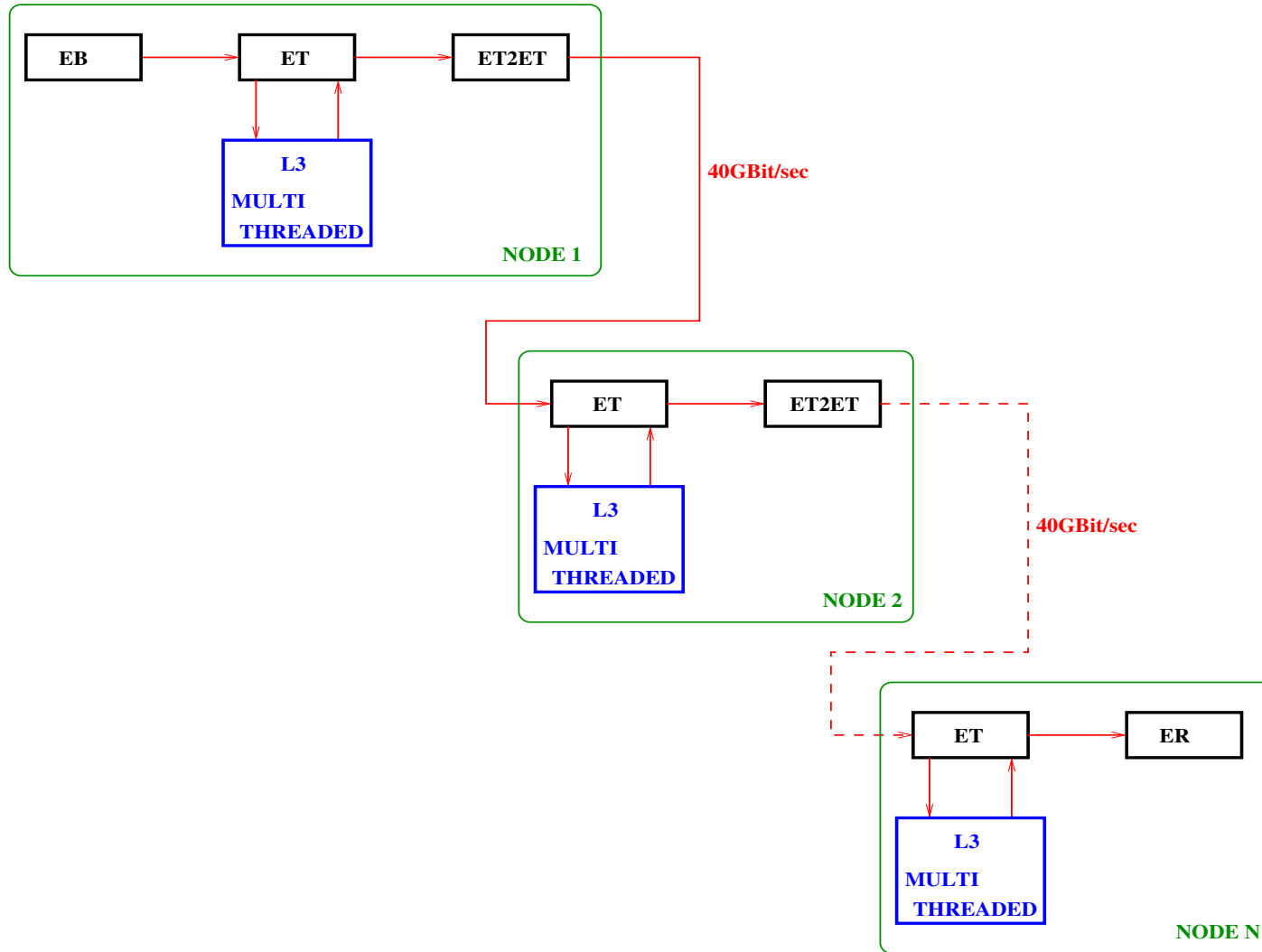
CLAS12 Level3 Component

The screenshot shows the net_Editor application window. The main interface displays a network diagram with components and their connections. A dialog box titled "Component Attributes" is open, showing the following fields:

- Name: L3DAQ6
- Ethernet Host: clondaq6
- Id Number: 922
- Booting String: coda_l3
- Chunk size: 100

The dialog box has "Ok", "Dismiss", and "Scripts..." buttons. The main window shows a network diagram with components like EBDQA3, EBDQA4, EBDQA5, EBDQA6, EBFC, and various ROC and vtp components. The status bar at the bottom indicates "Database clasrun" and "Run Type PROD66".

CLAS12 Level3 Data Path



Conclusion

All planned work on JLAB side for DAQ and trigger is complete, including new trigger hardware and firmware, ECAL and Hodoscope readout and corresponding software

All DAQ and trigger hardware is installed and operational, except SVT part

Cosmic runs for ECAL confirms that DAQ and Trigger systems are ready

After integration with SVT DAQ, full DAQ test will be conducted, **some more software development is expected on SVT side**