DAQ System for ECal Status update

Dasuni Adikaram

Jefferson Lab

February 18, 2015

SBS collaboration meeting

Electron Calorimeter for G_E^p

- **G_E^p** - Proton form factor ratio measurement up to ~12 GeV^2 using recoil polarization method

- Trigger – Coincidence detection of elastically scattered electron and the recoil proton
  Proton arm trigger rate ~ 1.5 MHz
  Electron arm trigger rate ~ 60 KHz
  Coincidence trigger rate ~5 kHz

- ∼**25% dead time at 5 kHz**

- **Need to reduce Fastbus dead time**

Deadtime fraction vs Trigger Rate (Hz)

HRS Data compared to SBS test stand

HRS data

model

Expected for 3-DAQ test
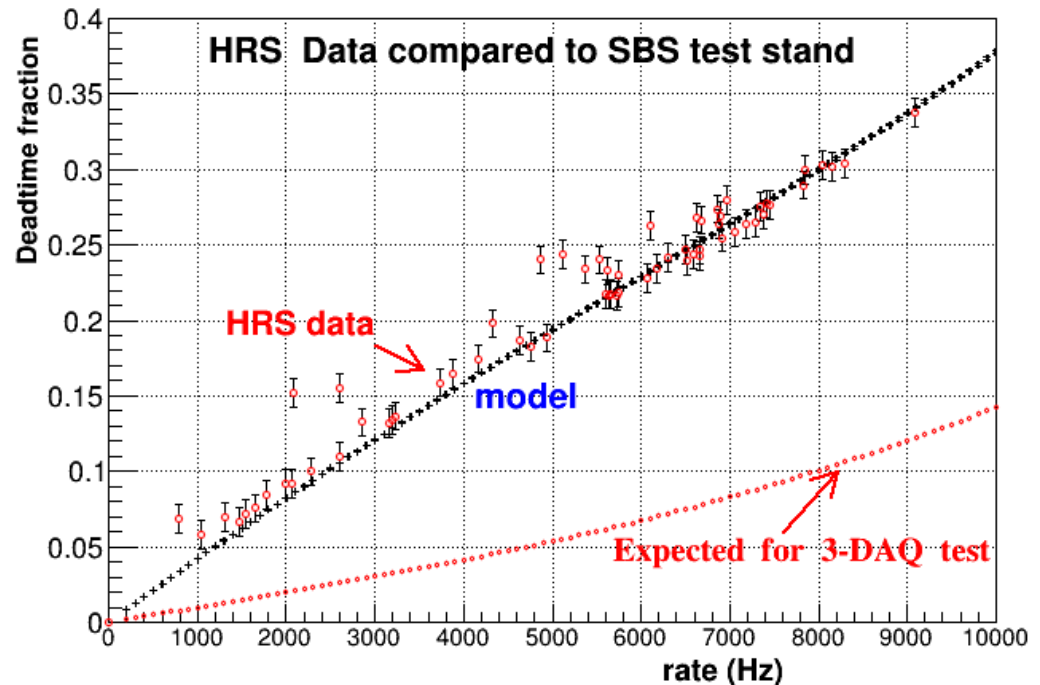
Test setup for module flipping
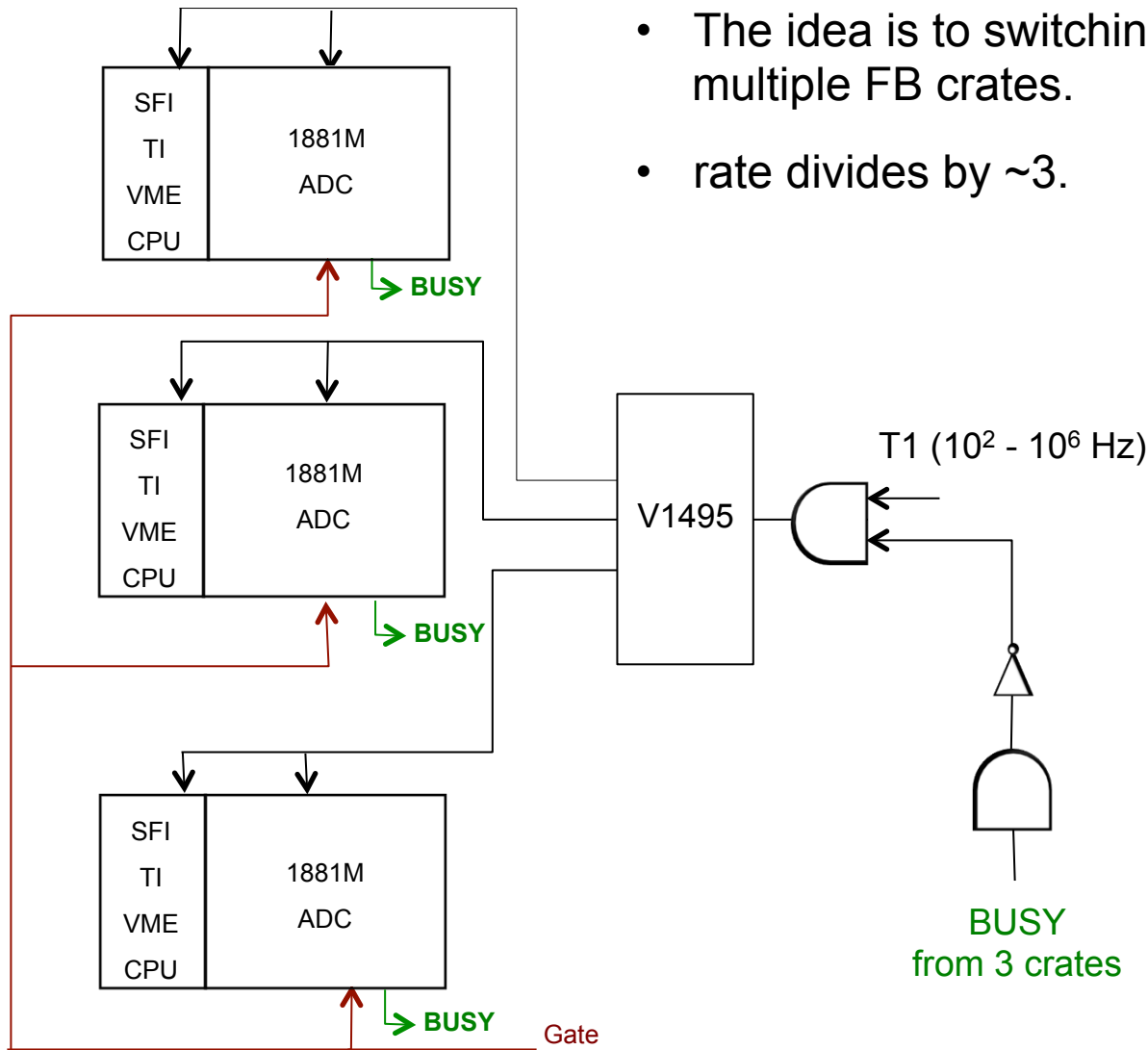
- The idea is to switching trigger between multiple FB crates.

- rate divides by ~3.

Timeline

	2014			2015			
	October	November	December	January	February	March	April
	▬▬▬						

- Joined the project.
- Built 2 PCs for SBS ECal DAQ setup
  - sbs1.jlab.org and sbs2.jlab.org
  - Dell model Optiplex 755 RHEL 6.3 CUE level 2
- CODA from /site and tested.
- Received new TI modules.
- Imported booting script examples from /yer122.
- Imported crl code examples from /home/vx/jessica/.
- Built VHDL code for CAEN 1495 (Bob)
  - Tested its functionality for low and high rates (up to ~200KHz)

Timeline

2014			2015			
October	November	December	January	February	March	April
▬						
	▬▬▬▬▬					

- 3 FB crates + 3 SFIs
- 3 single board computers: MVME 2306 (2) + MVME 5100 (1)
- Tested modules and SFIs
- Built 3 configurations for 3 FB crates.
- Updated the firmware on new TI modules.
- Tested the 3 FB crates with few TDCs in each.
  - Learned how to read the output data files and decode them.
- Added multi-block readout to crl codes and tested.

Timeline

2014			2015			
October	November	December	January	February	March	April
▬						
	▬▬▬▬▬					
			▬▬▬▬			

- Received ADCs.
- Cleaned, tested each ADC and added to 3 FB crates.
- Currently, we have 2 FB crates with 7 ADCs in each and other FB crate with 6 ADCs.
- Tested with ~2 - 200KHz pulser.
- Checked the busy signal (CIP- conversion in progress) from front panel and via FB signal distribution module.

To Do List

	2014			2015			
October	November	December	January	February	March	April
▬						
	▬▬▬▬					
			▬▬▬			
					▬▬▬▬	

To do:

- Test each FB crates with random trigger ($10^2 - 10^6$ KHz).

- Build a configuration to distribute the trigger to 2 FB crates, Test its functionality/stability with random trigger.

- Expand the concept for 3 FB crates.

- Measure the effects of trigger rate on dead time (dead time vs rate).

Thanks Robert Michaels, Mark Jones and Alexandre Camsonne for guidance and support.