DHCAL Back-End

Eric Hazen,
John Butler, Shouxiang Wu

Boston University
Readout Overview

VME Crate (VME64)

Data Collectors

Trigger Controller

Detector Plane

Front-end Link:
- 10Mhz clock
- Triggers
- Test pulse
- Slow control
- Hit Data

Clock

Triggers
Discussion Items

- Are Front-End hits in Time Order?
  - Need to settle this before detailed design of DCOL can start!

- Data/Super Concentrator should send one packet each timestamp wrap

- Permissible trigger delay?
  - Trigger from scintillator or ECAL CRC
    - Receive by trigger module, timestamp
    - Transmit to DCOL
    - Transmit to Data Concentrator
    - Transmit to Front-end board
    - Transmit to DCAL chip
  - Each stage has a delay... what total can be tolerated by DCAL chip?
Discussion Items (2)

- How to handle front-end links detector end
  - Daughter-board designed by BU
  - Built-in circuit designed by ANL to BU specs
Data Collector Status

- **Spec online**
  - [http://edf.bu.edu/Proj/DHCAL](http://edf.bu.edu/Proj/DHCAL)

- **Detailed design started**
  - Spartan-3e front-ends
  - Spartan-3 event builder
  - SDRAM buffer

- **T.B.D.**
  - Front-end link details
  - Buffer size needed
Trigger Module Specs

• Inputs:
  - 10MHz system clock
  - External trigger (from logic or ECAL)
  - Logic inputs for coincidence trigger
  - Test pulse

• Outputs
  - (12) Encoded trigger/clock to Data Collectors

• LEDs for power, VME activity, triggers, clock present, other general purpose
Trigger Module Specs (2)

- **Functionality:**
  - Timestamp each trigger, store trigger time and event number in FIFO
  - **Trigger modes:**
    - External
    - Coincidence logic using multiple (i.e. PMT) inputs
    - Periodic (timer)
    - VME (software forced)
  - **VME Interface**
    - Access to trigger FIFO
    - Current status (current event #, trigger counters, etc)
Candidate Hardware

- CAEN V1495 General-Purpose VME Module

This thing is in production
One unit could be obtained for evaluation quickly
Price: $3400 (cheaper than custom design)
Action Items

- Settle hardware discussion items today
- Obtain a CAEN module and assign someone the task of programming it to perform simple trigger tasks (or make some other plan for trigger)
- Get started on DAQ software
  - Understand CALICE DAQ requirements
  - Write HAL address tables (DCOL, trigger)
  - Write C++ classes to control modules
  - Write “toy” DAQ for testing