Opto-Link R&D Status

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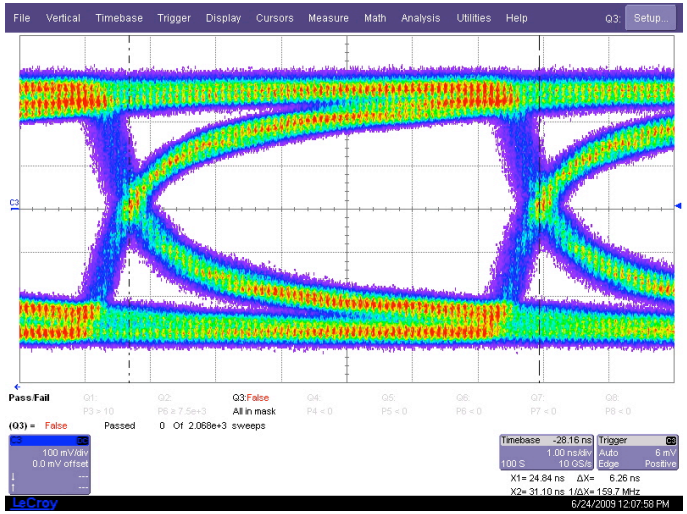
Outline

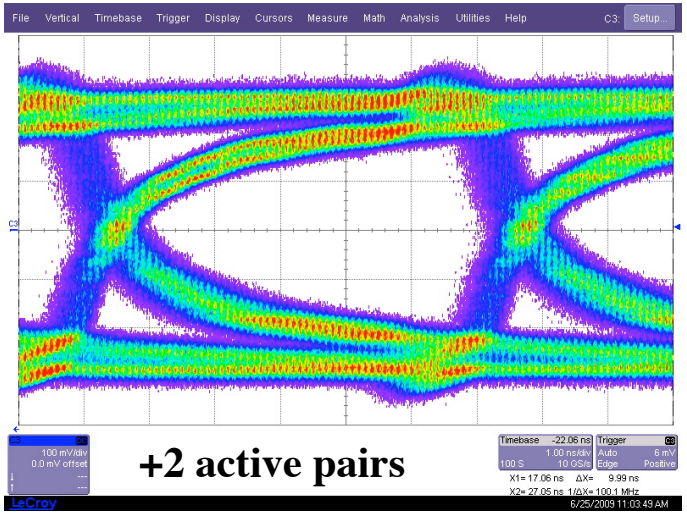
- Opto-boards at 160 Mb/s with skinny wires
- VCSEL/PIN results/recommendation
- Redundancy???
- Summary

Opto-board Test

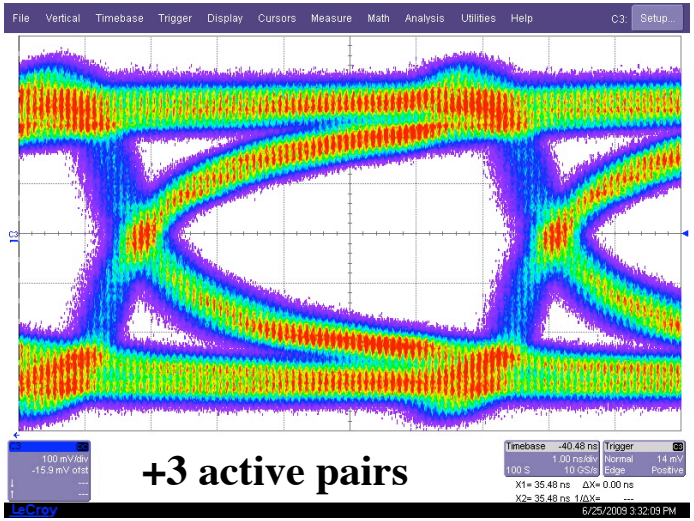
- opto-board:
  - two BeO opto-packs with AOC VCSEL array
  - one PCB opto-pack with Taiwan PIN array
  - VDC:
    - receive 160 Mb/s signal from commercial LVDS driver
- wires:
  - 30 AWG copper clad aluminum
  - 4 turns per inch (2.5 cm)
  - polyimide insulation (quad)
  - 8 pairs/bundle

Electrical Eye Diagrams

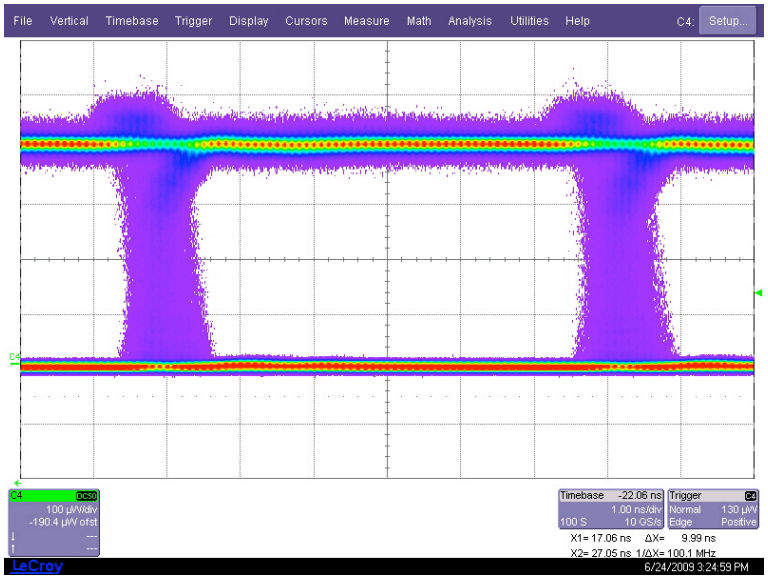




- LVDS signal after 6 m of wires looks adequate

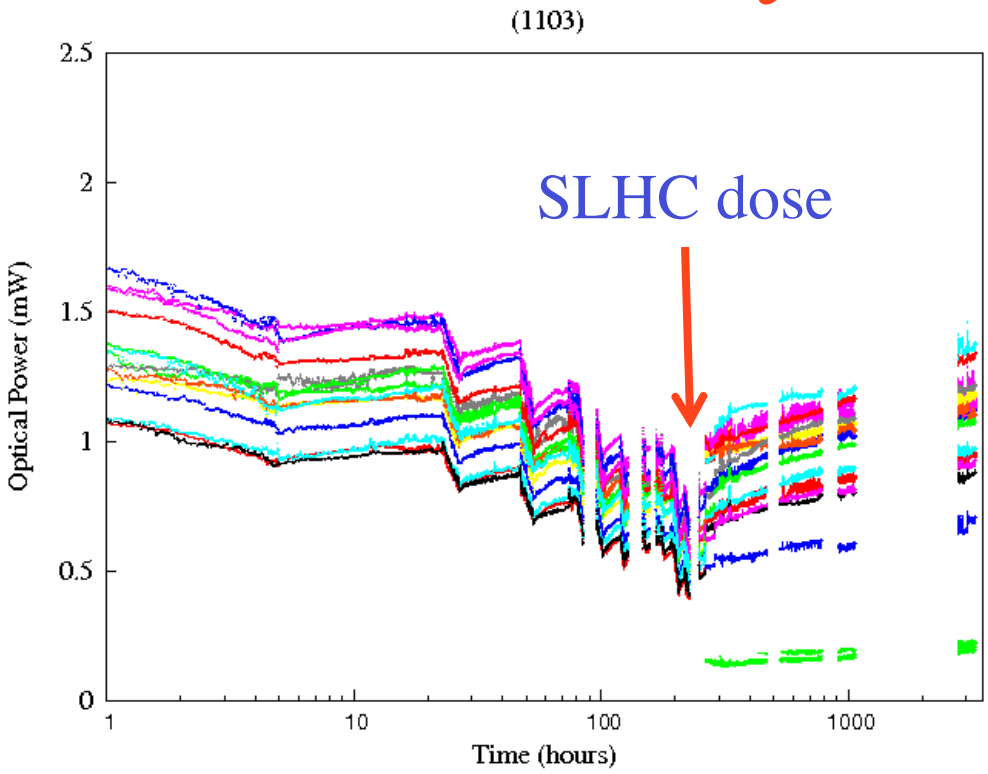


Optical Eye Diagrams



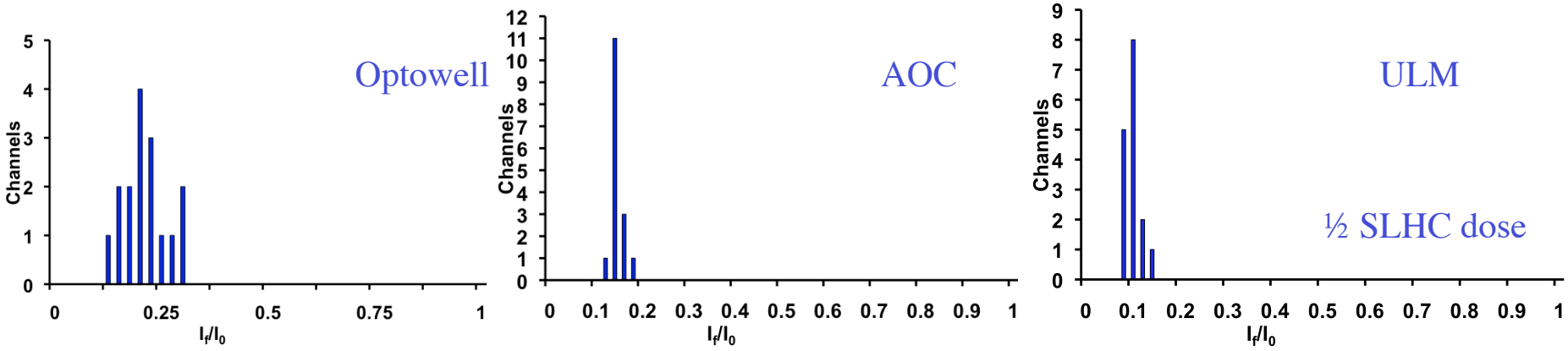
- 160 Mb/s optical signal produced by VDC looks adequate
- Plan to study eye diagram/bit error rate on opto-boards with 7 active VDC/DORIC signals received/transmitted through small wires

VCSEL Arrays



- propose to use AOC 10 Gb/s VCSEL for on detector
- propose to irradiate 20 VCSEL opto-packs in August

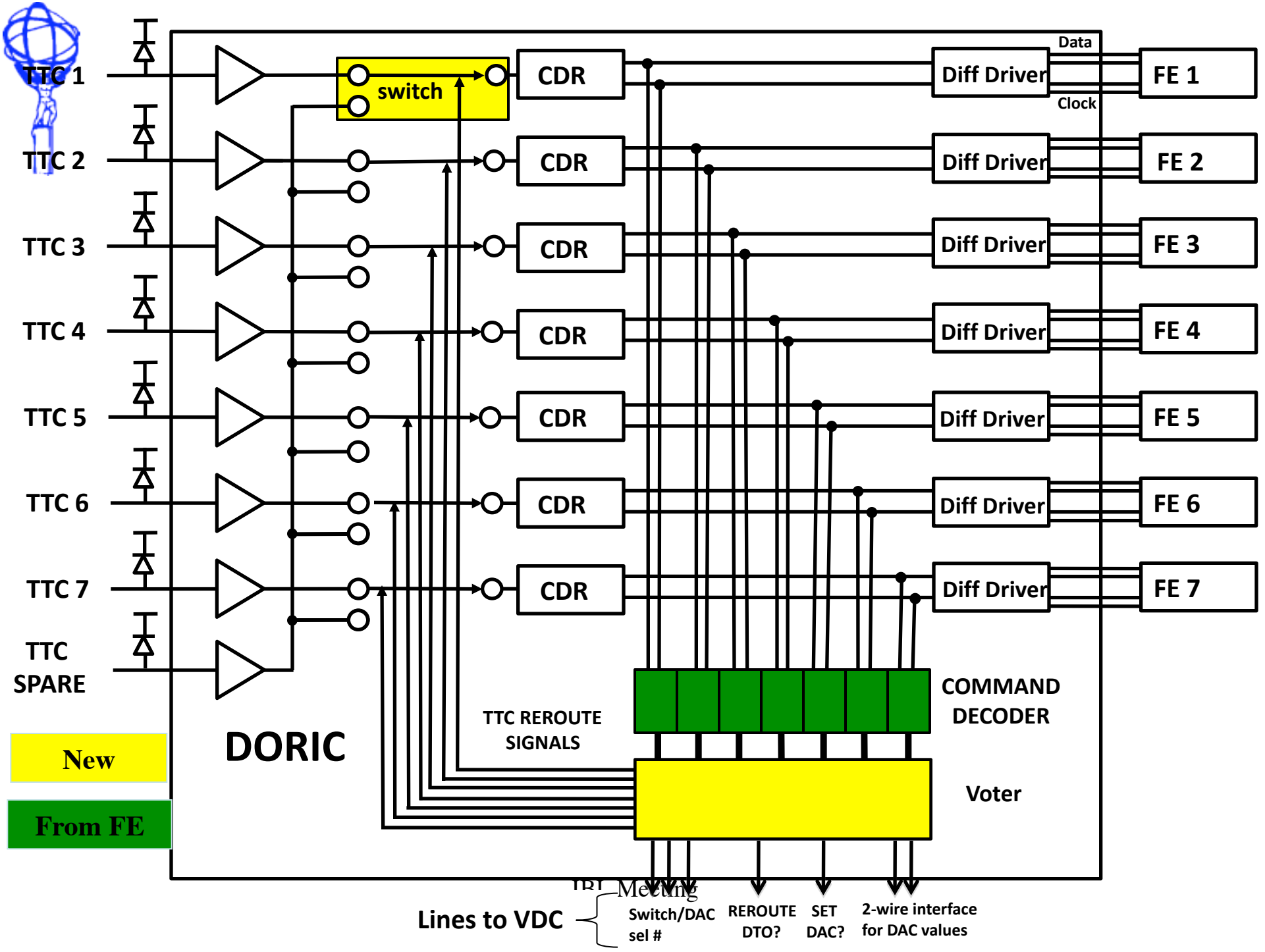
PIN Arrays

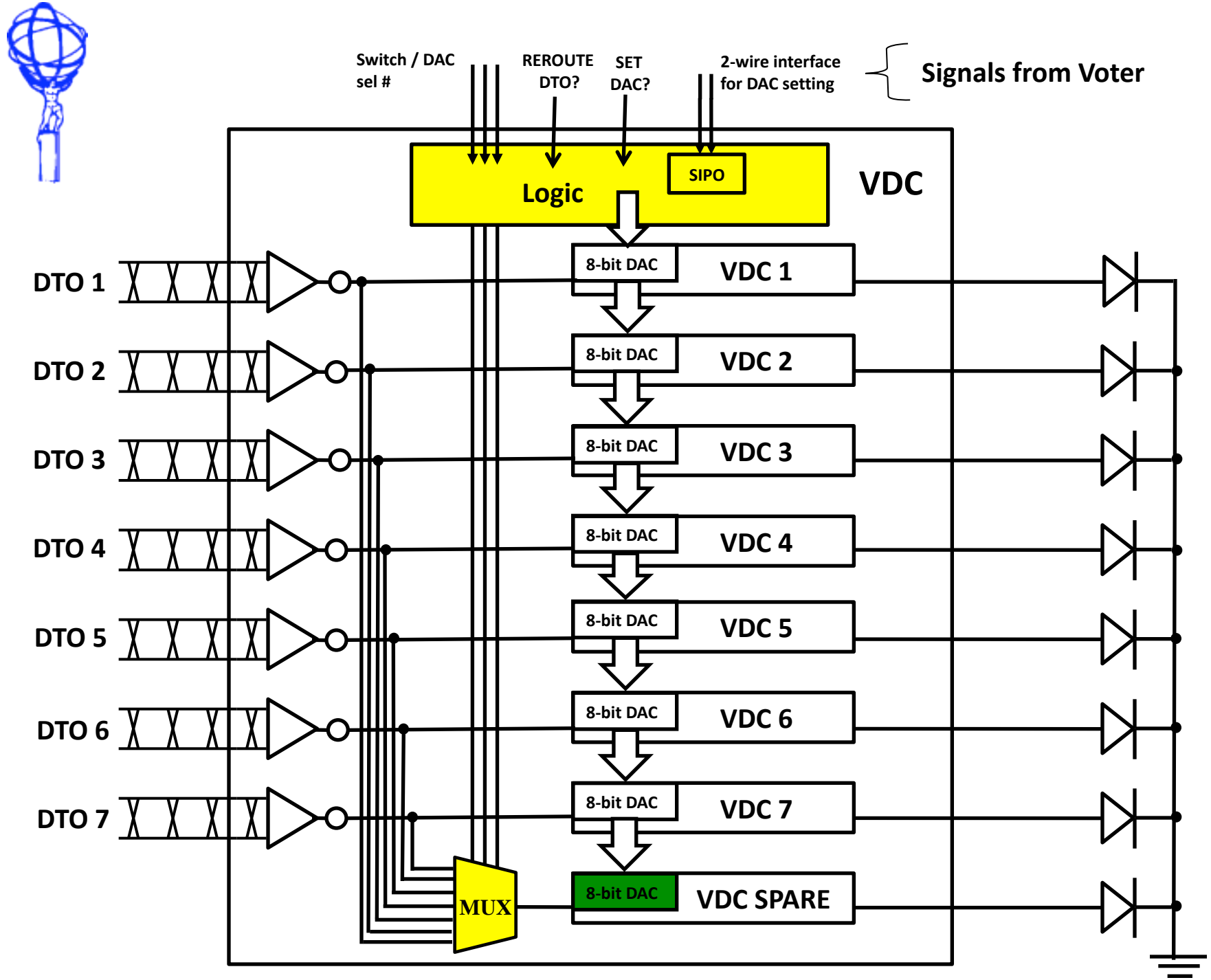


- propose to use Optowell PIN for on/off detector
- propose to irradiate 20 PIN opto-packs in August

Redundancy???

- Heated debate at last IBL meeting on the need for redundancy
  - advantage: build a more robust opto-links:
    - implement redundancy to bypass broken PIN/VCSEL
    - individual control of VCSEL currents
  - disadvantage:
    - add cost
    - require modest development effort


TTC 1
TTC 2
TTC 3
TTC 4
TTC 5
TTC 6
TTC 7
TTC SPARE
switch
CDR
CDR
CDR
CDR
CDR
CDR
CDR
Diff Driver
Diff Driver
Diff Driver
Diff Driver
Diff Driver
Diff Driver
Diff Driver
Data
Clock
FE 1
FE 2
FE 3
FE 4
FE 5
FE 6
FE 7
DORIC
TTC REROUTE SIGNALS
COMMAND DECODER
Voter
New
From FE
Lines to VDC
Switch/DAC sel #
REROUTE DTO?
SET DAC?
2-wire interface for DAC values


Switch / DAC sel #
REROUTE DTO?
SET DAC?
2-wire interface for DAC setting
Signals from Voter
Logic
SIPO
VDC
DTO 1
DTO 2
DTO 3
DTO 4
DTO 5
DTO 6
DTO 7
8-bit DAC
VDC 1
VDC 2
VDC 3
VDC 4
VDC 5
VDC 6
VDC 7
VDC SPARE
MUX

Summary

- VDC operates adequately after 6 m of transmission lines
- AOC VCSEL/Optowell PIN proposed for irradiation in August
- Modest effort needed to develop redundancy…