Warm Electronics

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Parallel Session, Tuesday, March 9, 2021

MCE Electronics (obsolete)

A fully-kitted subrack contains:

- 1 clock card
- 2 (48-HP subrack, 3 MDM connectors) or 4 (72-HP subrack, 5 MDM connectors) readout cards signals
- 3 bias cards (in some situations one might be removed)
- 1 address card

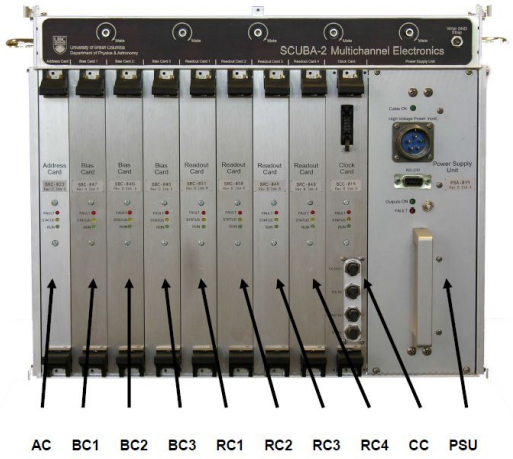


Figure 2.1 MCE subrack with switching power supply card.

What we have in MCEs for S4 test setups*:

- SLAC: 3 MDM with one 41-row and two column cards
- UCIC: 3 MDM with one 41-row and two column cards
- (ANL->FNAL): 5 MDM with one 41-row and one column card

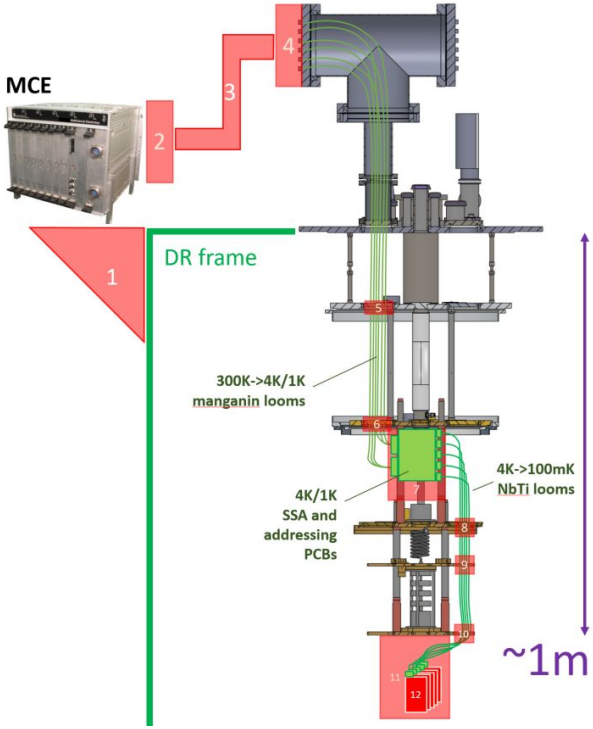
What we can read out without making modifications to setups which is not recommended for develop cold harnesses and software to use spare DACs on column cards for extra rows)

- **<u>41 of the 64 rows of TES columns</u>**
  - => switch cables between flange connectors to read out row 1-41 versus 42-64
- **<u>Two 100mK modules each reading out one of six wafer sides</u>**
  - => switch cables between flange connectors to read out other wafer sides

MCE support needed tbd

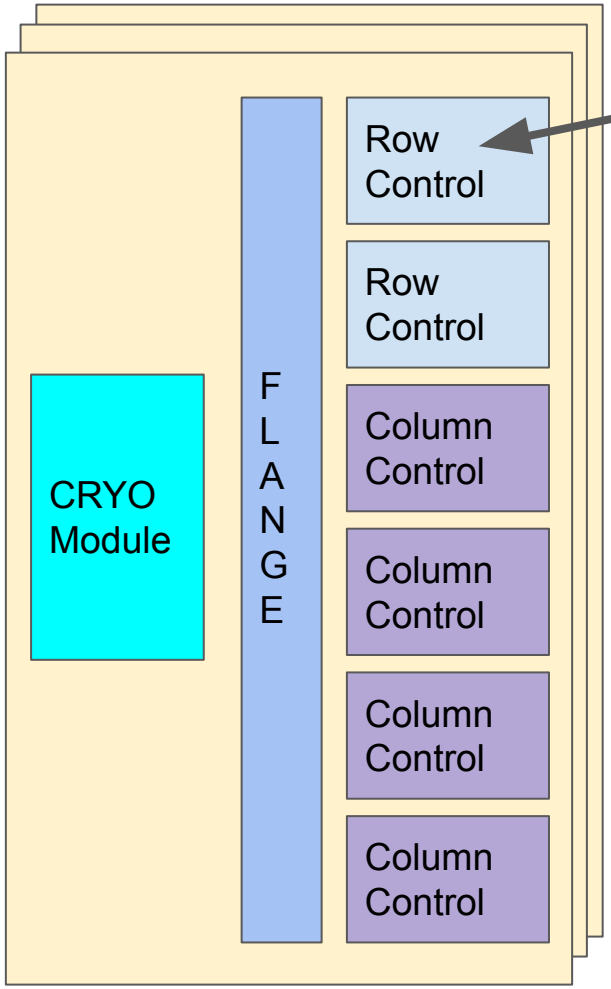
Ok for initial testing, but limits what can be tested, requires multiple test cycles

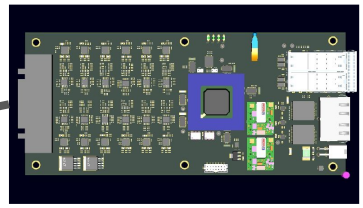
- **Goal to replace MCE electronics with new electronics as soon as feasible**
- **Goal to build the test-ups so only 100mK modules need to be replaced to result**



*Not clear if there are spare column cards available from other experiments to augment

Row and Column Control Boards mounted directly on flange (no cables), backwards compatible with MCE



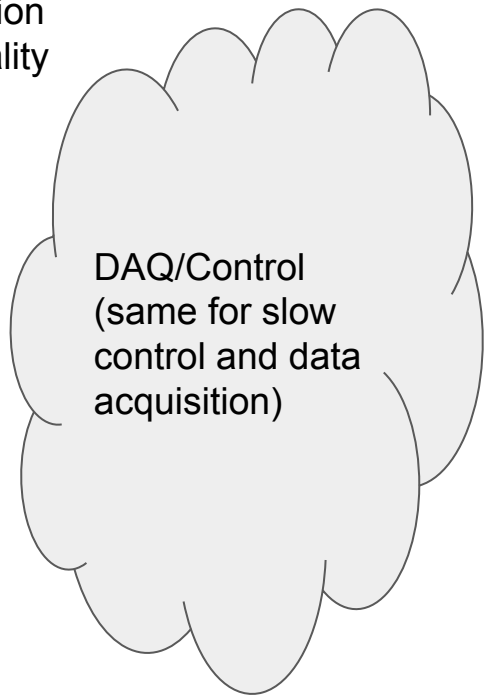


Each board is packaged in its enclosure

5” x 10”

Separate clock card, bias card and power conversion not needed, all functionality integrated

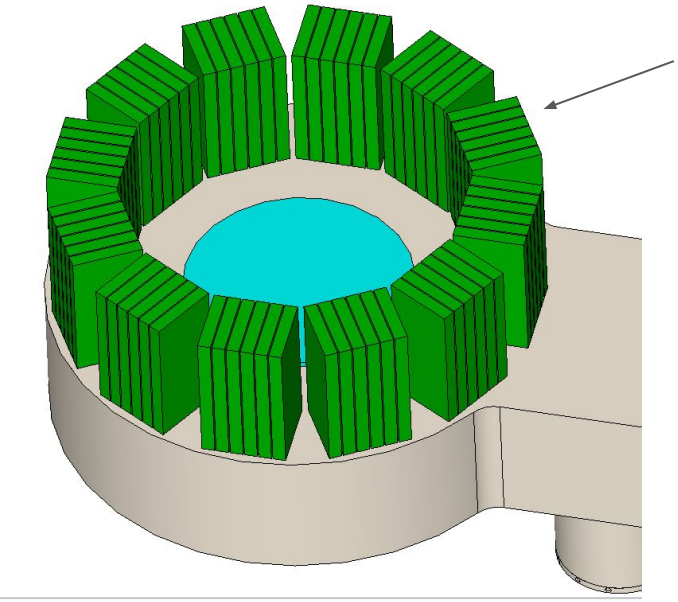
Power
Ethernet Network
PTP



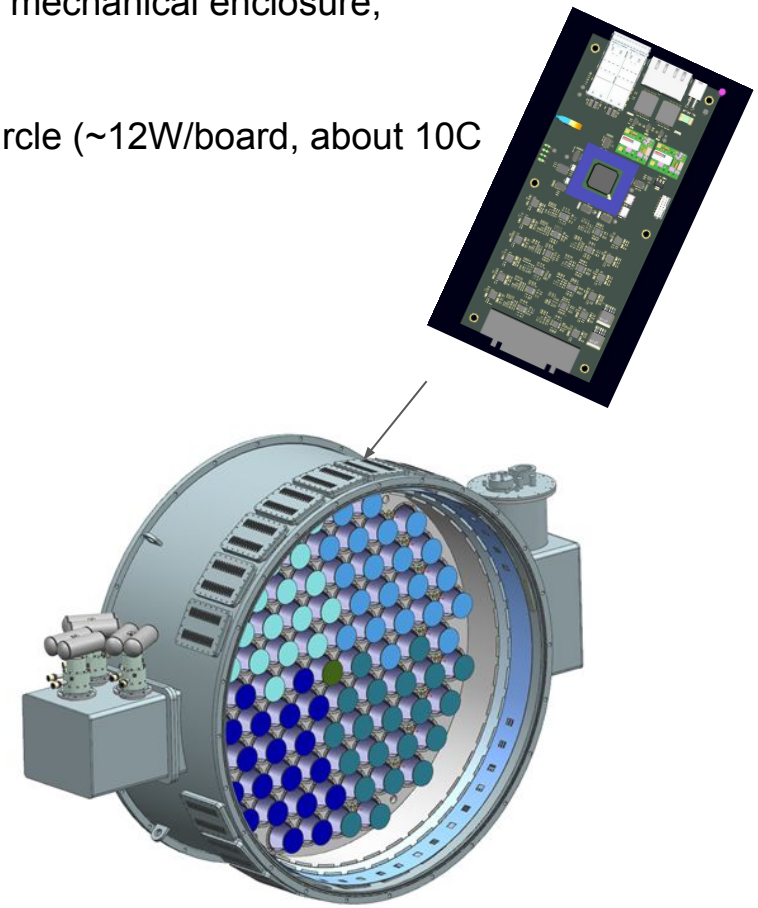
SAT: 12 groups of 6 modules: 72 modules

- Each of the 12 groups has 2 row and 4 column modules
- Row and column modules are identical in size, identical mechanical enclosure, conductively cooled to on-board components

- Overall: Conductive cooling via liquid pipe around the circle (~12W/board, about 10C rise for full circle)

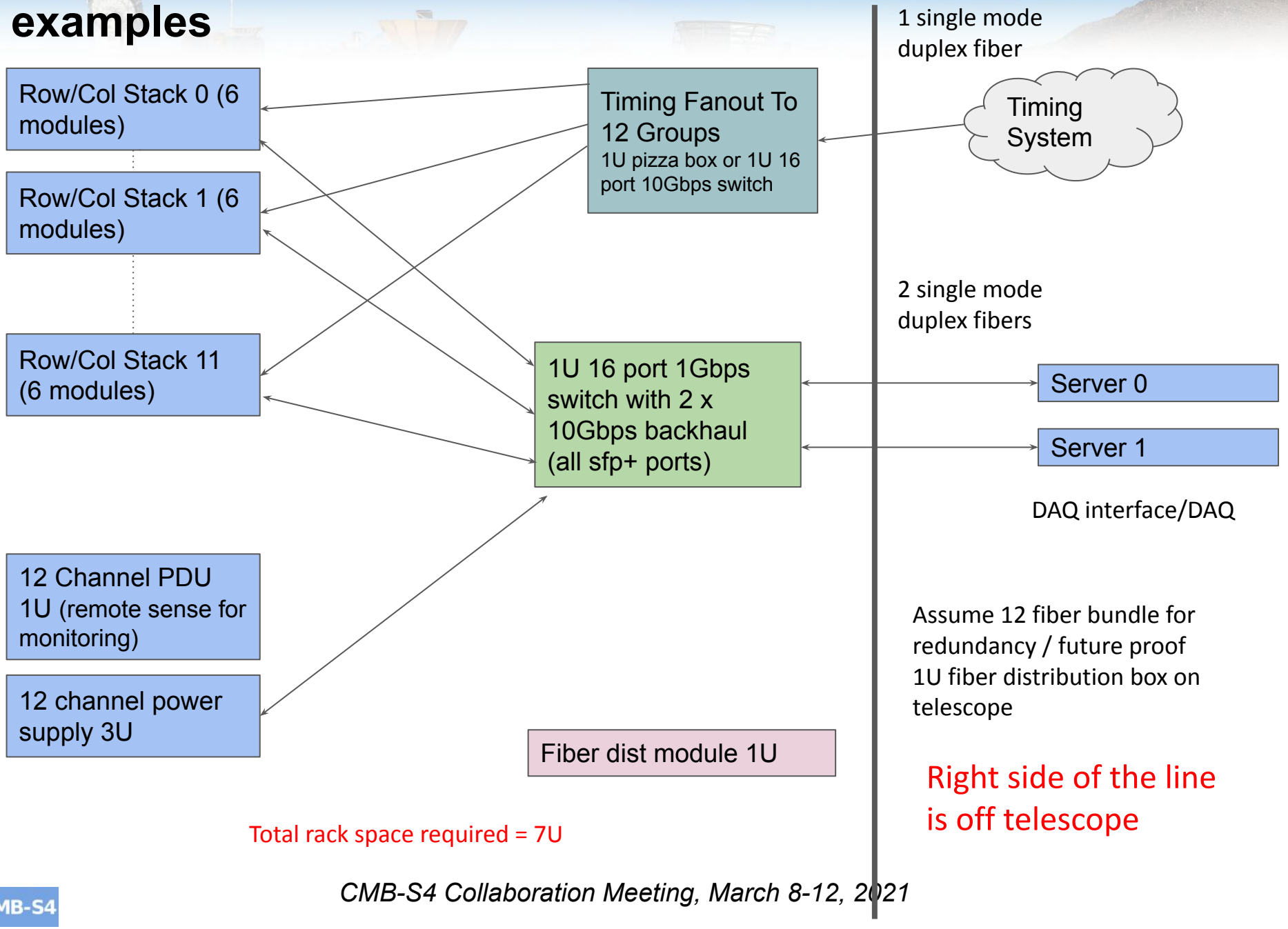


SAT supplied drawing showing warm flange boards



LAT has 20 flanges, 24 boards each

Warm System Connectivity + DAQ with component examples



Path forward

Start with MCE electronics but

- only 41 row addressing readout versus 64 rows
- only 2 sides readout of detector wafer versus all 6 (at ANL/FNAL only one side). Unless more column cards can be found.

New warm board prototype to be fabricated (off project up to now)

<u>However need project funds for</u>

- Initial Bench testing labor
- Software labor
- Testing on chamber labor

before they can be used instead of MCE

Request submitted to project office.