

Cold Electronics

VD-PDS Module 0

Dante Totani - UCSB

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New* flex boards production

*Recent modification: addition of resistor on output in order to have impedance adaptation on the signal cable (140 HPK and 60 FBK flex circuit old design @ UCSB now)

- 140 HPK and 60 FBK flex circuit new design are in production:
 - **scheduled end of production: Oct. 14th.**
- 114 HPK and 60 FBK will be immediately shipped to Milano.
 - **Shipping on 3rd week of Oct.**
- 25 flexes will be populated (+1 week) and tested (+1 week) at UCSB and sent to NIU.
 - **Shipping 1st week of Nov.**

Cathode electronics 8 X Arapuca = 16 channels

- 8 DCEM board (active summing stage and differential to single ended active stage)
 - We have multiple versions: V 1.0, V 1.1, V 2
 - Similar concept for active summing
 - Substantial change between V 1. and V 2.
 - They host PoF, SoF daughter card, DCDC card.
 - Once PoF are installed, power over copper is not possible
 - Testing procedure need to be finalized.
- V 1.0 widely tested at ColdBox and various institutions, showing good results (SNR, SPE shape, ...)
 - NOTE: with the new flexes we have to change the R values of the signal input.

Membrane electronics 8 X Arapuca = 16 channels

- HD style readout electronics.

Proposed alternatives based on DCEM cathode design:

- No PoF population. Power over copper.
 - 2 conductors (bias + ground) - Single bias (+6V) + DC-DC for SiPM bias.
 - 4 (3x) conductors (6V and 48V bias + 2x (1x) ground) - Double bias: (+6V) for Analog electronics and (+48V) for SiPM bias.
- Signal transmission:
 - (2 fiber) SoF: Same DCEM as cathode configuration.
 - 2 conductors (signal + shielding) Signal over Copper (single ended)
 - DCEM V1.0 output to the Laser daughter board is transmitted over copper
 - Directly read by DAQ
 - 3 conductors (2 signal + shielding) Signal over Copper (differential)
 - DCEM V1.0 circuit has to be splitted.
 - Output of the first (differential) OpAmp is transmitted over copper
 - The differential signal is converted in single ended with same/similar second OpAmp stage in warm, then go in DAQ.

Membrane electronics II

Three options:

1. fully copper based (no PoF, no SoF stages), alternative signal conditioning stage by FD1-HD solution + HD cables and FTs [only partially tested with a tile/VD-style flexi SiPMboard]
2. fully copper based (no PoF, no SoF stages), standard signal conditioning stage by FD2-VD solution + dedicated/new cables and FTs [tested with VD-style flexi board, but cables and transmission out of cryostat to be demonstrated]
3. Pwr via Copper and SoF: an interesting option for some membrane tiles for the sake of comparison with the copper-based option

Since it is too early to decide the sharing between 1) , 2) and 3), we aim to build flanges that can allocate all options - the additional complexity should be modest (but need to be evaluated in detail)

We will carry out the tests necessary to validate 1) and 2) and solve current issues in transmission lines and take a decision by the end of November