

WA105 

Mapping of readout strips  
to DAQ channels for 6x6x6

# Overview

- The channels read out by the DAQ need to be referred / mapped in a physically coherent way to the anode (see [for example](#) implementation for 311)
- The basic readout unit is one card → 64 channels → two connectors on the anode and at the bottom of SGFT flange

# Raw data format

Raw data format of the 6x6x6 would follow the same basic principle as in the 3x1x1

Ordering of 10,000 samples from 7680 channels in a event data vector:

Crate 1

Card 1

Ch 1...64

Ch1: 1 ... 10,000 ADC values

...

Card 2

Ch 1...64

...

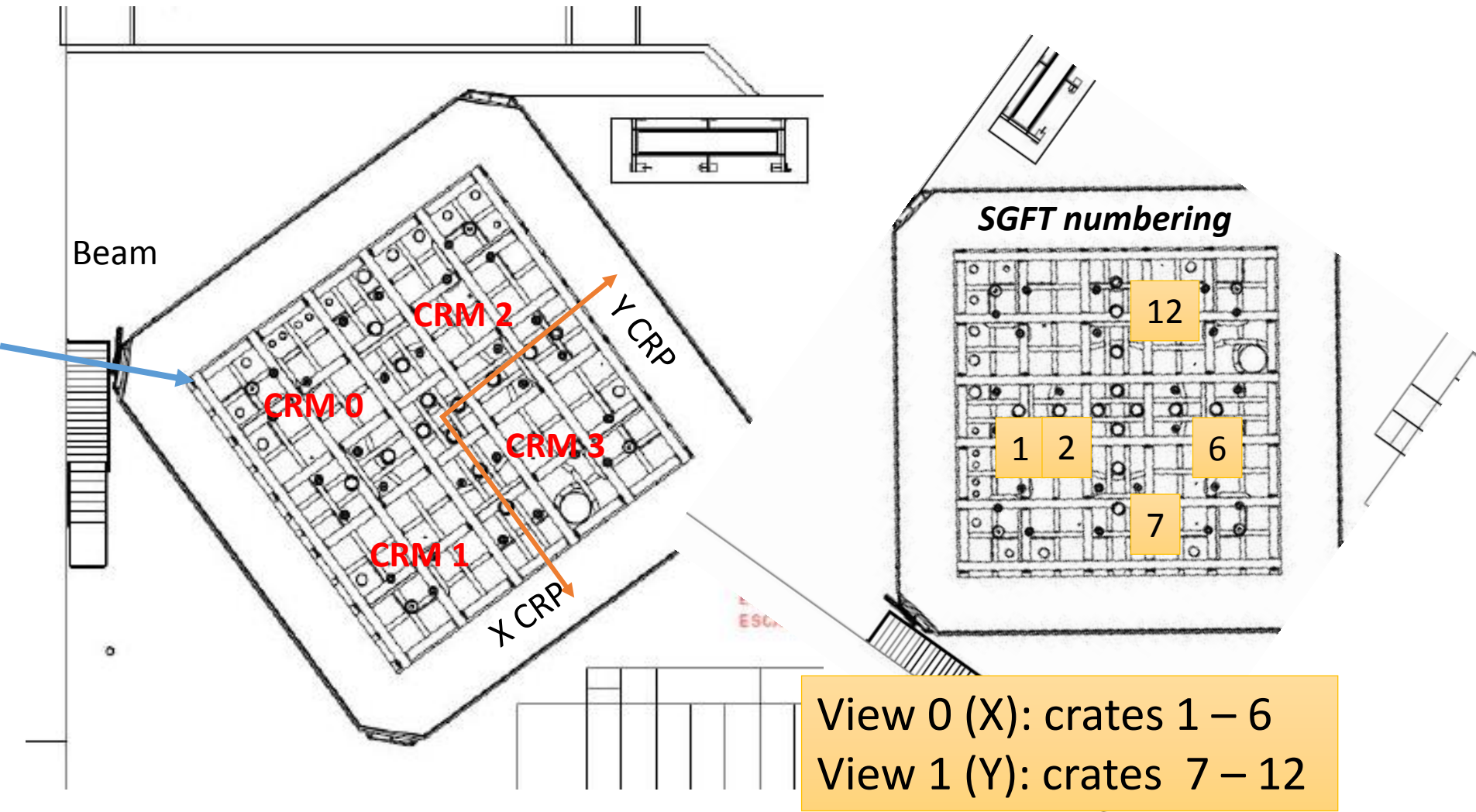
Crate 13 ( 36 ch x 20,000 samples ) PMT data

**Need to define a convention for SGFT numbering**

Other conventions are basically fixed by hardware:

- AMC card numbering is determined by the uTCA crate configuration
- Channel numbering is fixed by connector reference pins of the KEL connectors on the anode

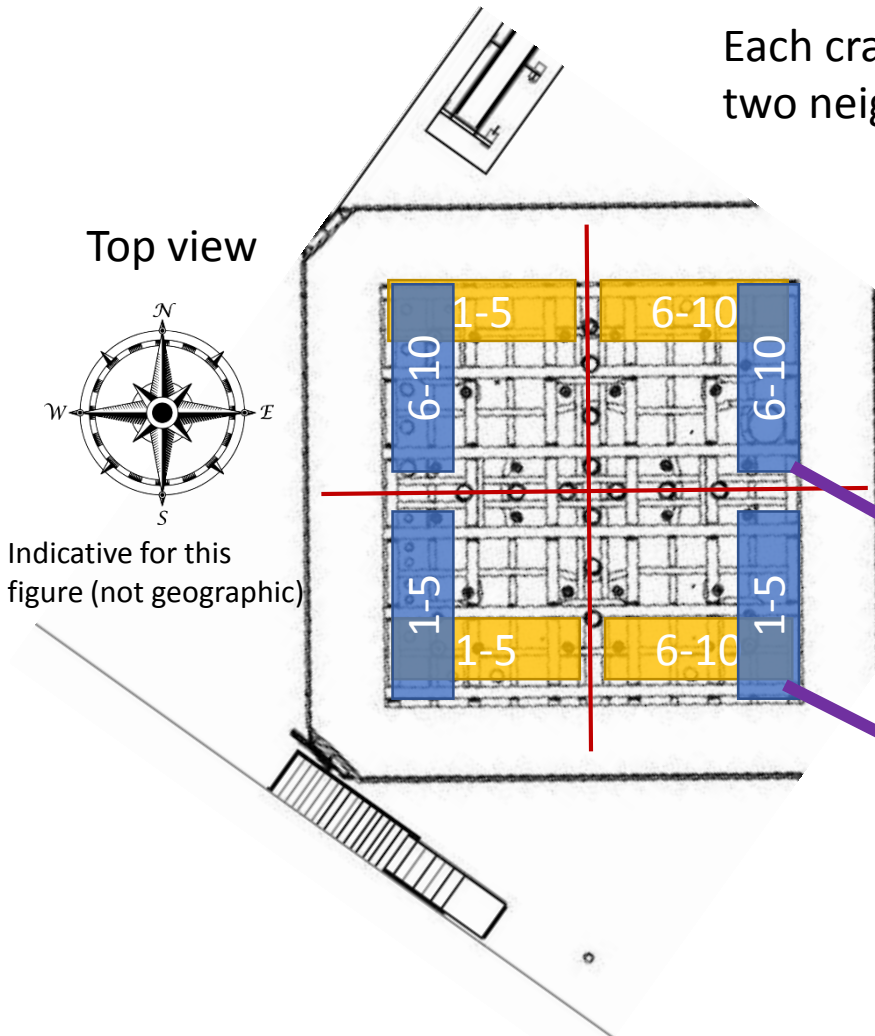
# CRM / Crate numbering



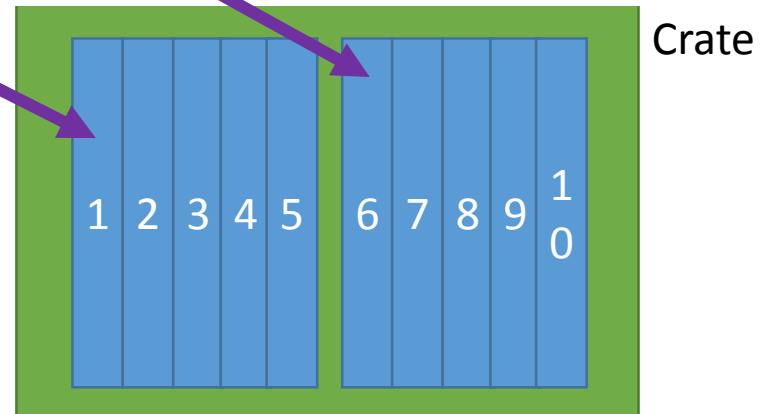
This is a convention, but it would be good to make it as simple as possible → first half reads view 0, second half of the crates reads view 1

# Cards in crate

Each crate reads a 3x1 sub-view block from two neighbouring 3x3 m<sup>2</sup> CRMs

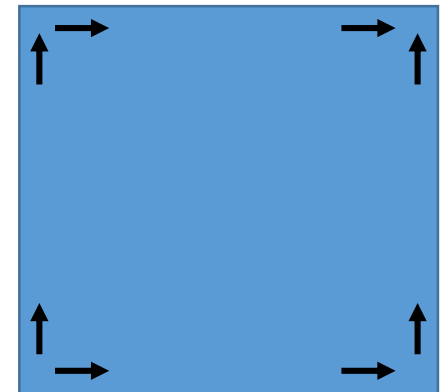
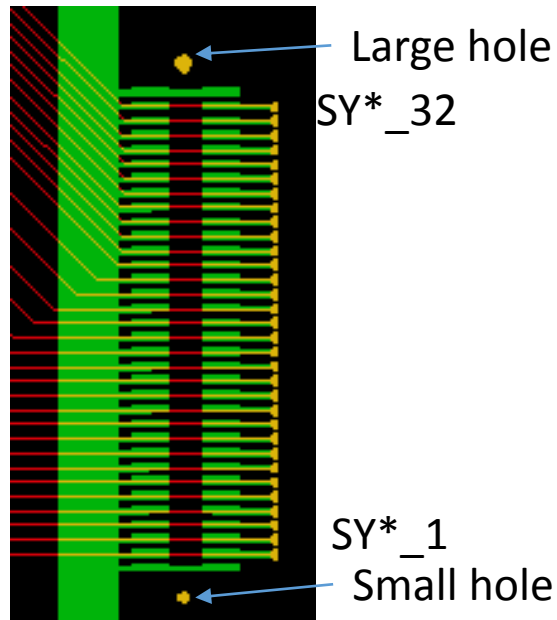
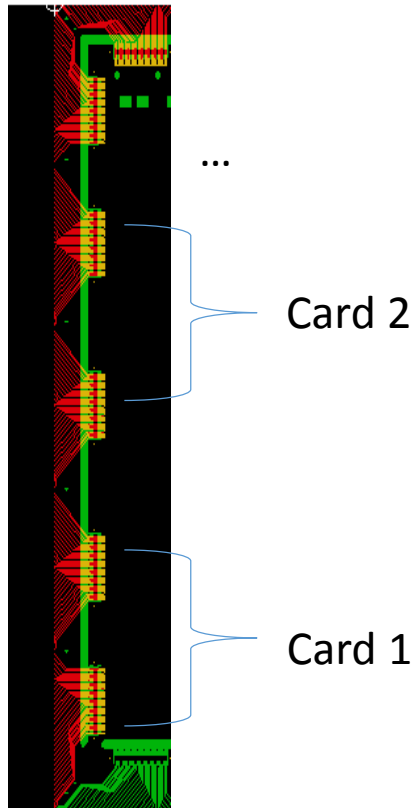
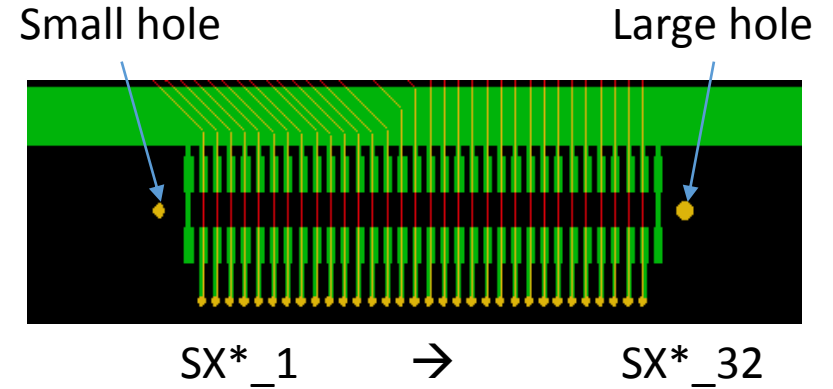
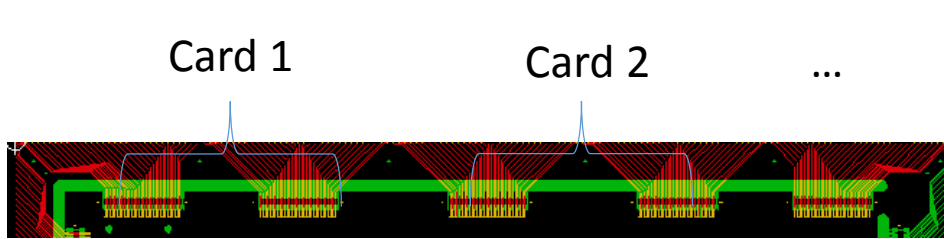


- Cards 1-5 read “S” (“W”) half for view 0 (1)
- Cards 6-10 read “N” (“E”) half for view 0 (1)
- Card order increases from W→E (S→N) for view 0 (1)
- Five cards read a block of 320 channels corresponding to 3x1 sub-view

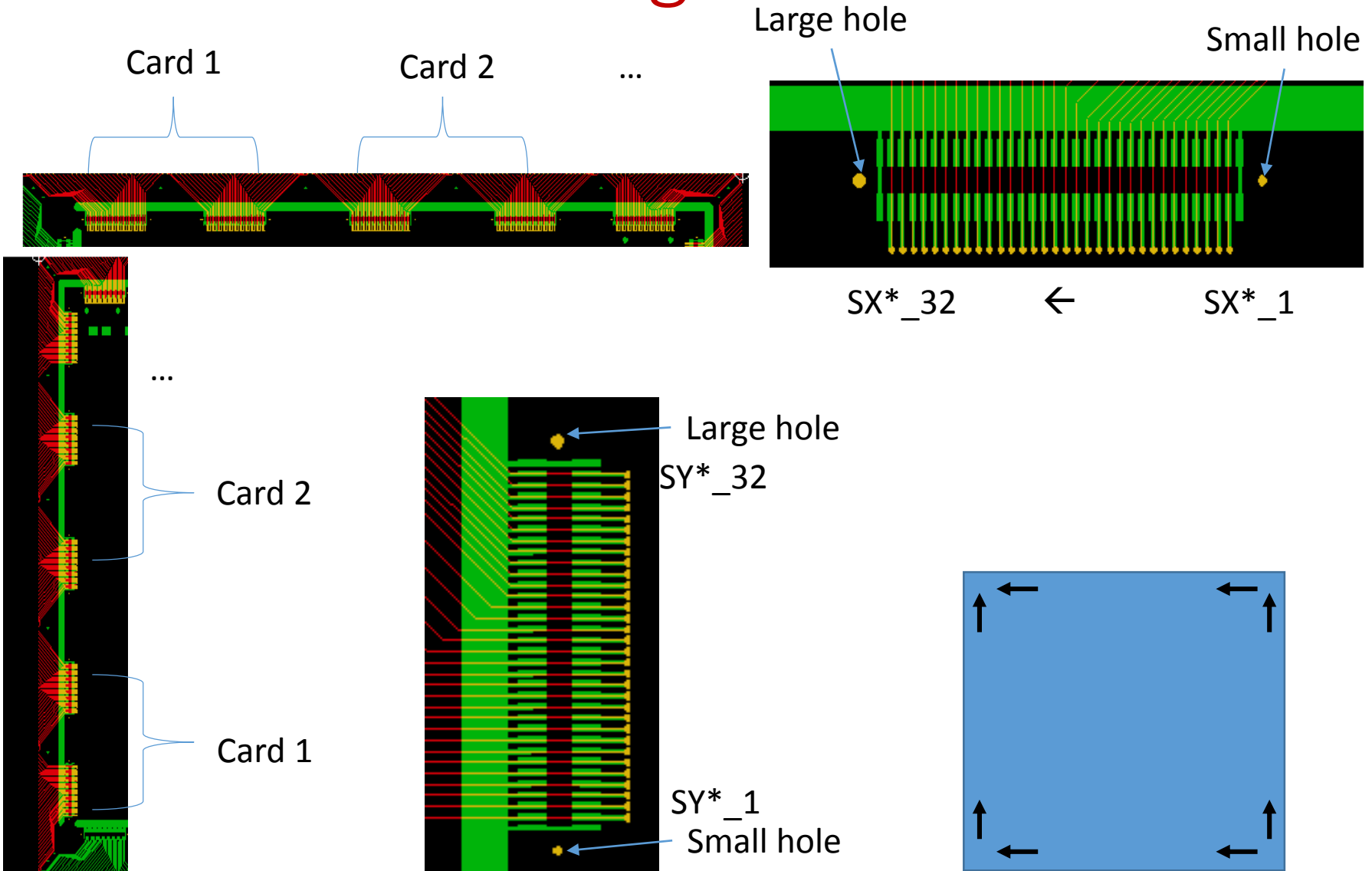


The order carries implications for the connections on the cold flange

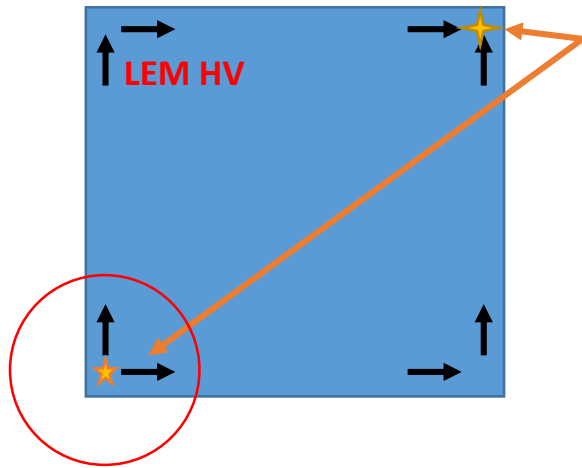
# Normal (channel) ordering



# Inverted ordering



# Anode in the CRP



Two unique corners

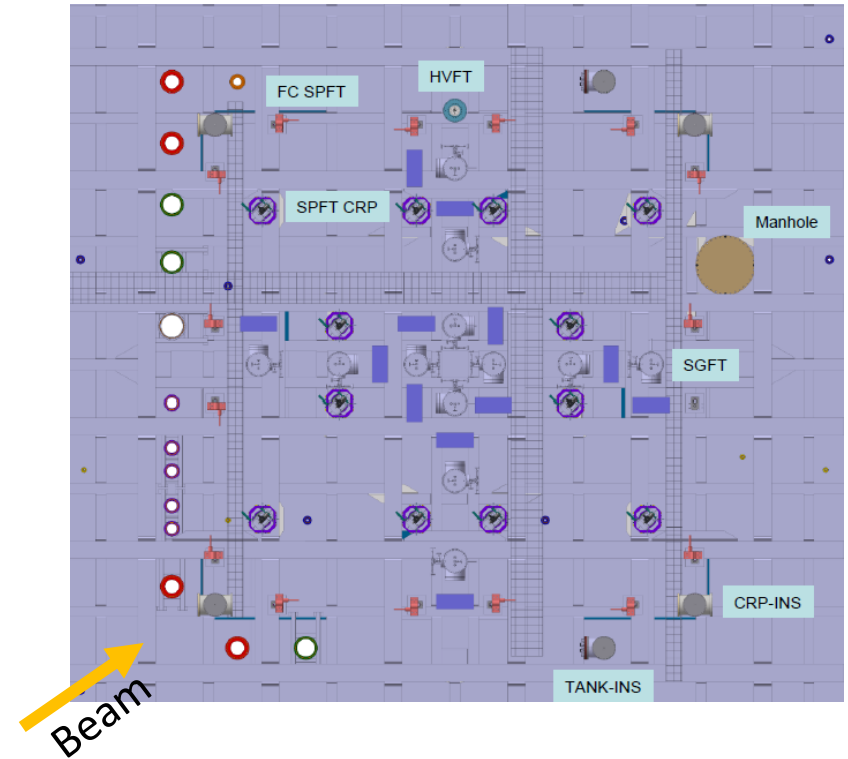
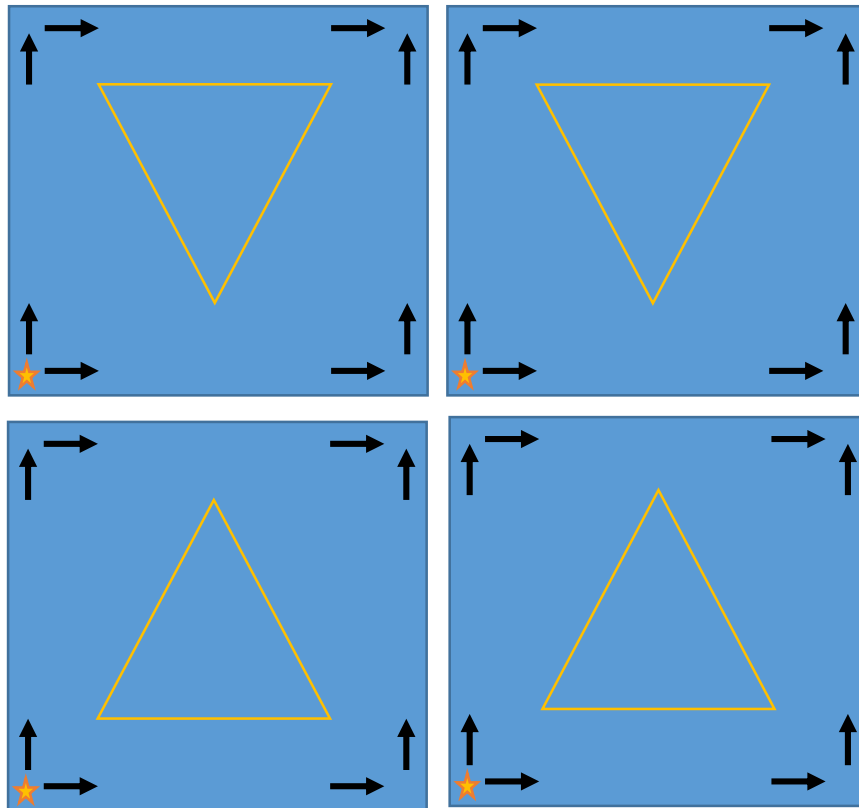
Once mounted on the frame, the connector orientations along the border of a 3x3 m<sup>2</sup> module are topologically equivalent to a single anode

Naturally defines an orthogonal coordinate axis system



# CRP

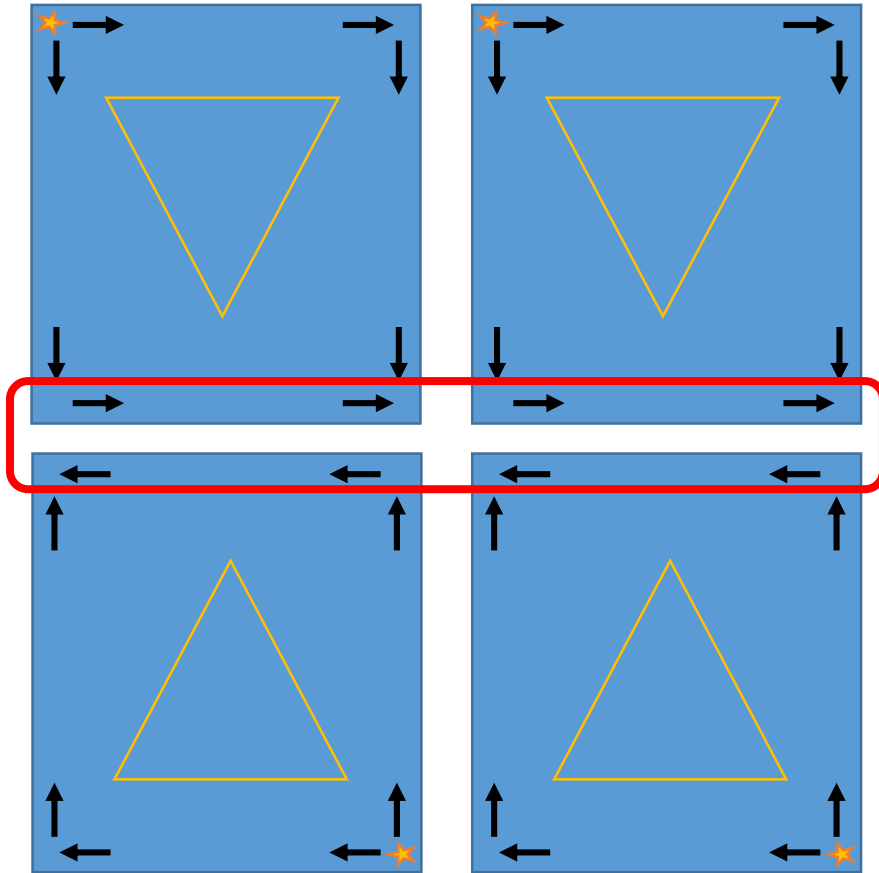
Ideal orientations from the point of view of channel mapping of the 3x3 m<sup>2</sup> modules after suspension



Implies that two modules are assembled with different anode orientation w.r.t. the pattern of the suspension points

How much a part of the CRP structure are the suspension fasteners?

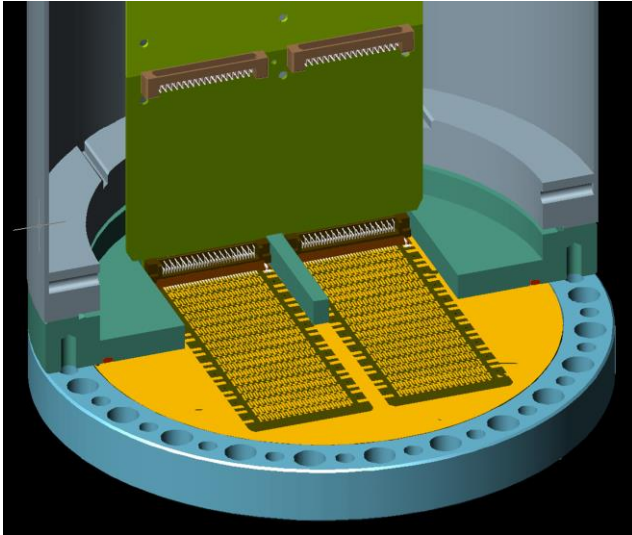
# Undesirable configuration



it would be ideal to avoid mixing connector orientations within a single SGFT

Such situation would happen if all anodes are mounted in the identical orientation w.r.t. suspension points for all four modules and then two are rotated by 180 degrees before being lifted into their positions

# Cold flange connections

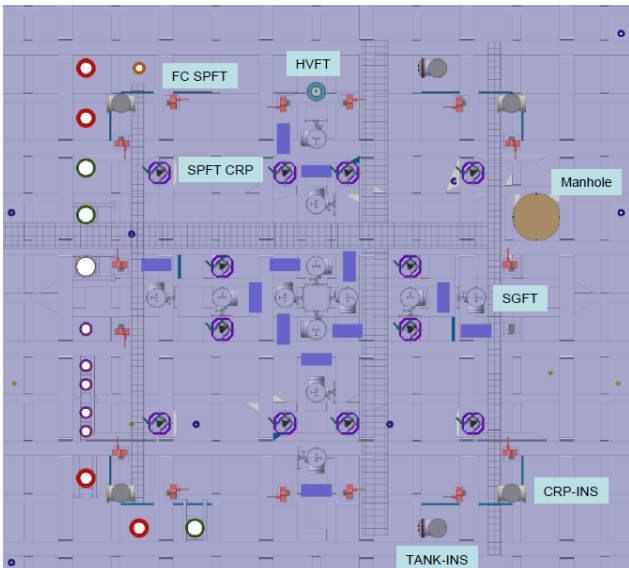


Each card should be connected to a single continuous block of 64 channels on the anode (= 2 KEL connectors on the anode)  
Connecting one 32 ch group in one 3x3 m<sup>2</sup> and the other 32 ch in the other 3x3 m<sup>2</sup> is highly undesirable

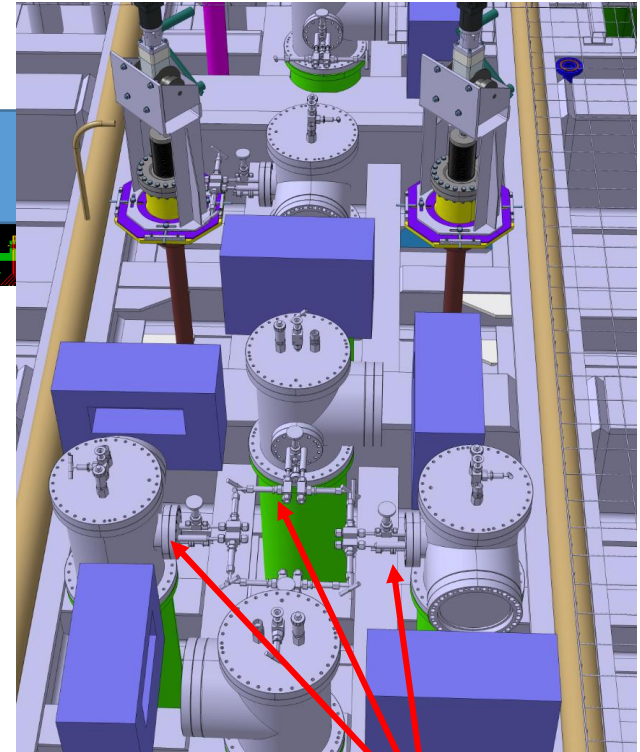
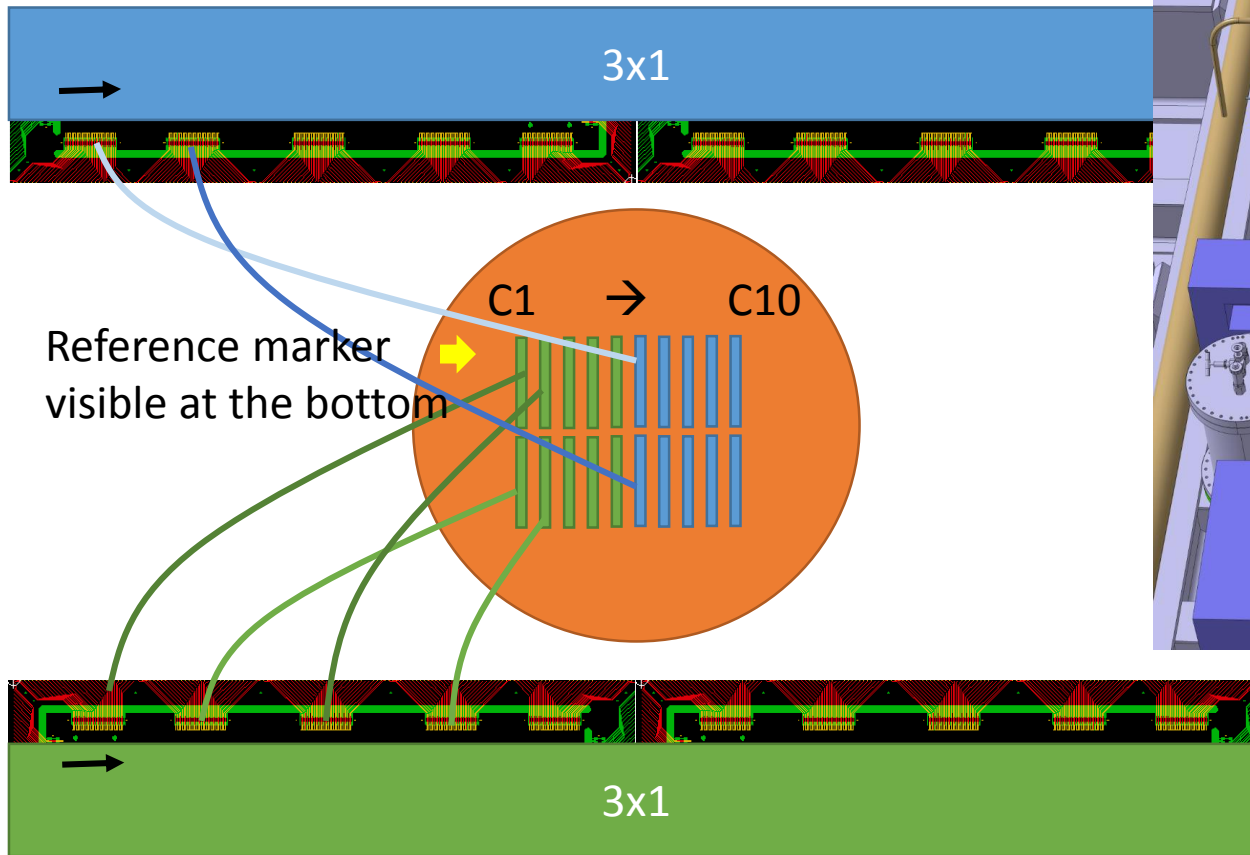
The chimneys could actually be mounted in a different orientations due to space constraint on the top of the exoskeleton as shown by Adamo at a TB on 15.03.2017

Is there a reference marker on bottom side of the cold FT / chimney to ensure that the cables from anodes are plugged in the well-defined and fixed order with respect to it?

This marker should be referenceable to the outer side of the warm flange / chimney to ensure that one knows the anode strip order corresponding to the plugged digital cards

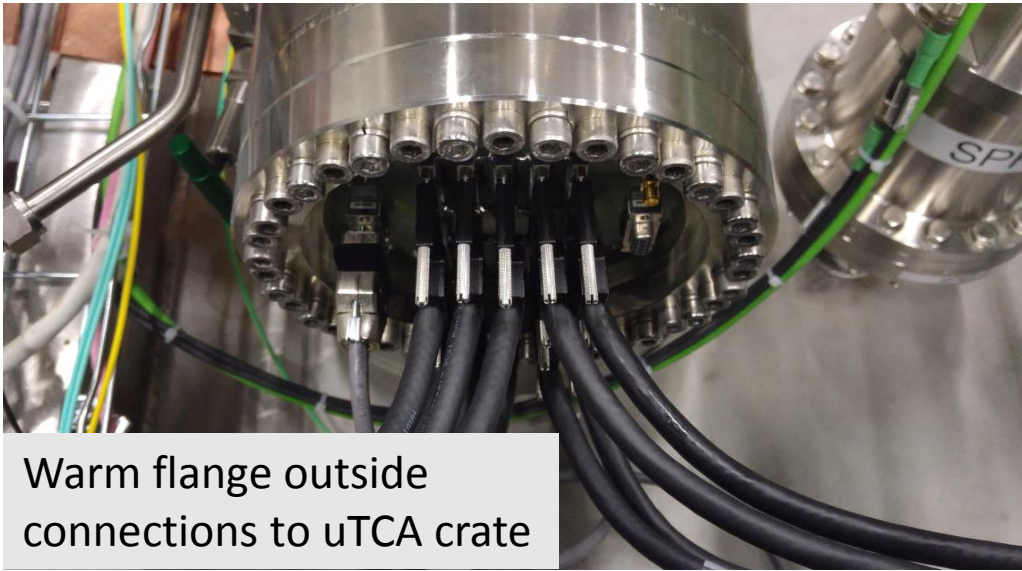


# Connections at the cold flange

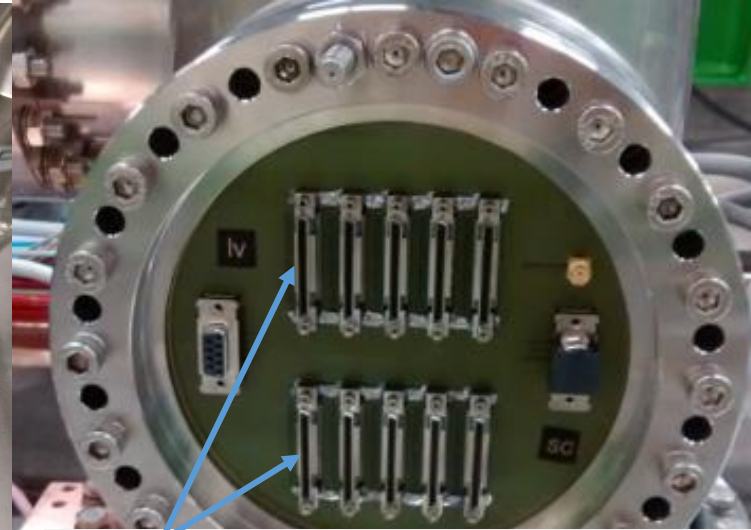


On the top, we can rely on the side valves for the purge pipes as a reference provided that the order for anode – chimney connections made at the bottom is always the same w.r.t. it

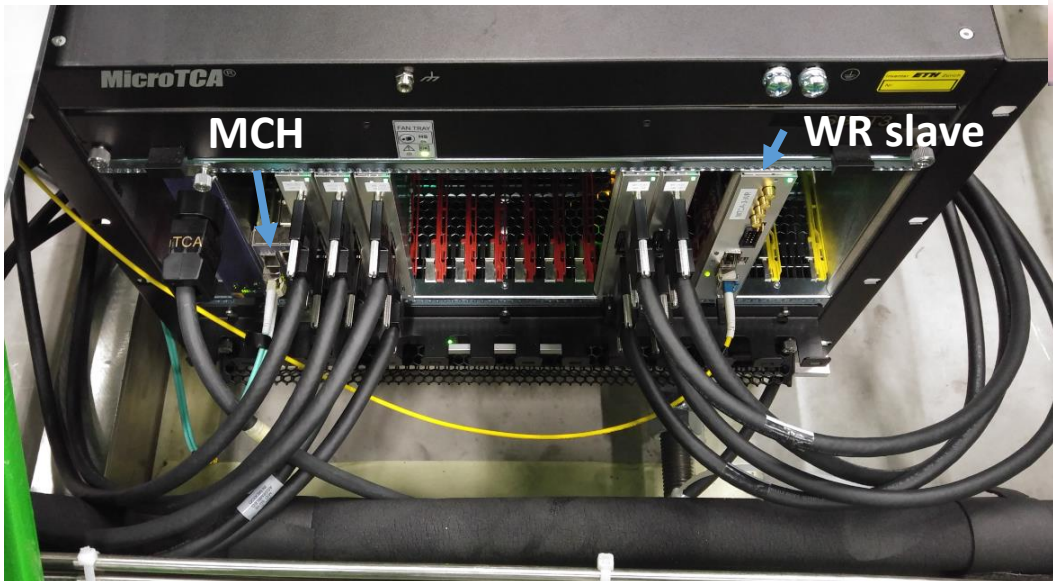
# Warm side connections



Warm flange outside connections to uTCA crate



The mapping of the VHDCI connectors to the two cold FT 36-pin connectors is uniquely determined by 80 and 68-pin connector / cable on the inside



The card order in the uTCA crate is well-defined → the order of the connections on the outer side of the warm FT is then well-defined



# Summary

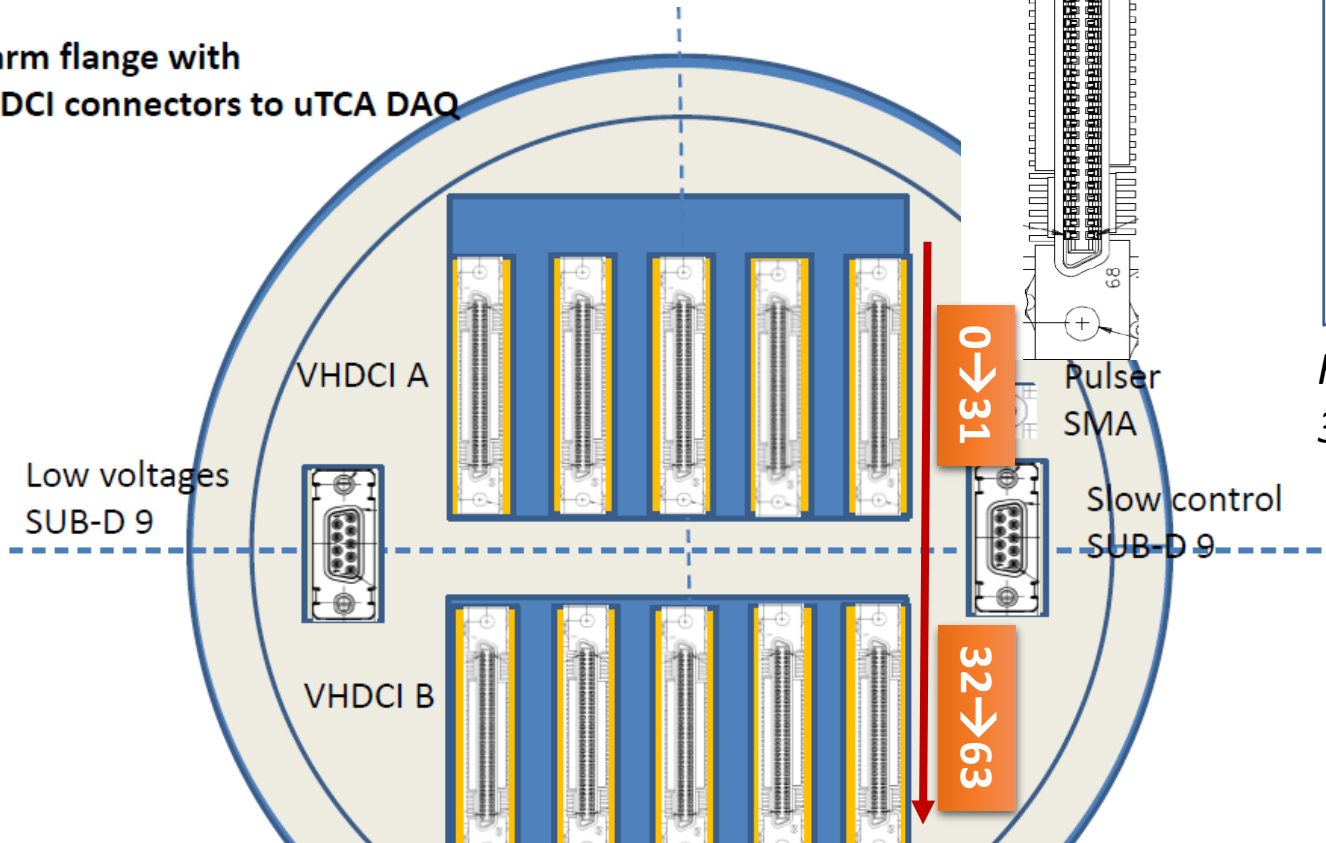
Proposed order:

- Crate numbering convention: crates 1-6 read view 0 (x), crates 7-12 read view 1 (y), crate 13 to for LRO
- Cards 1-5 are connected to one 3x1 sub-unit, while 6-10 to the other in a nearby 3x3 module
- The orientation of the channel connectors along the anode border should be the same between neighboring 3x3 m<sup>2</sup> modules

# Channel numbering

is propagated to flange from anode

Warm flange with  
VHDCI connectors to uTCA DAQ



Molex to uTCA crate (32 channels)

Pin	Pin
1 S1_P	35 S1_N
2 S2_P	36 S2_N
3 S3_P	37 S3_N
....	
16 S16_P	50 S16_N
17 GND	51 GND
18 GND	52 GND
19 S17_P	53 S17_N
.....	
33 S31_P	67 S31_N
34 S32_P	68 S32_N

*From 02/06/2016  
3x1 meeting*

The channel numbering on connectors is given by the orientations of the connector key and followed by the DAQ (1 card reads 2x32 channels)  
Then we have to take care of is which part of anode each connector maps to

