

Report on KEK electronics

2017/Mar/21, WA105 collaboration meeting
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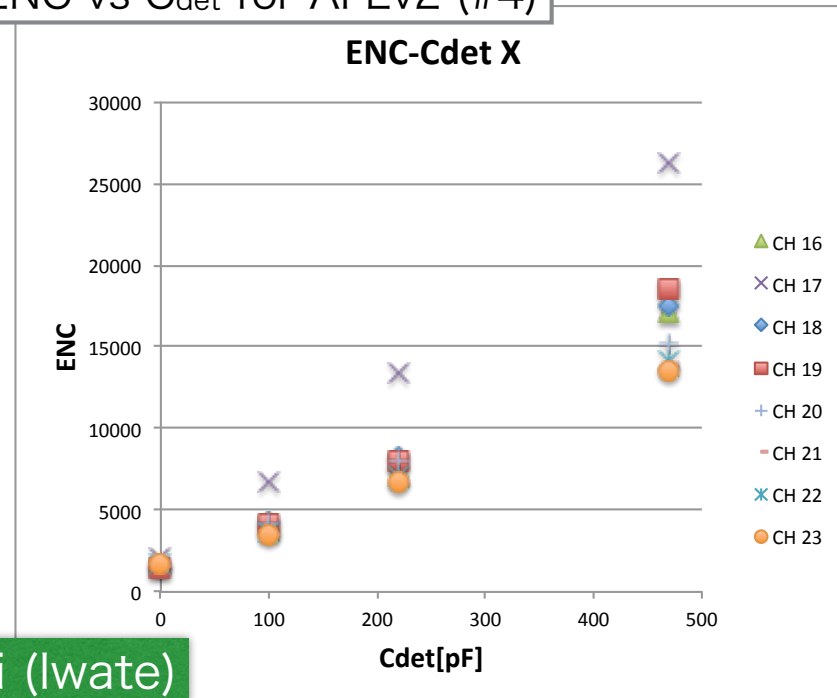
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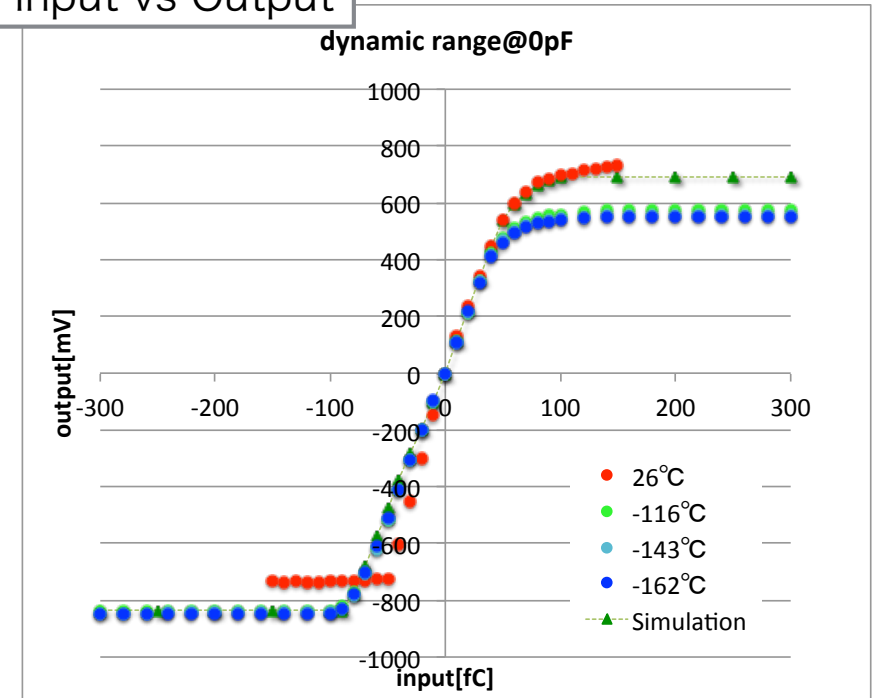
Introduction

- The first prototype of analog front-end card and the digital card was tested with the CERN 3I detector on December 2015
- Protection circuit which is the same circuit as the Lyon FE was implemented (analog front-end card version 2, AFEv2). Then, ten cards (640ch) have been produced
- Measured performance is as expected for all the 640ch
- Tested at cold environment (down to -160degC) and confirmed that ASIC and other component can properly work at such an environment

ENC vs C_{det} for AFEv2 (#4)

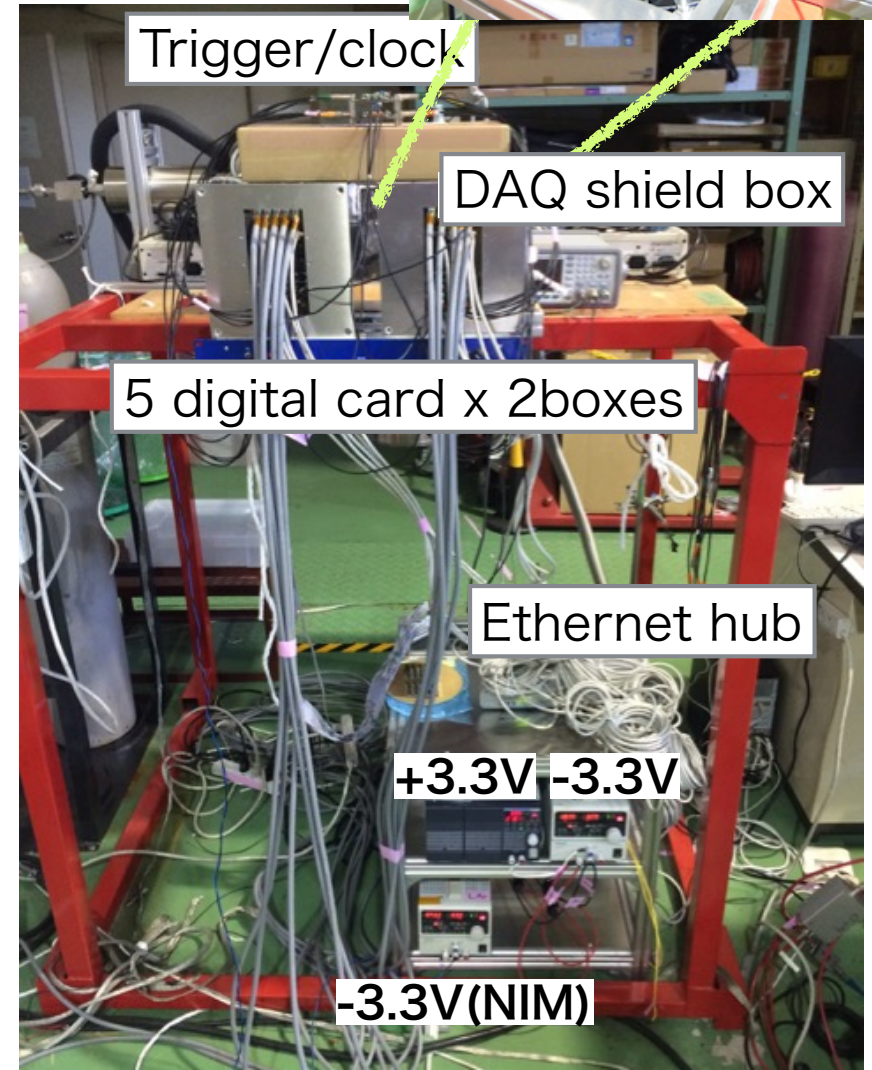
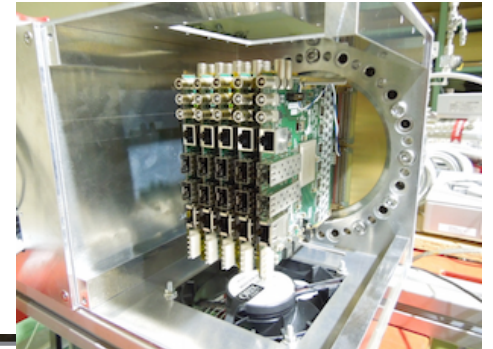


Input vs Output



Status of integration test at KEK

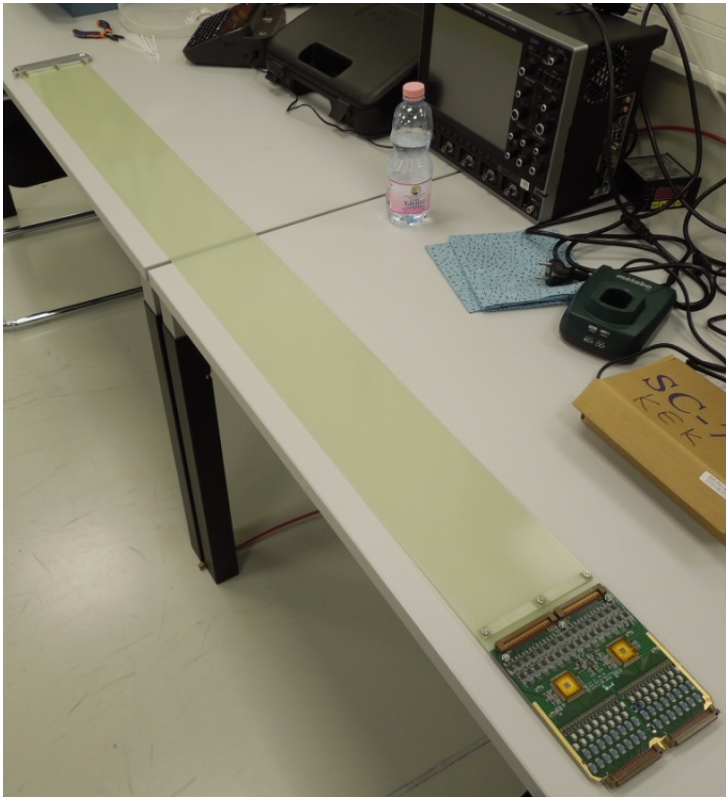
- System commissioning at KEK is on-going
 - Configuration:
 - all the DAQ card connect to the warm feedthrough and covered by a DAQ shield box
- KEK-DAQ software was developed
 - performance tuning is on-going
- We plan to check the DAQ performance, noise level, test pulse injection, long-term stability etc.



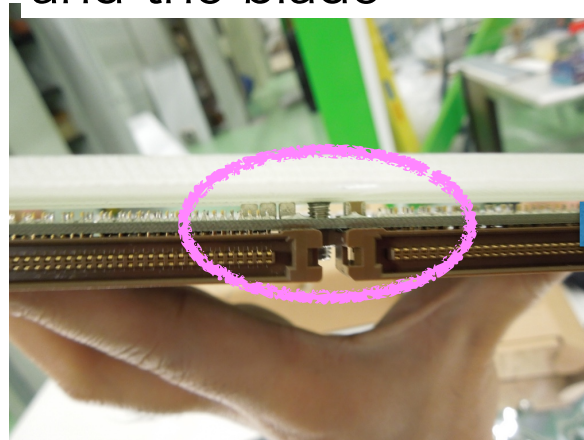
SGFT insertion test

- We performed insertion test of the KEK FE + blade to the signal feed-through chimney on Nov. 2016 and Feb. 2017

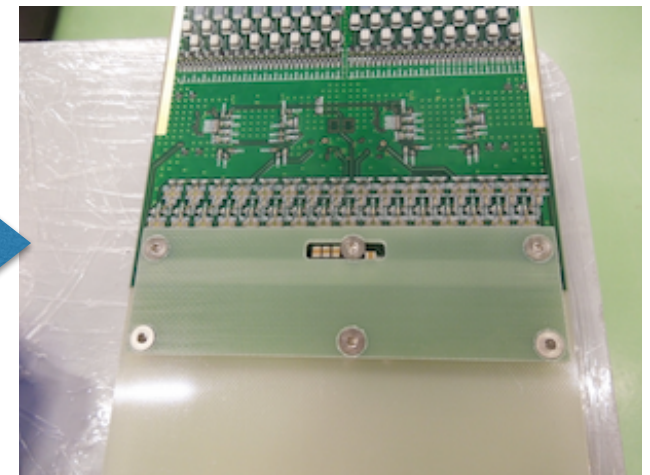
Spare blade + KEK FE



On Nov 2016, we found that there was an interference between the capacitance(filter) at the back side of FE and the blade



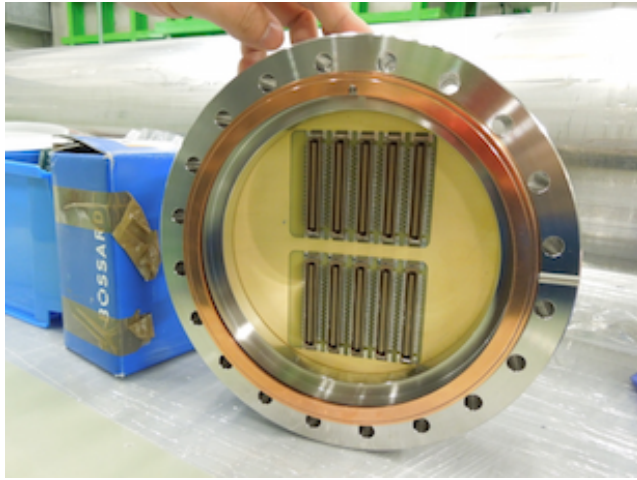
We prepared a modified FR4 part and assembled to check if that interference is cleared
→ confirmed it is OK



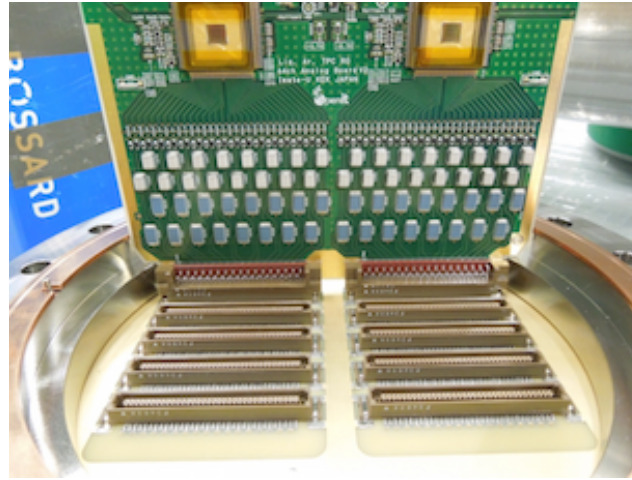
SGFT insertion test (cont.)

- On Nov. 2016, we tried to insert the KEK FE+blade to 3x1x3m³ SGFT#2 but we were not able to mechanically connect the FE to the connectors on the cold feed-through
- On Feb. 2017, we performed further investigations using the spare signal chimney and the spare cold FT which was prepared by Franco
- We confirm that the KEK-FE can be connected to the cold FT although we need slight force to push the blade into the final position
 - we also performed several test using the spare SGFT e.g. inserting to different position, etc.
 - all the case, we can connect the KEK-FE and the cold FT

cold feed-through (FT)
with flange



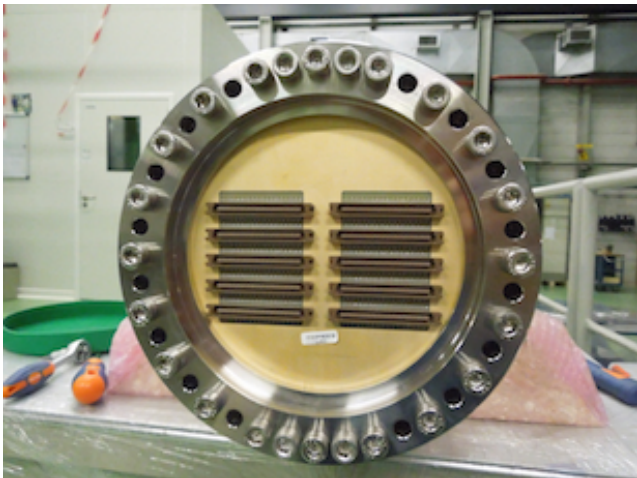
KEK-FE can be connected
to the cold FT



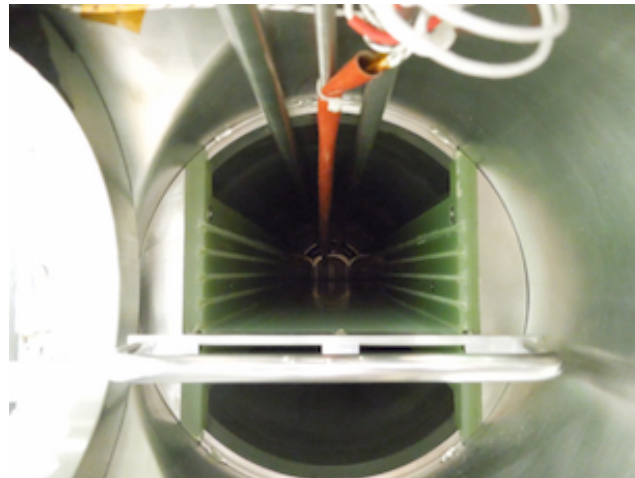
overall setup



the cold-FT attached
to the spare SGFT



We confirmed the KEK-
FE can be connected to
the cold FT using the
blade !

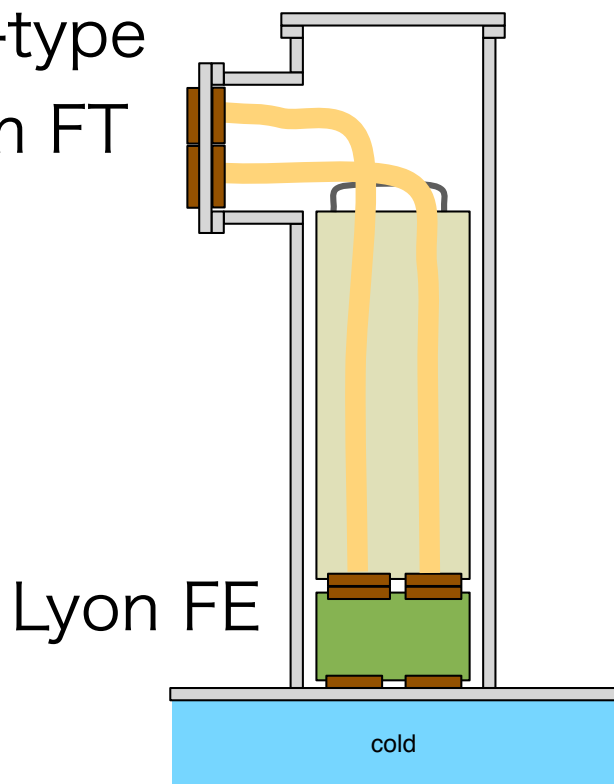


Consideration on the procedure to exchange electronics

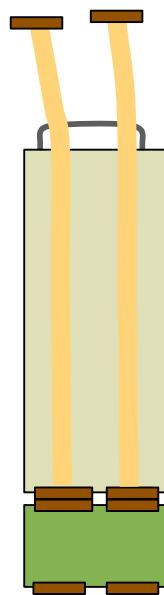
- A rough idea of the FE exchange procedure is discussed
- Need further discussion with relevant people

(0) preparation

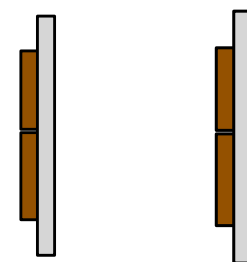
Lyon-type
warm FT



- We plan to prepare 10 additional blades for KEK-FE in order to minimize the period when the SGFT chimneys open
- KEK-type warm FT with DAQ box back plate is already at CERN

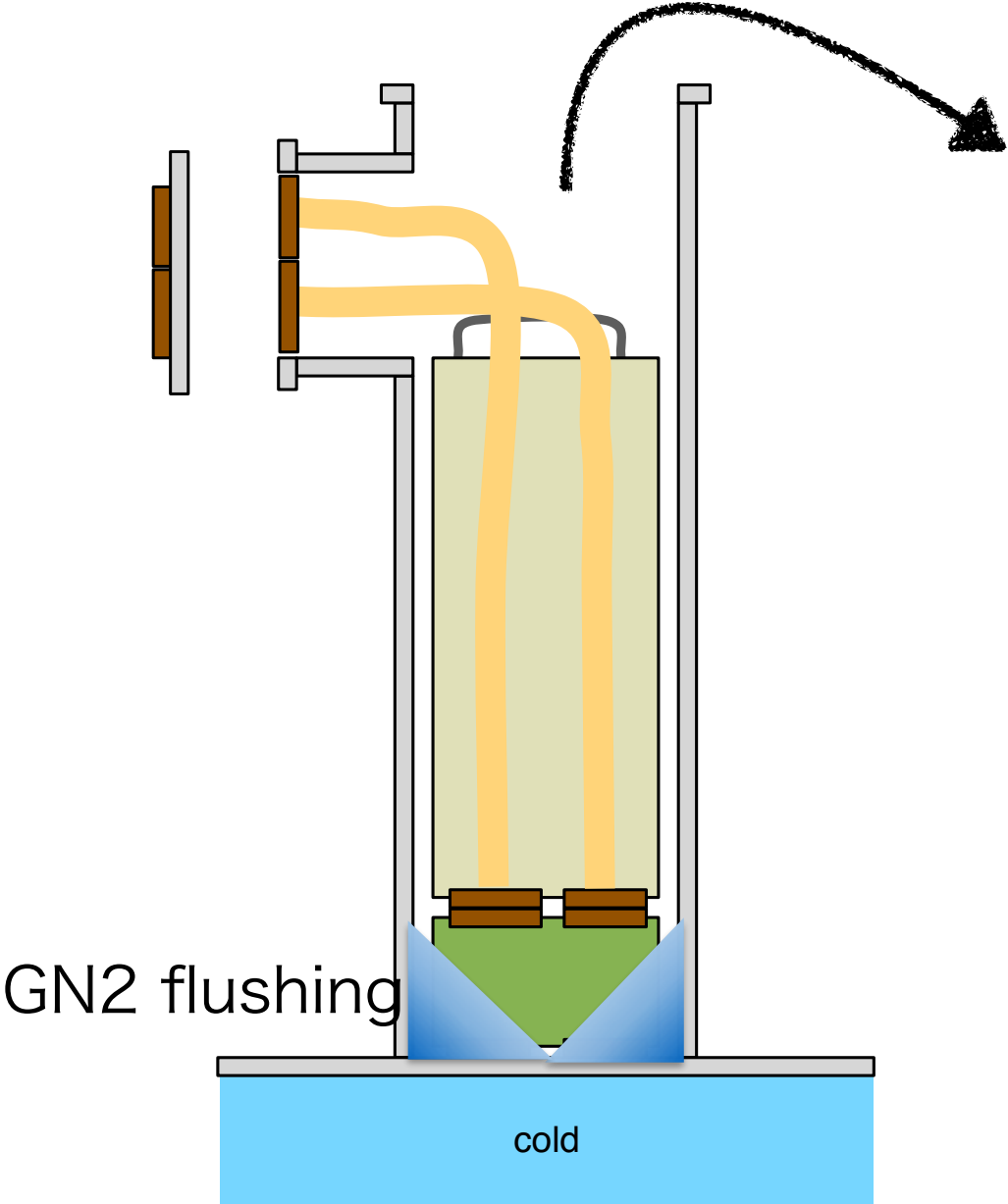


KEK FE w/ blade
x 10

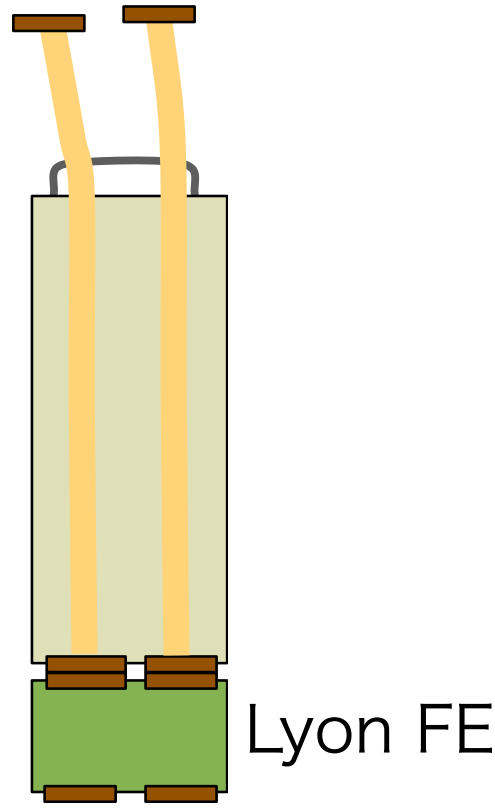


KEK-type
warm FT
(w/ DAQ box
back plate)
x2

(1) open SGFT (top flange and warm-FT) and start GN2 flushing

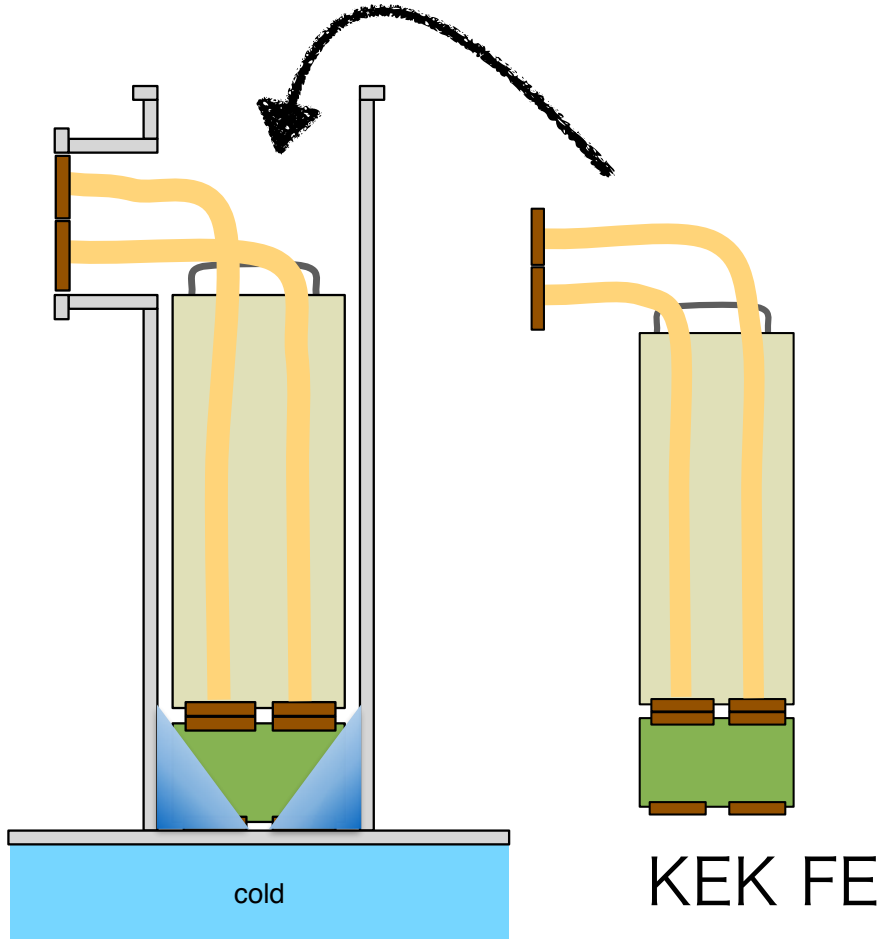


(2) pull out the blade+FT



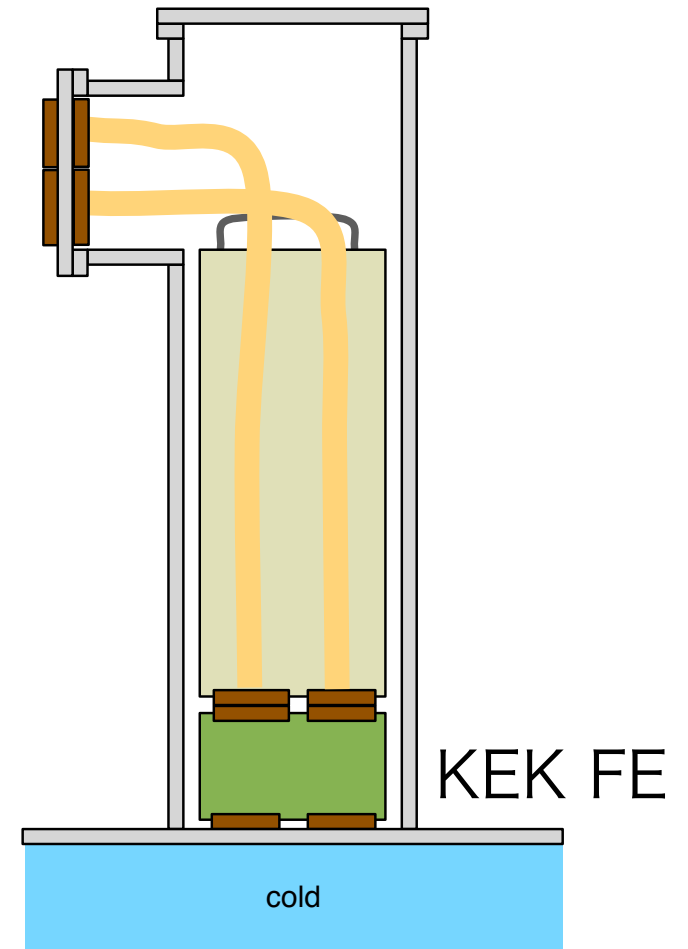
(3) install the blade+KEK-FE

keep GN2 flushing



(4) attach the warm-FT for KEK digital cards, close the top flange

warm FT
for KEK
digital
card



It could be possible to skip evacuation/refilling of GN2

Schedule

- We plan to prepare the 10 additional blades (+ relevant components) and finish the integration test at KEK by the end of April
 - KEK charge signal readout system will be ready for test at $3 \times 1 \times 1 \text{ m}^3$ at the beginning of May