# MuTr Recapacitation

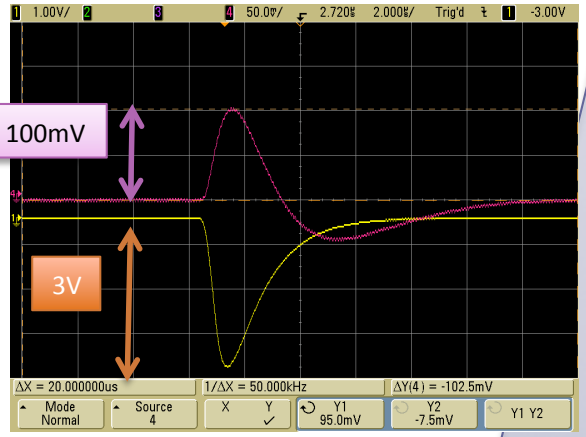
RIKEN/RBRC

Itaru Nakagawa

中川格

# MuTr Cross Talk

$$\frac{3V}{\#\ of\ Strips}\ ?$$




HV (1800 V)

1 MΩ

Anode wire

Removed to reduce HV trips

100 pF

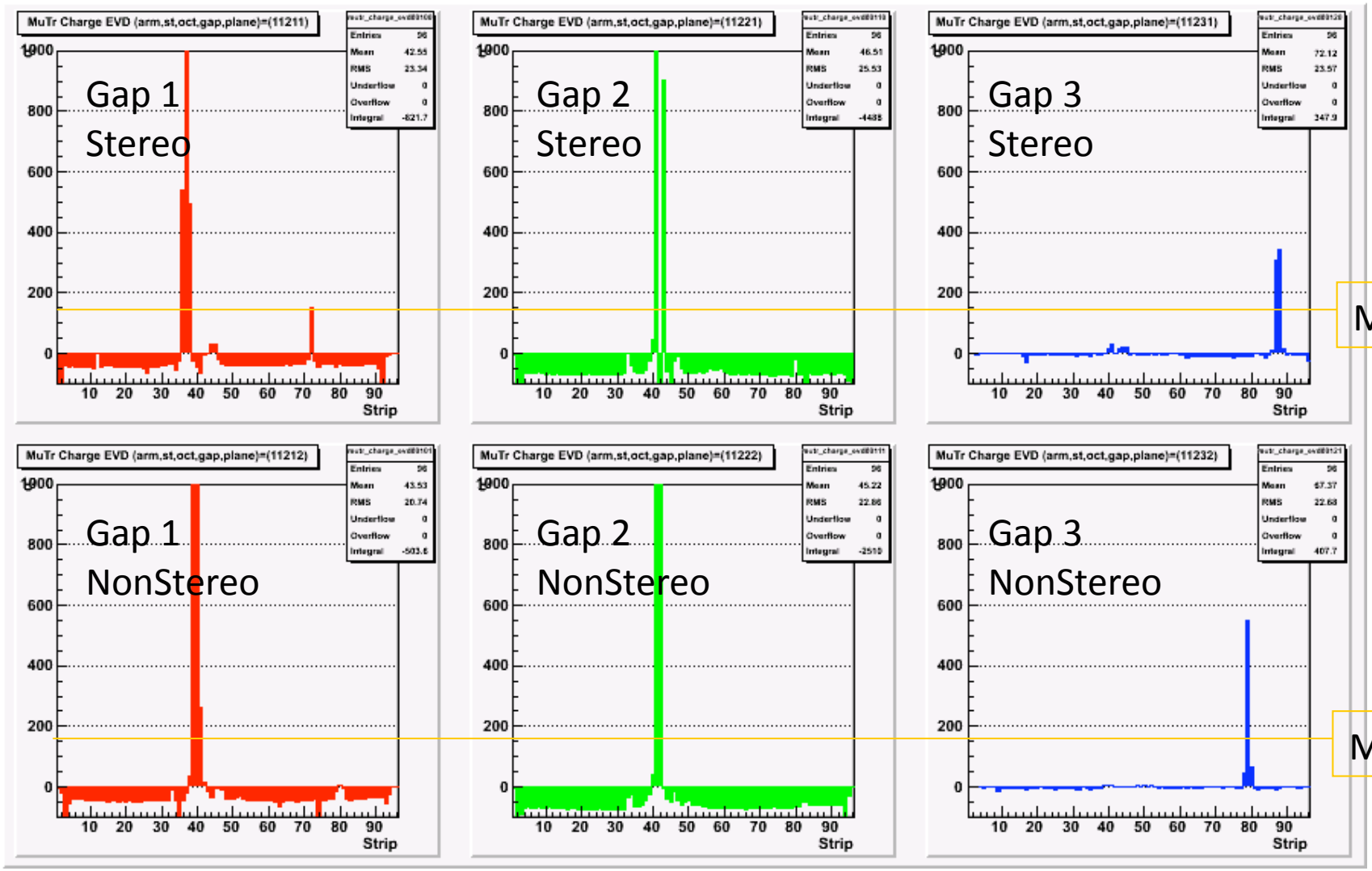
1 MΩ

Anode Readout

Rise time of anode signal ~ 10 nsec

Cathode strips (96 strip)

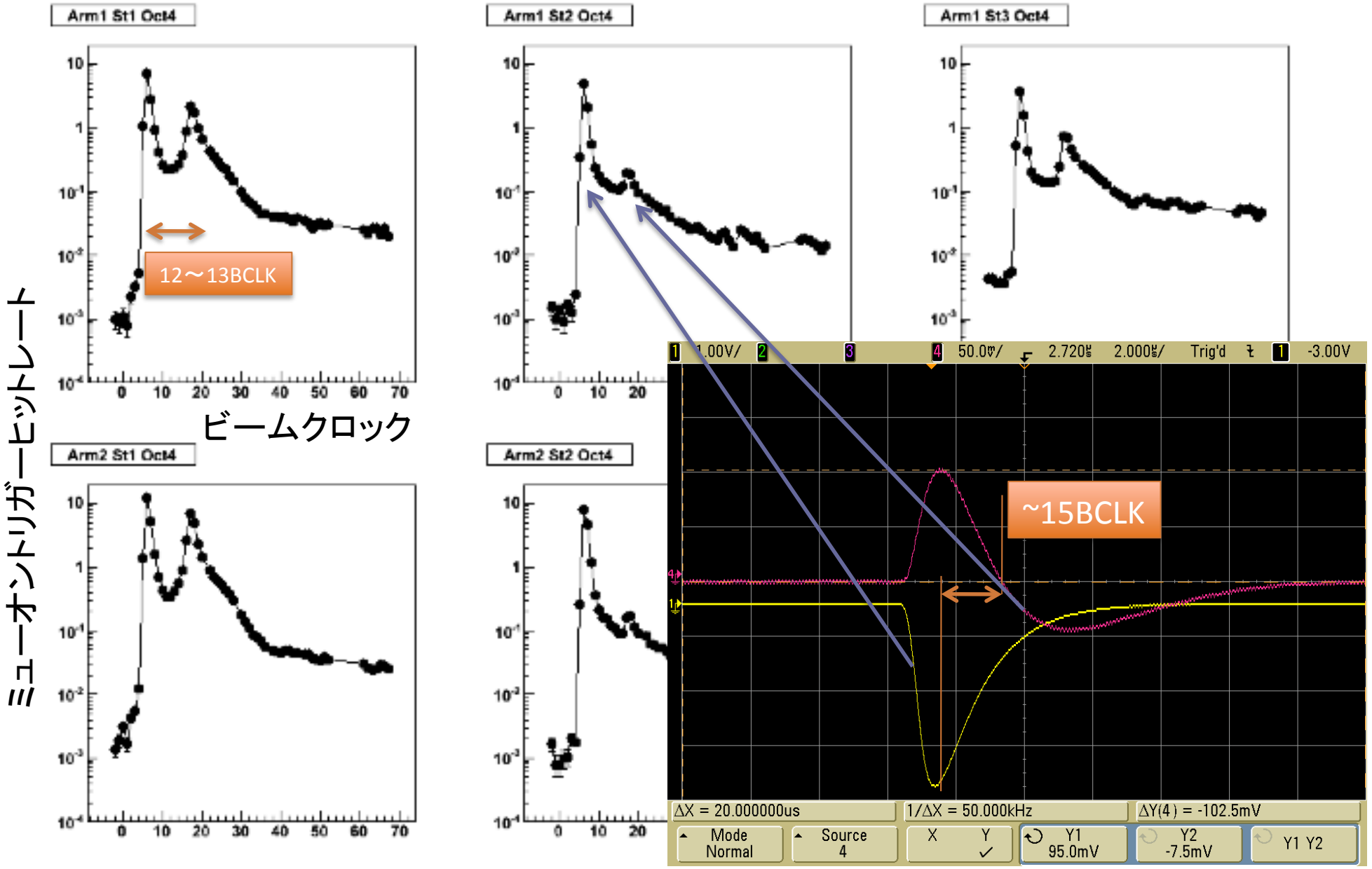
# Hit distribution (200 GeV, zerosup OFF)




Pedestal – ADC(3)

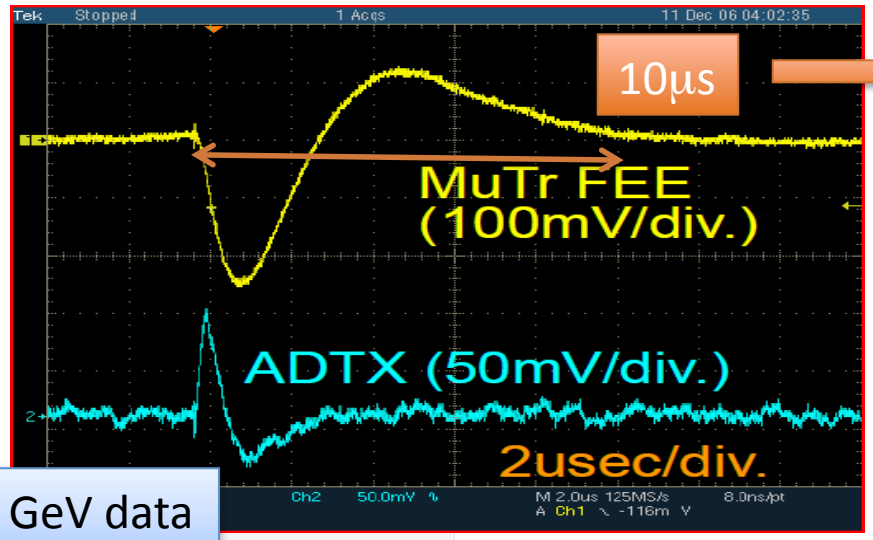
mutr_strip_event000980_clk2424488954q

Strip



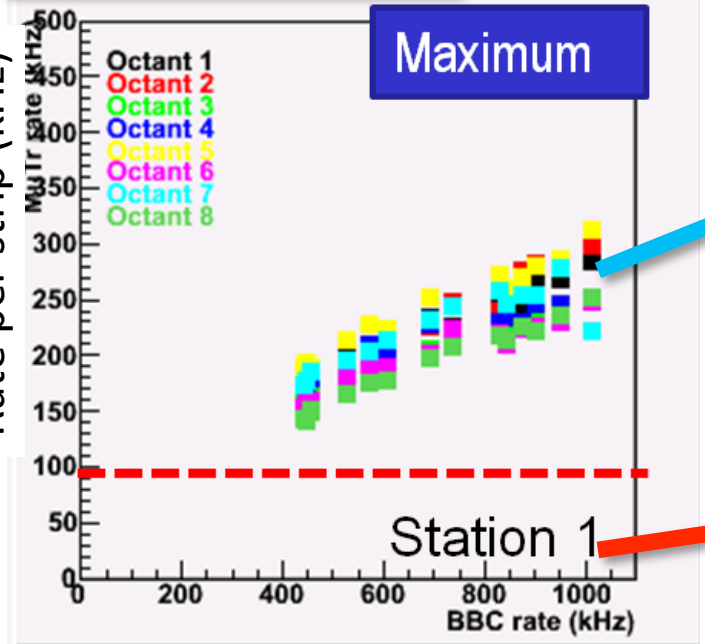

> Data were taken with clock trigger.

# 放置できない理由




100kHzでパイルアップ！

Run 9, 500 GeV data




Rate per strip (kHz)

Current set up

Recapacitation + Neutron Absorber + Shaper Tune

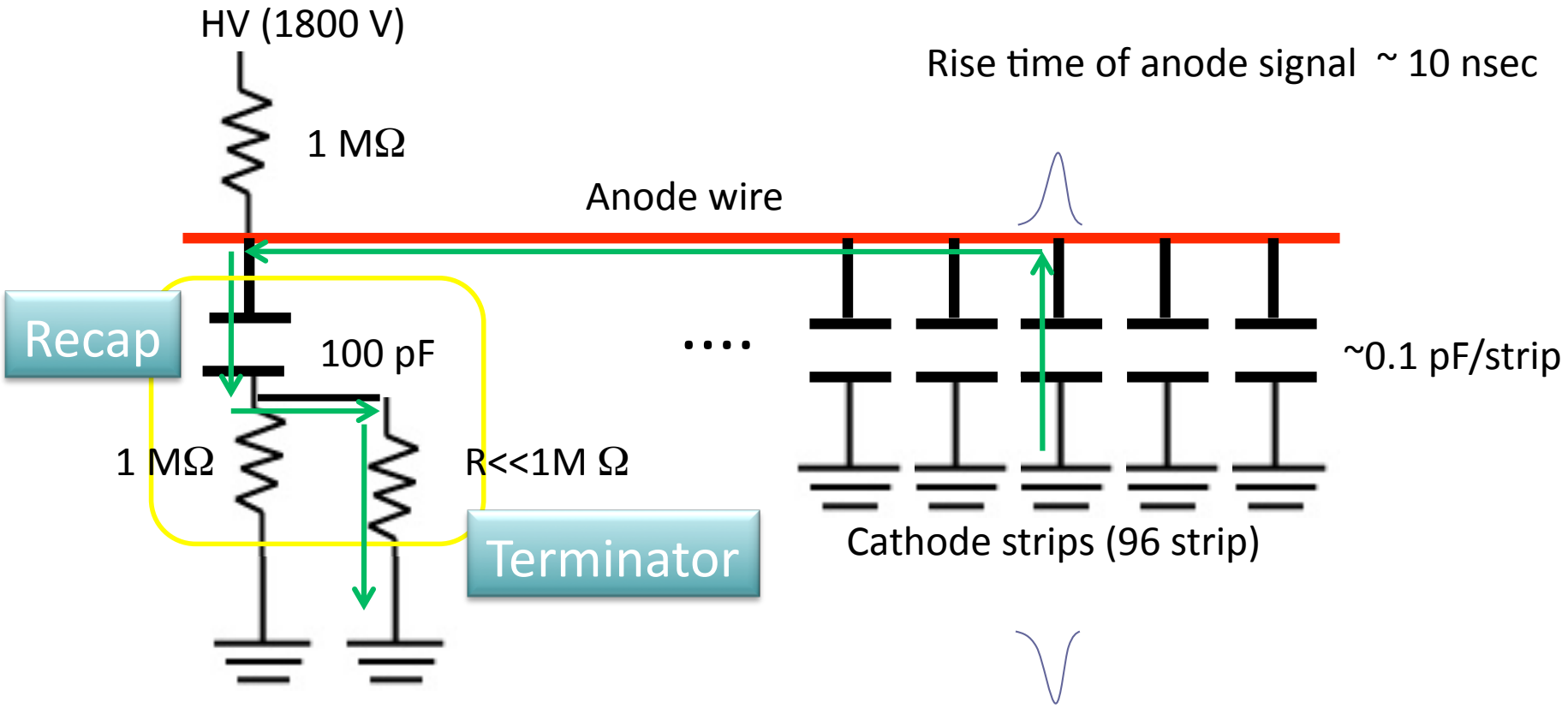
Recap (1/10? cross talk)

x2 (Run 11?)

x5 (design)

Luminosity

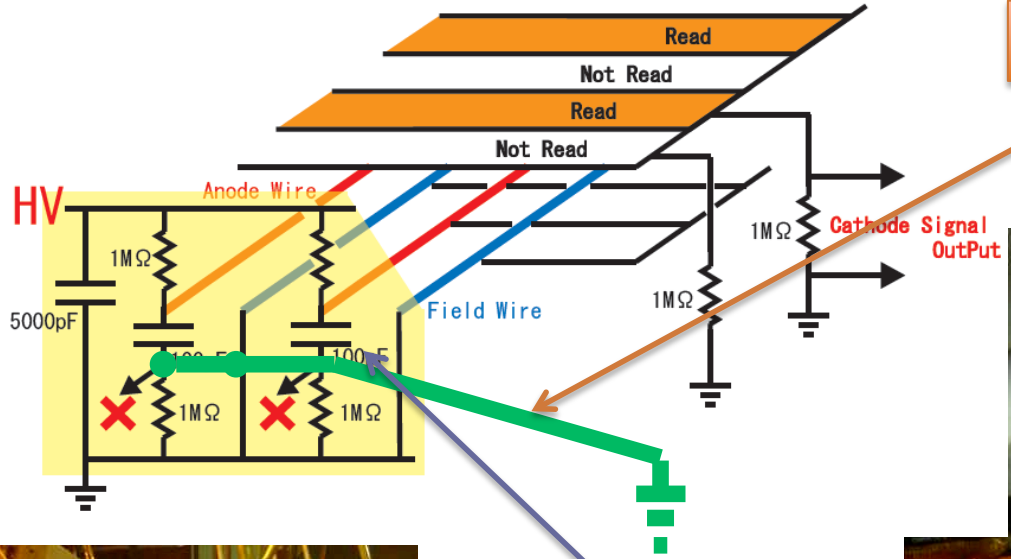
# Anode circuit diagram after recap +termination




- Cathode impedance = 1/ωC
- Z(cathode) = 1/(100 M Hz/ 2 pi * 0.1 pF) = 6 kΩ @10 nsec

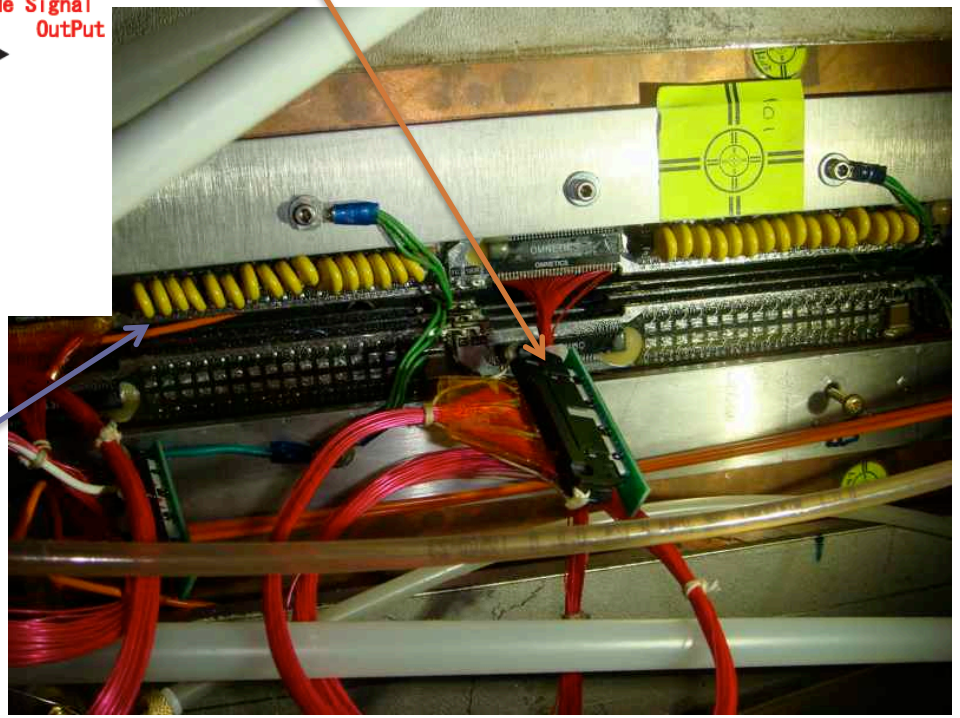
- Z(bypass) = 6 Ω << Z(cathode)

# Recapacitation (Station-1)




terminator

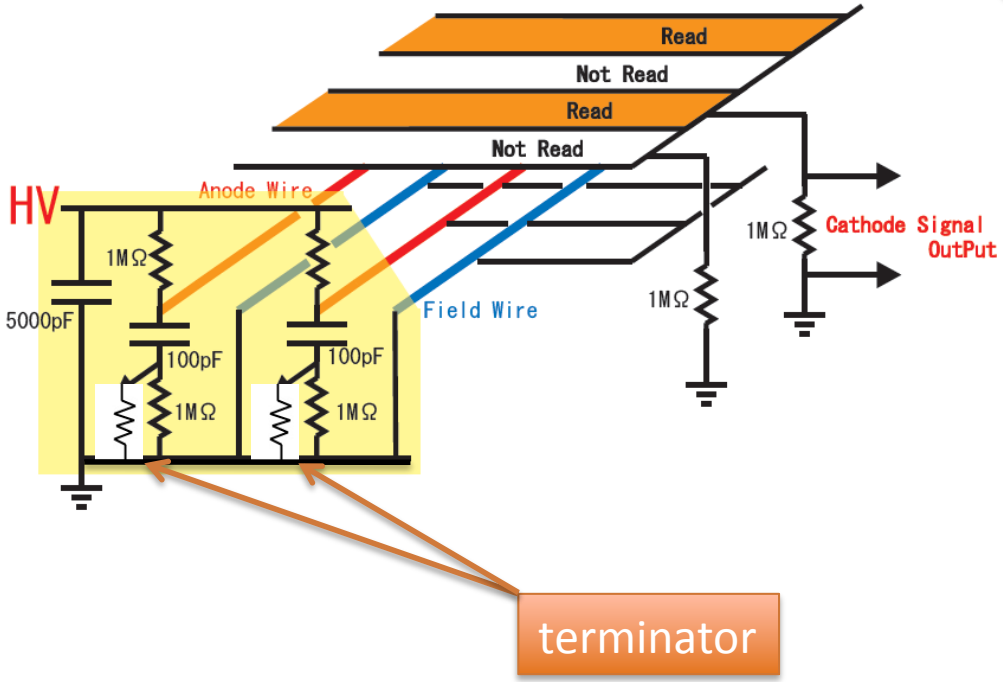
capacitors



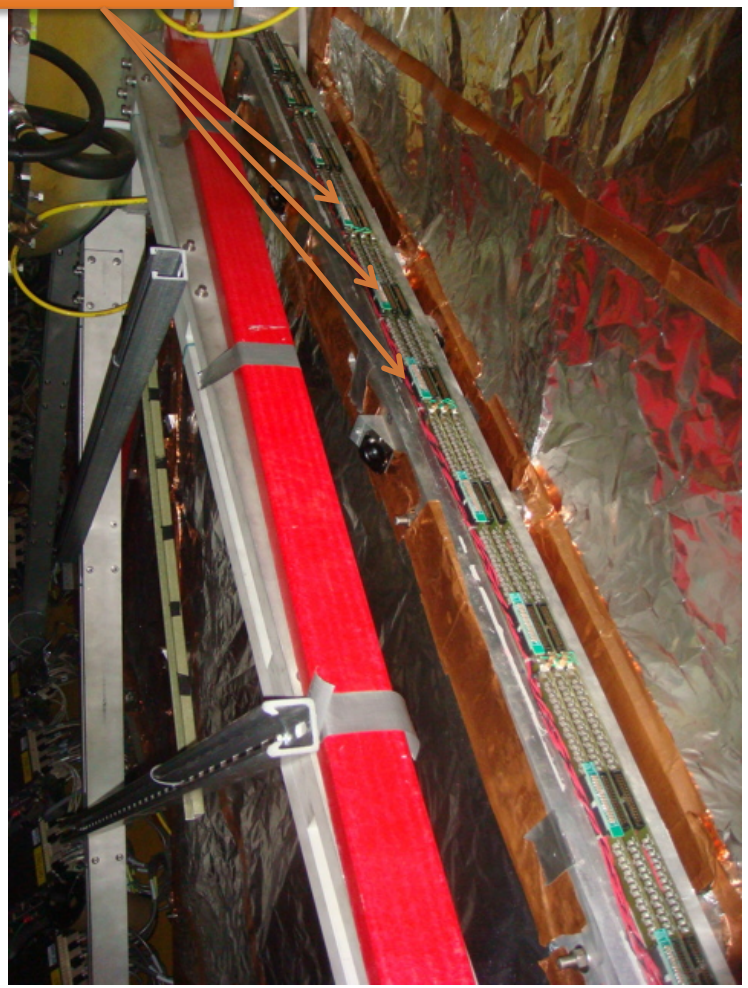
2010: Gap-1
2011?: Take Station-1
Chamber out, and solder

All capacitors are removed. New capacitors will be soldered and attach terminators to ground.

# Recapacitation (Station-2)

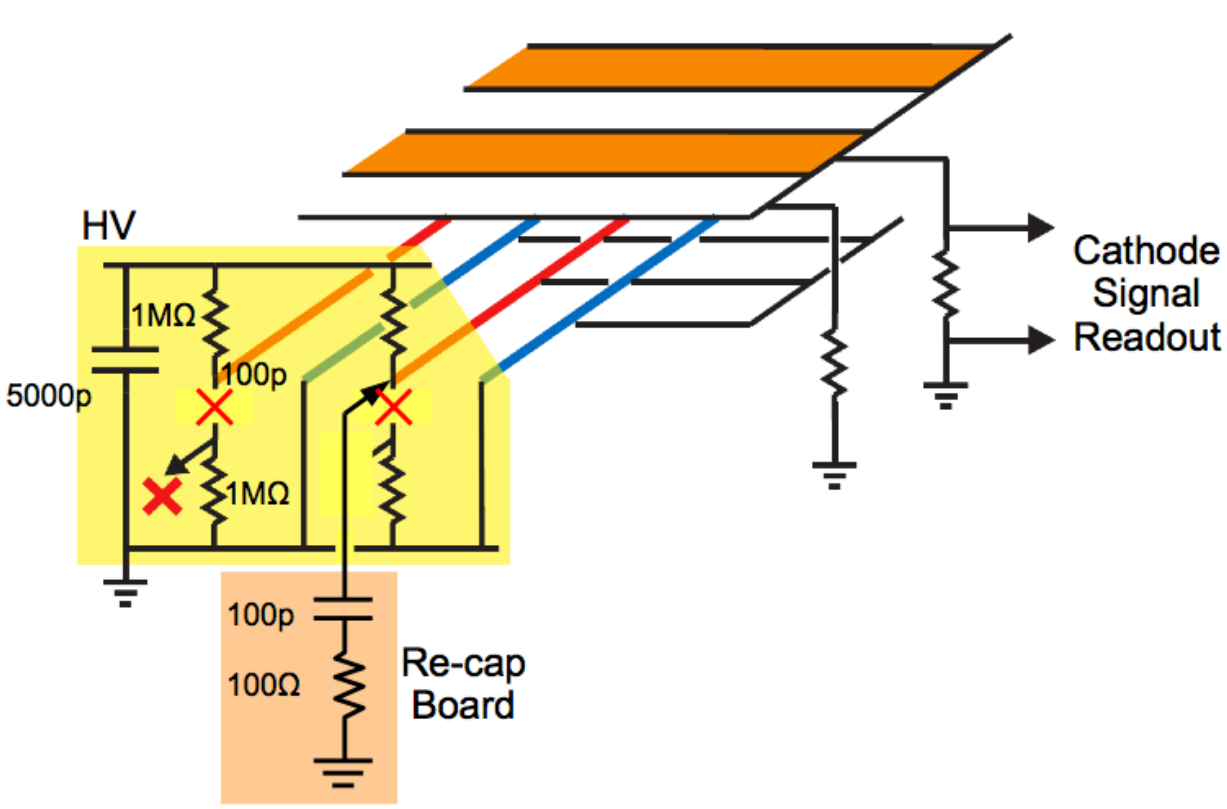


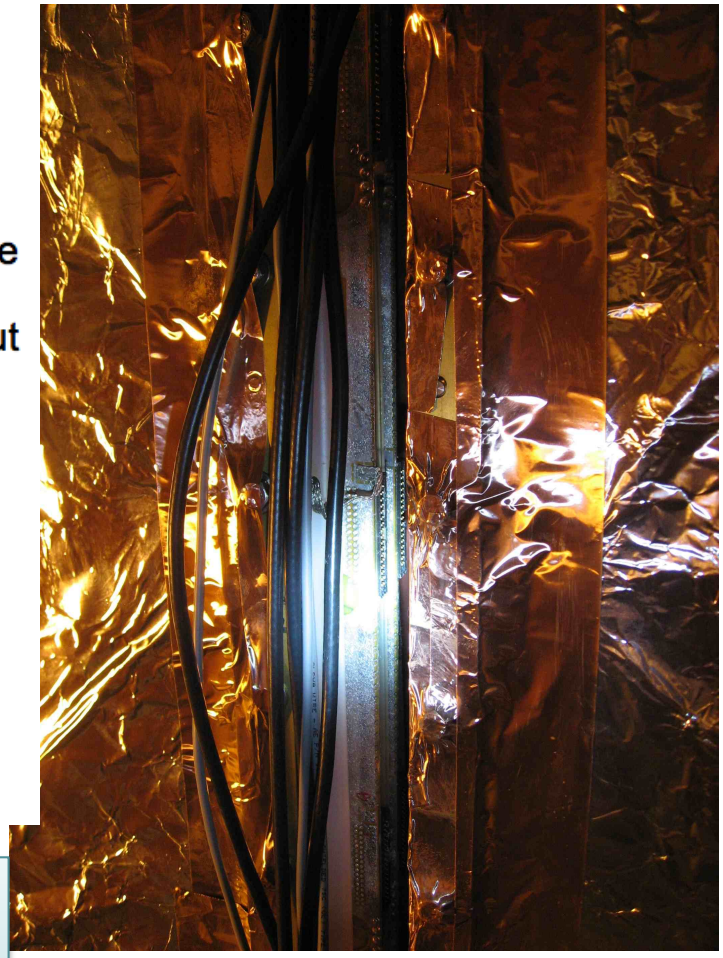

terminator



Capacitors are remaining. So new terminal cards to be mounted to the anode readout connector.

# Recapacitation (Station-3)



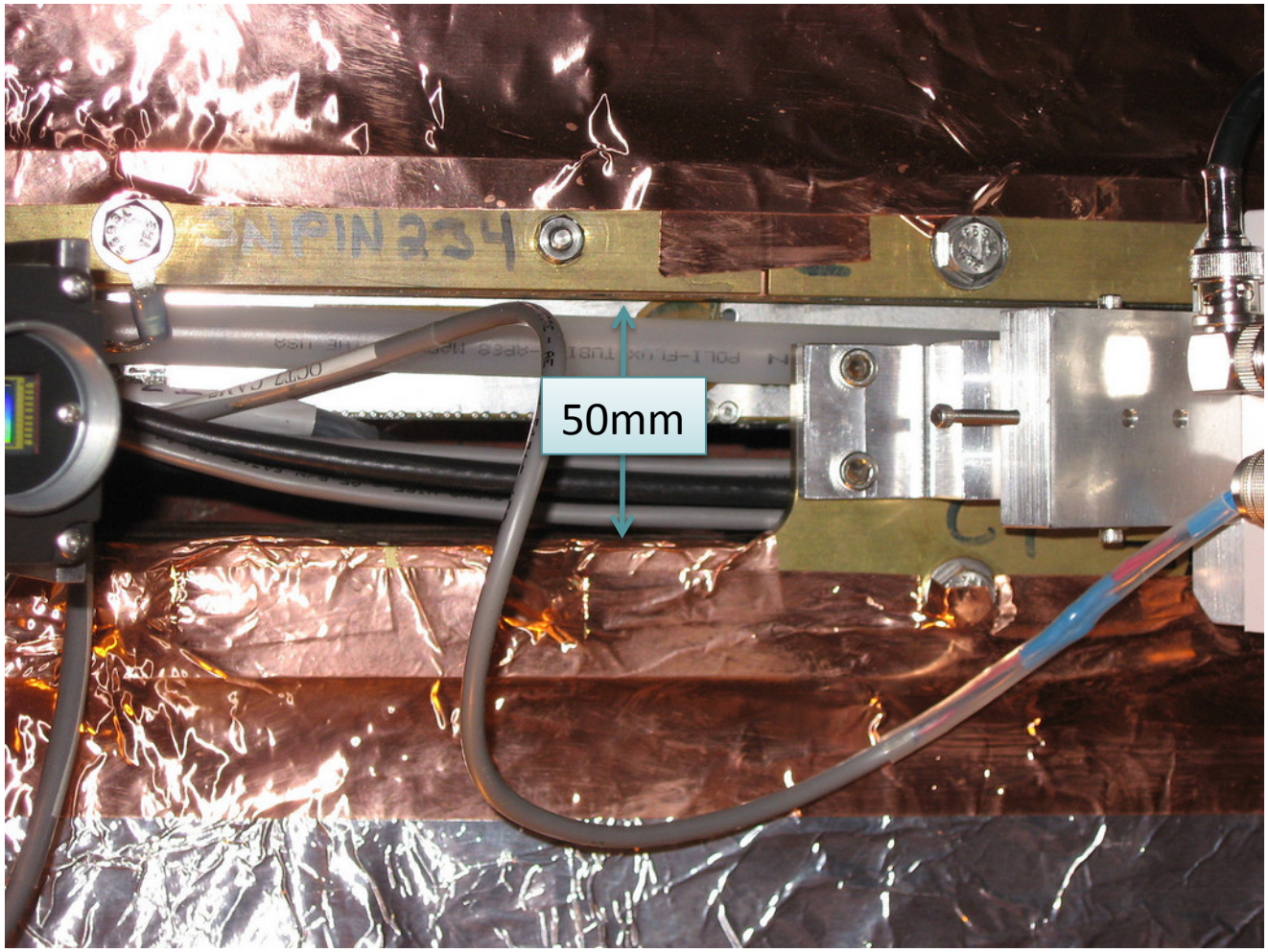



All Capacitors had removed. It is very difficult to take out Station-3 chamber. Thus “clamp type” recap-board is under development.

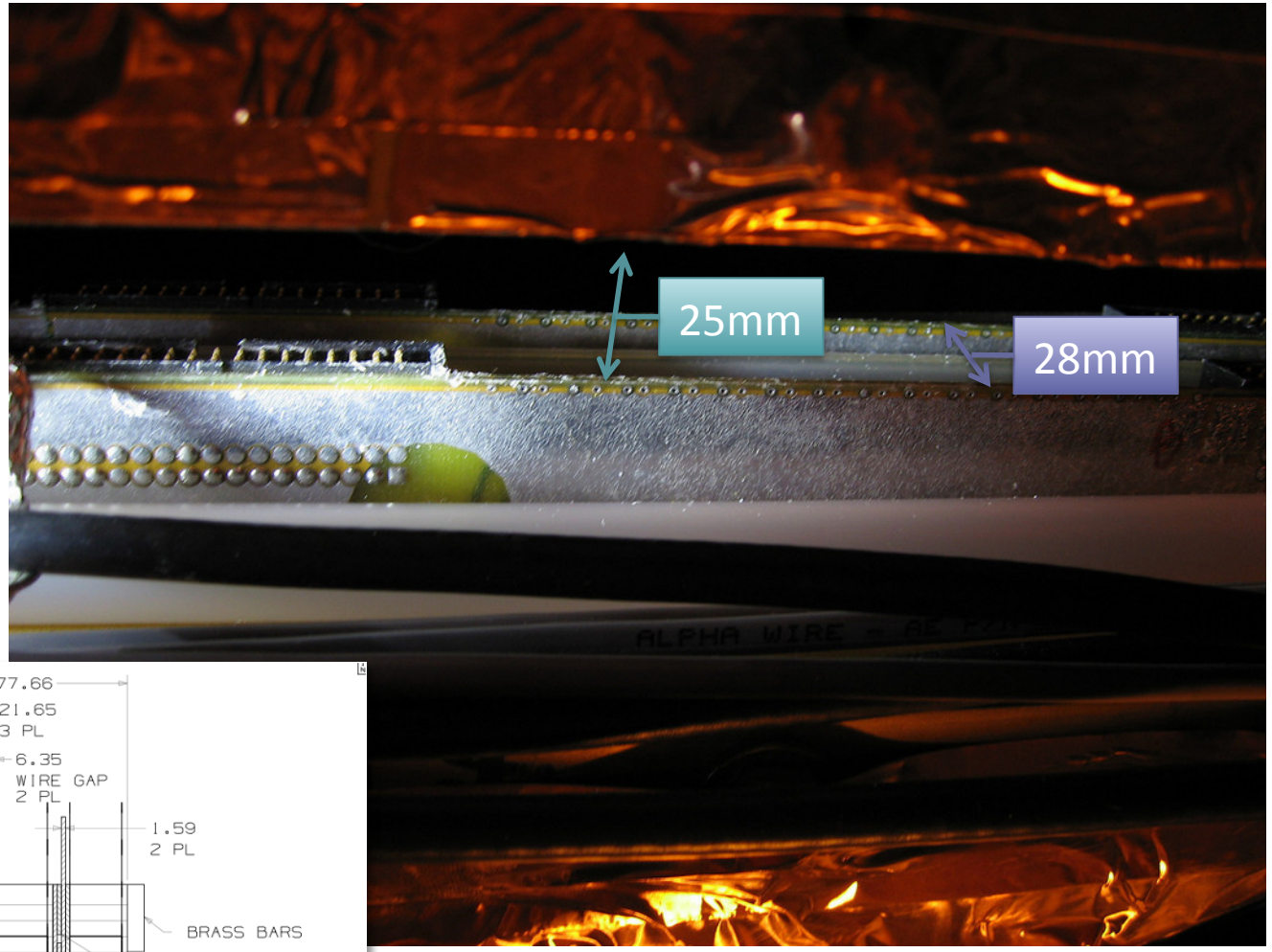
# Installation Constraint

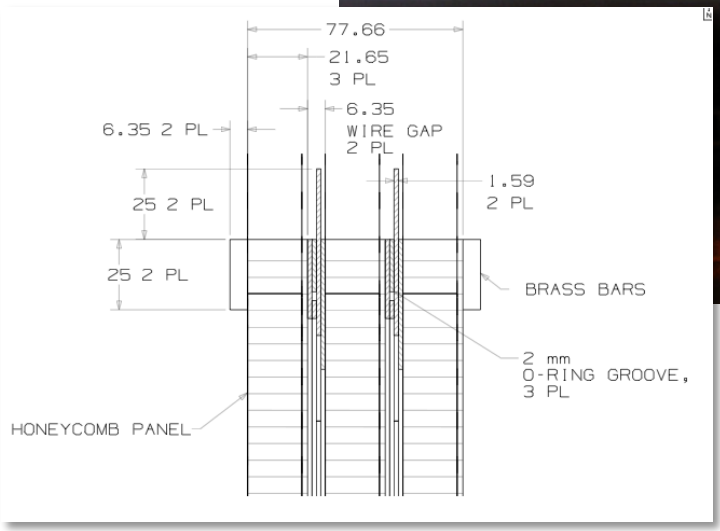
# North Station-3 Anode Gap

# North Station-3 Anode Gap



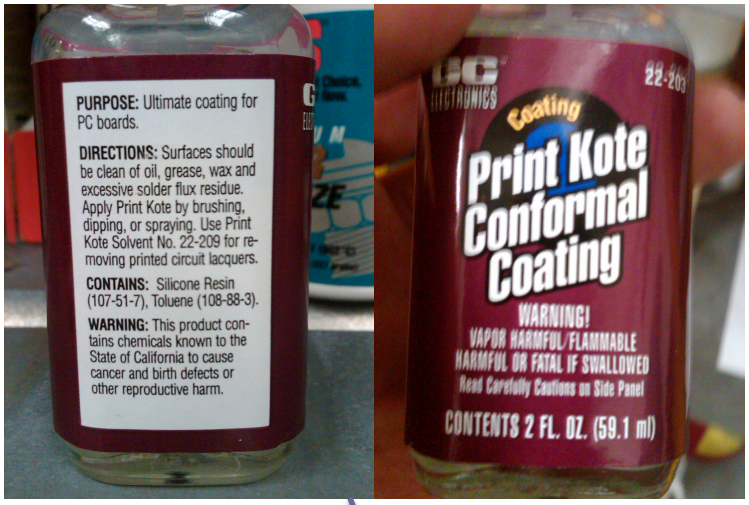
# North Station-3 Anode Gap




Cross section drawing

# Surface Coating



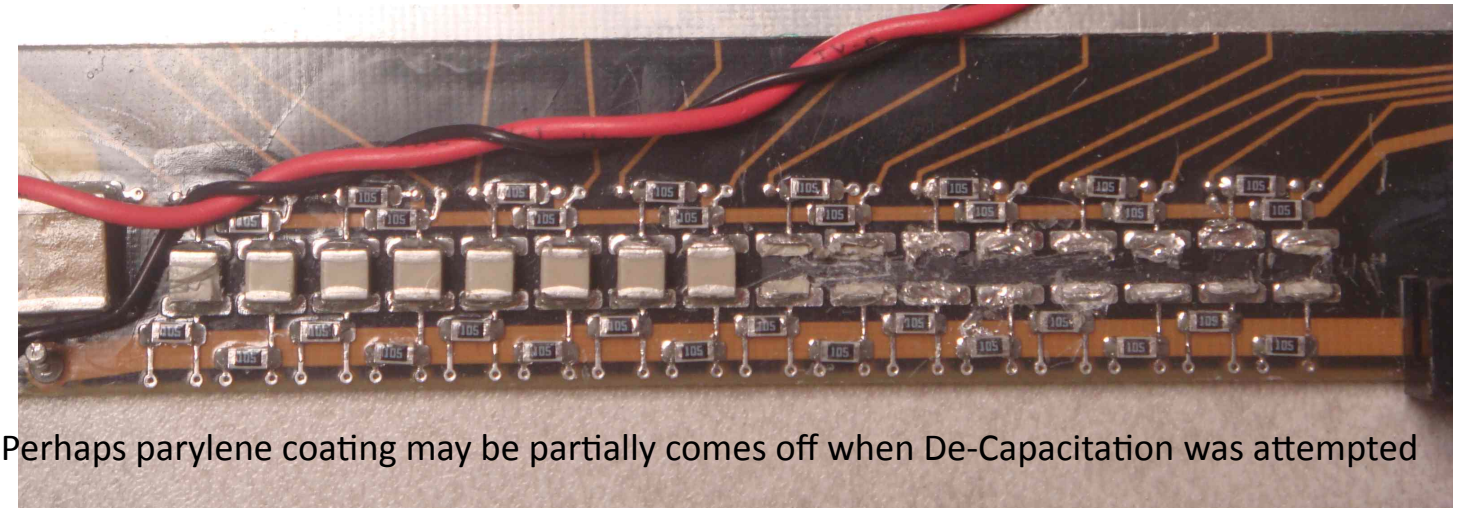
remover

Takes time, but eventually comes off

Print Kote
Parylene C
Anode Card

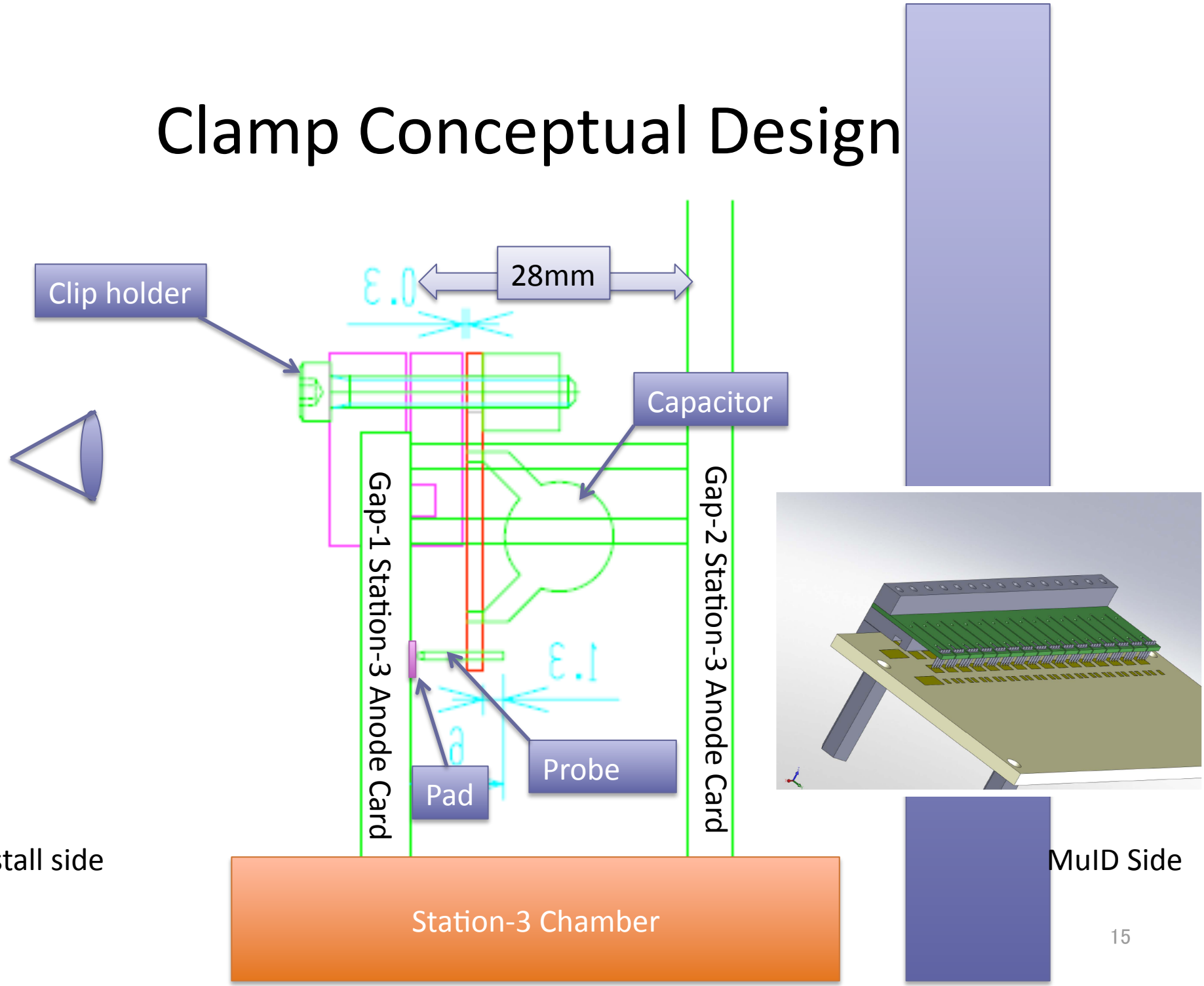
Will melt with chloronaphthalene at 175 degrees (more than 1 hour).

Practically impossible

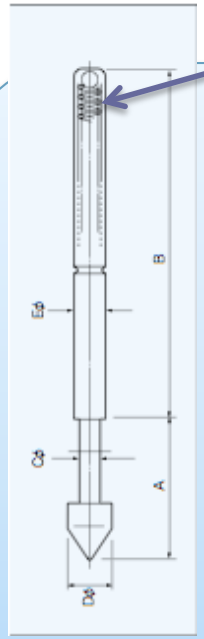


Perhaps parylene coating may be partially comes off when De-Capacitation was attempted

# Clamp Conceptual Design



# History of R&D

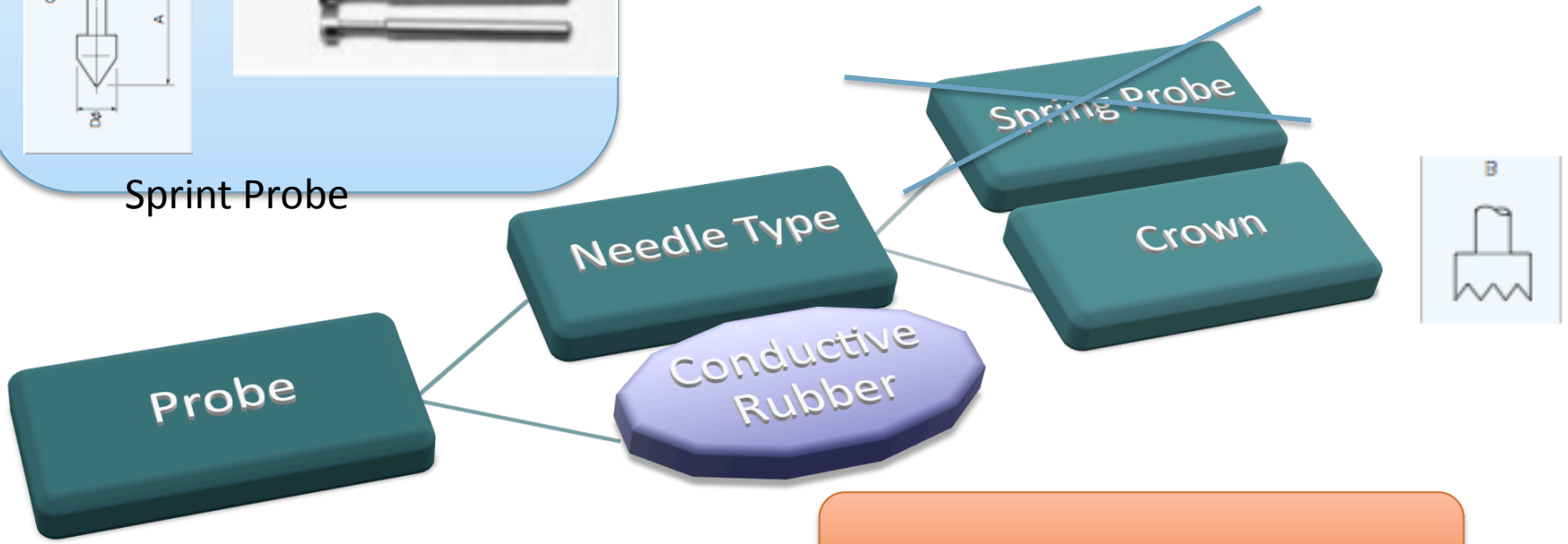


Spring

Sprint Probe

NG

- Probe Length > ~few cm
- Max Current < 3A
- Spring is not too strong

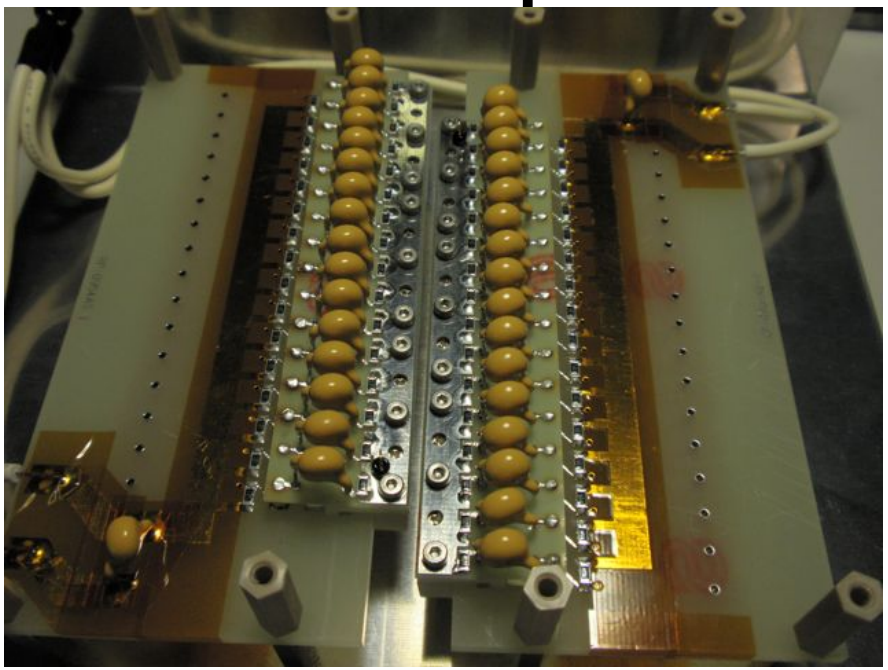


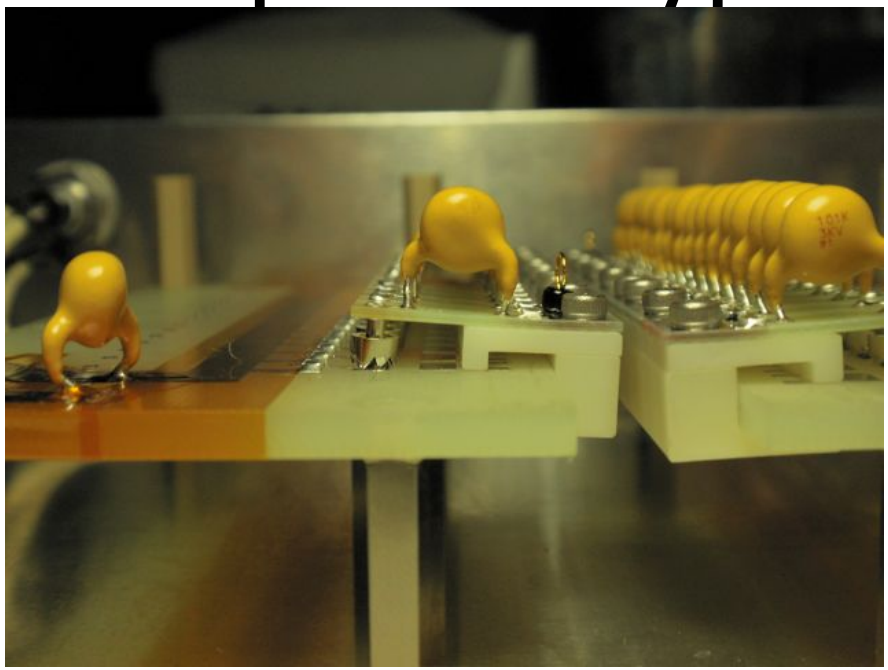


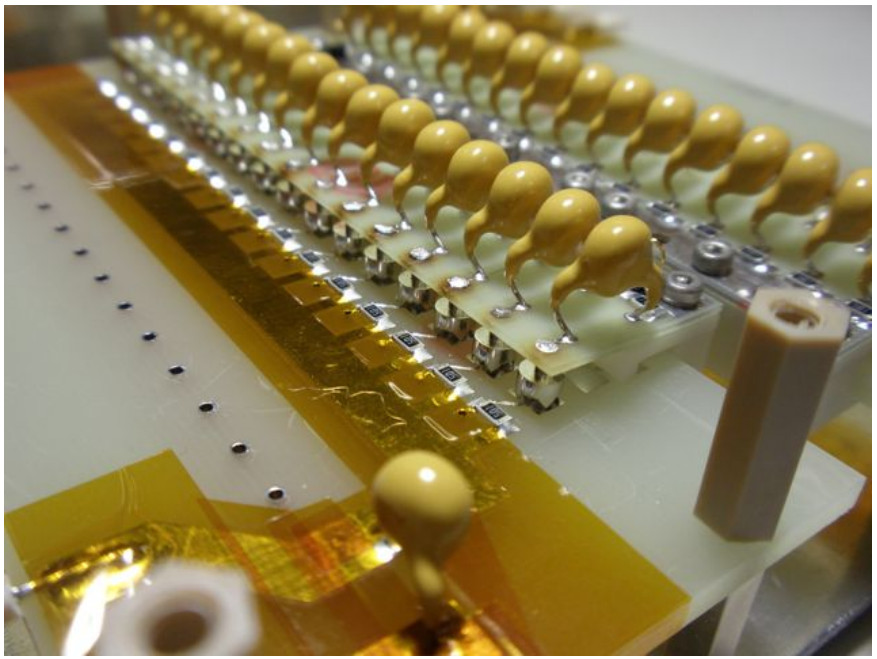

Possibly penetrate coating

Good

# St-1 Recapacitation Clip Prototype

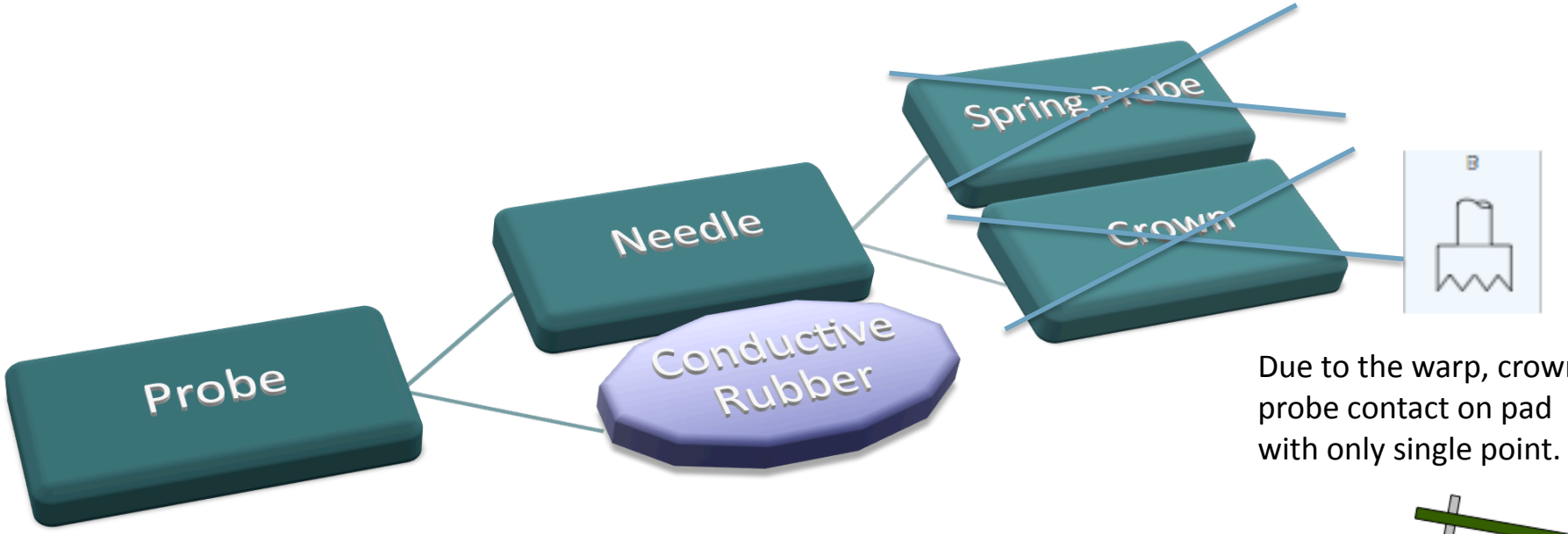




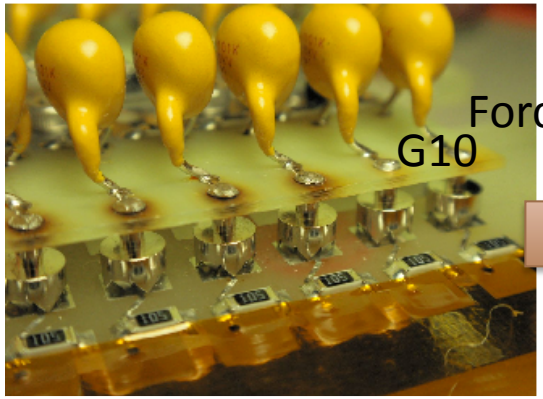


Delivered in mid. February.
To be tested shortly.

# History of R&D

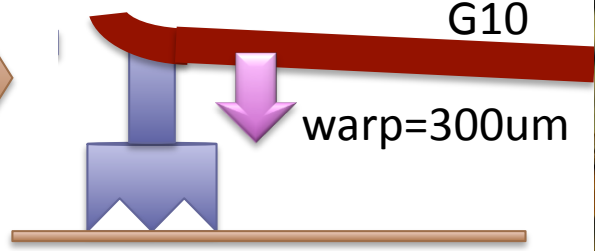


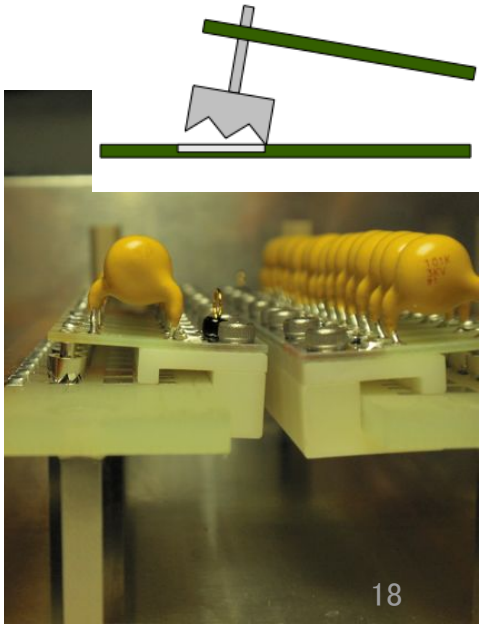

Due to the warp, crown probe contact on pad with only single point.




Looses it's contact if adjacent pad have left over solder.

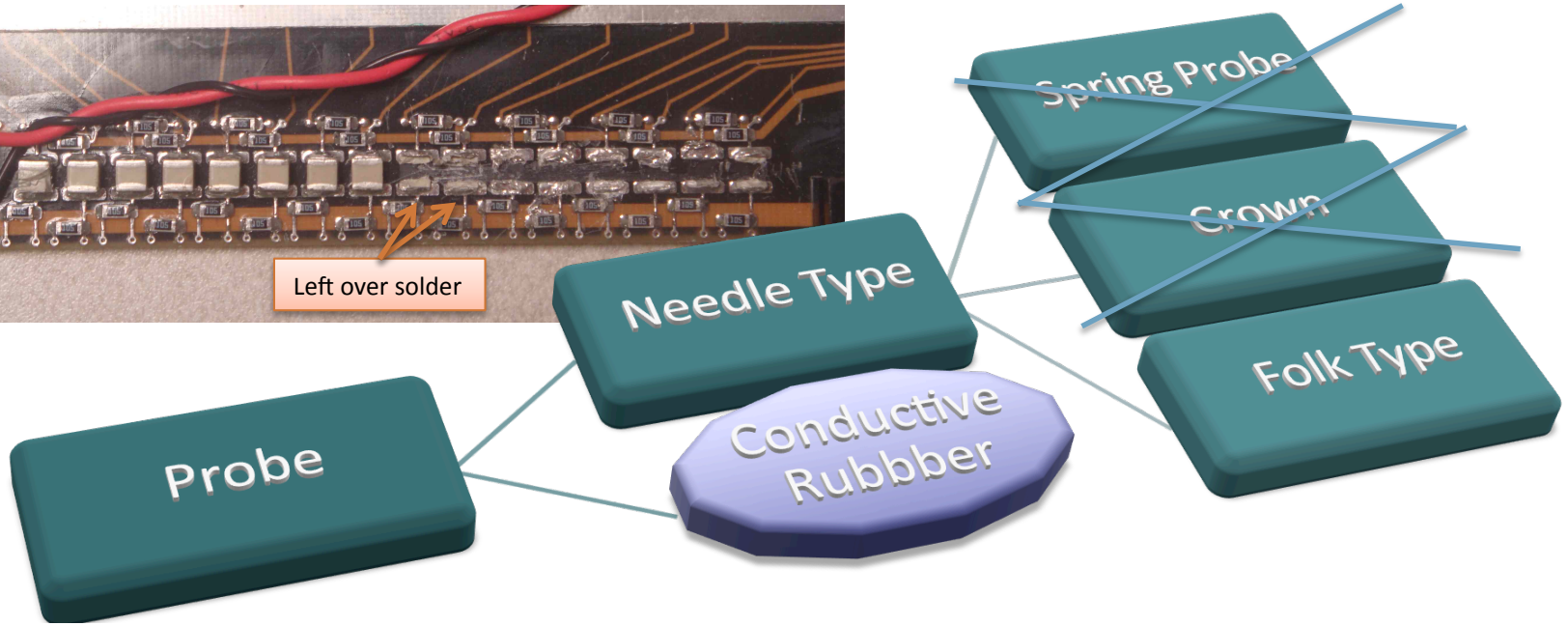
Force crown to contact with pad

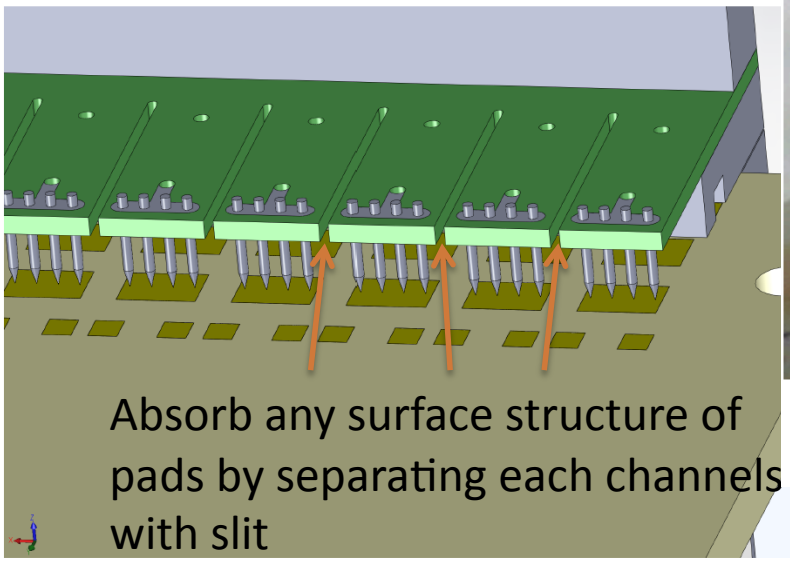


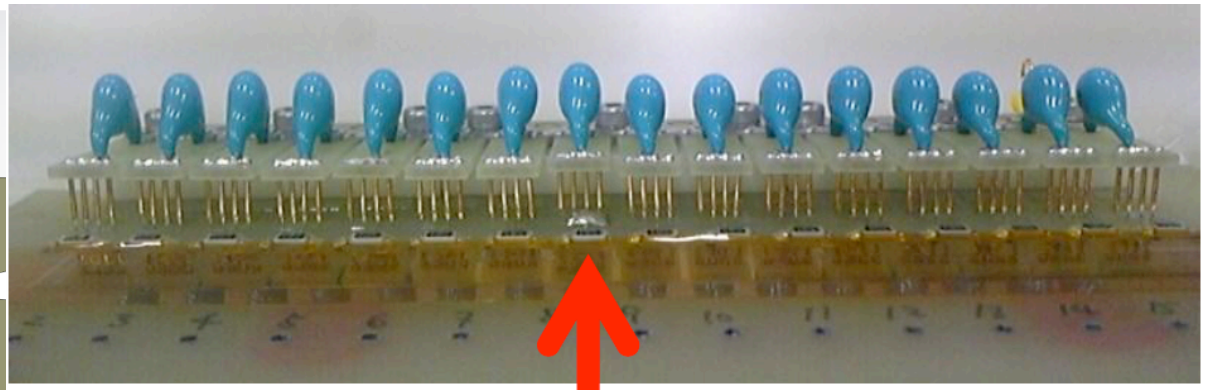
# History of R&D



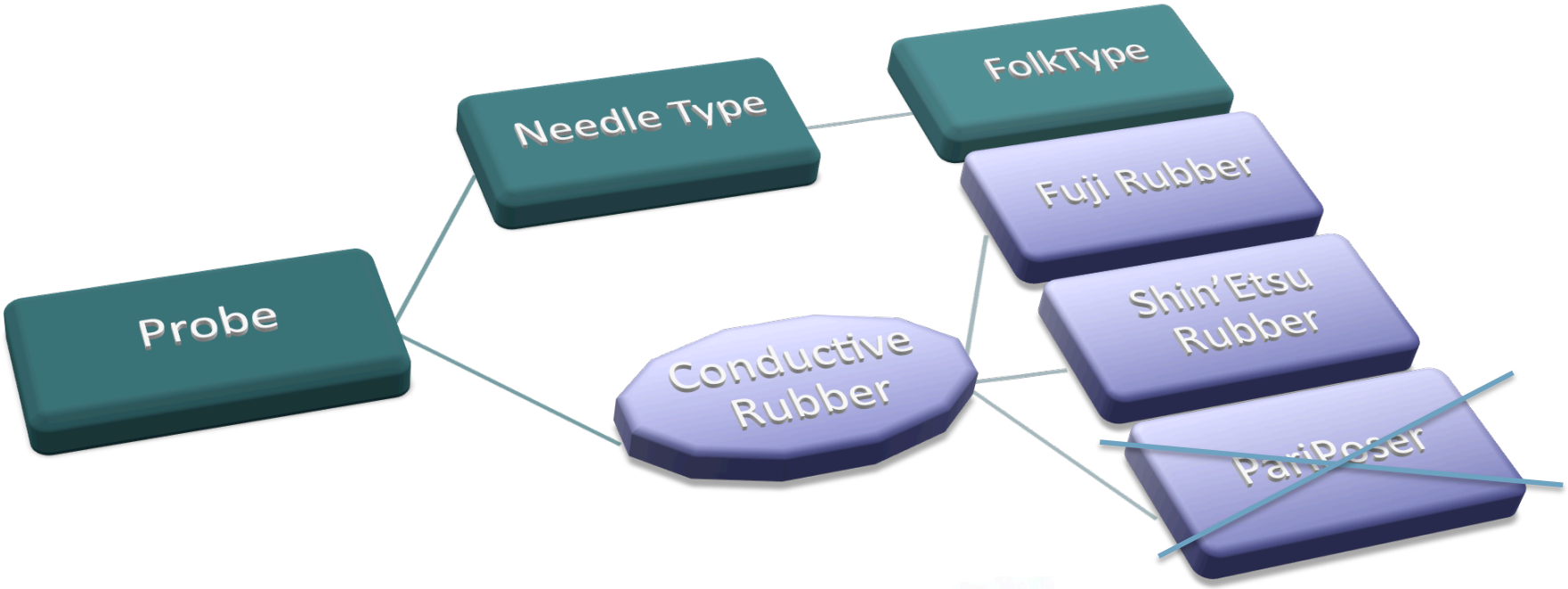



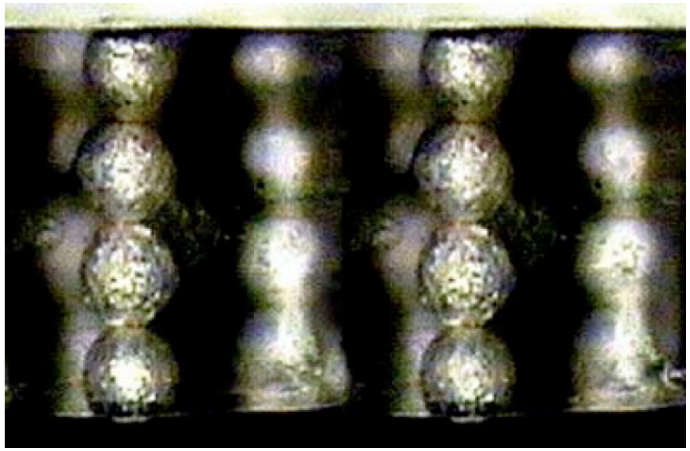
Absorb any surface structure of pads by separating each channels with slit



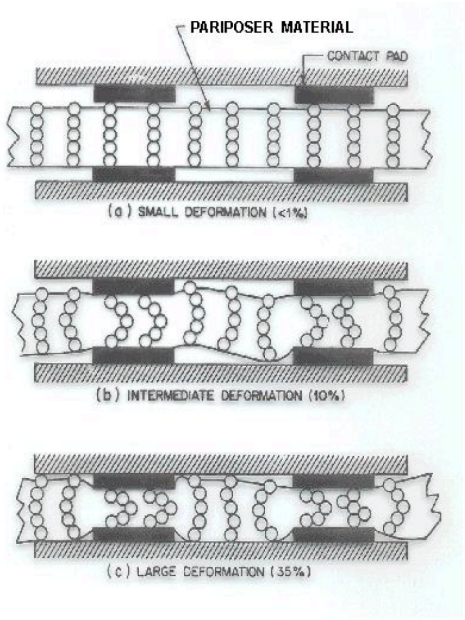
Confirmed good contact even strips right next to the channel where 800um high left over solder is

# History of R&D



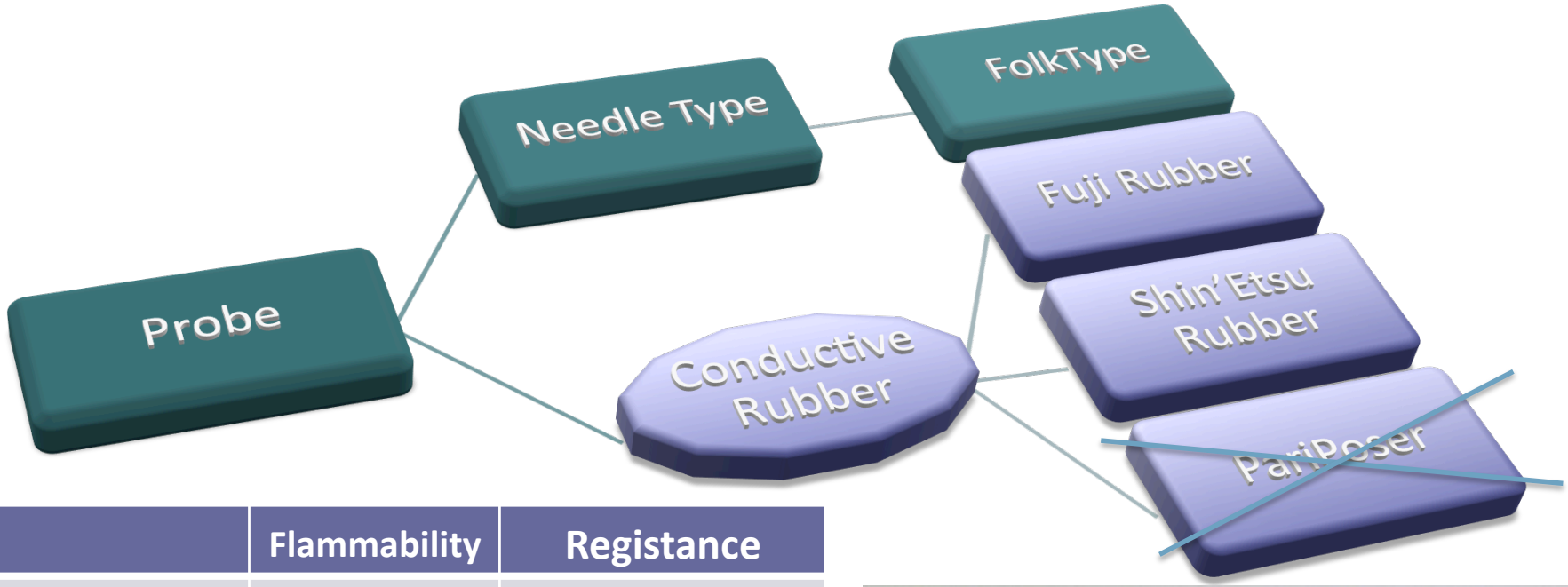



Register<6mΩ

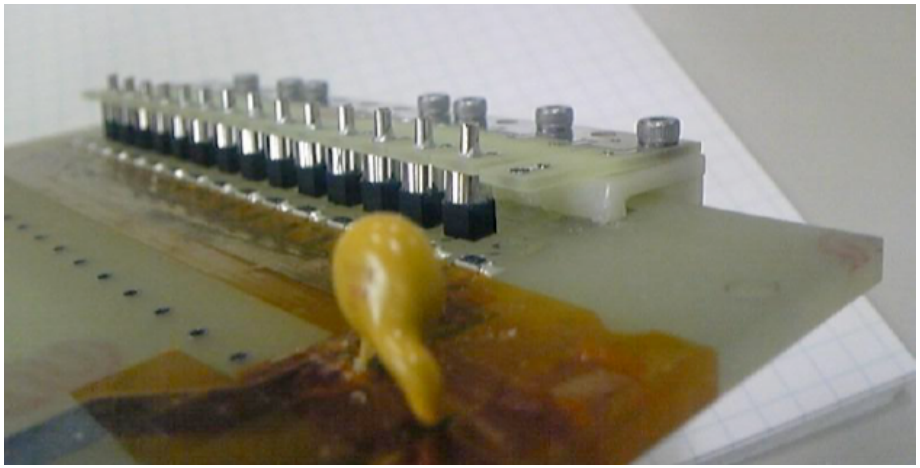


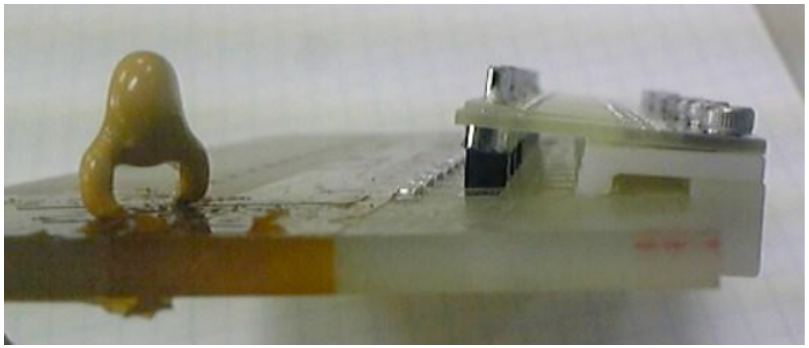

Thickness is limitted <500um

# History of R&D



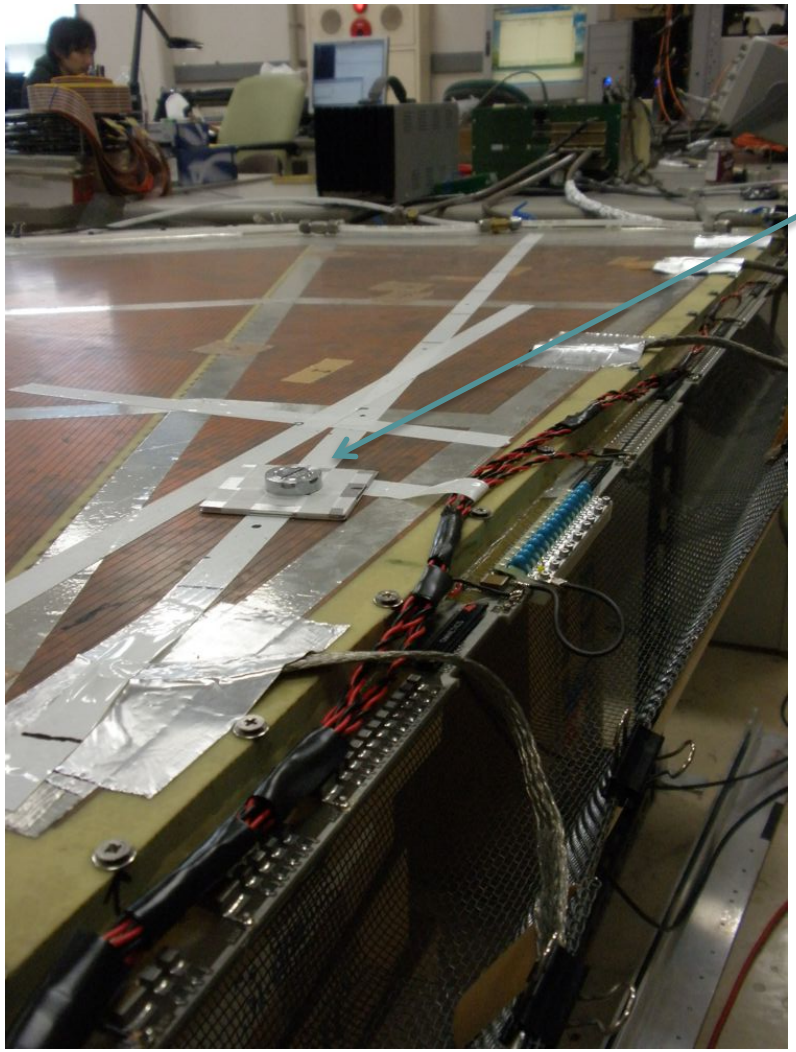

| | Flammability | Registance |
|---|---|---|
| Fuji Rubber | UL94-V2 | 2～3Ω |
| Shin'Etsu Rubber | UL94-V0 | 100～400Ω |

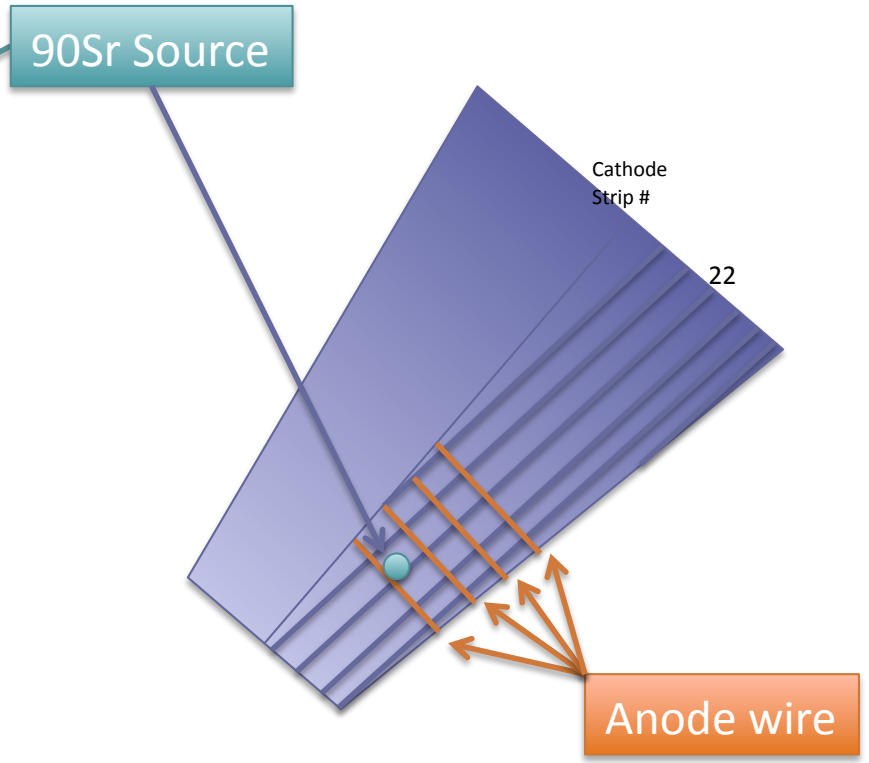




# Recap Effect

# Test Bench Setup

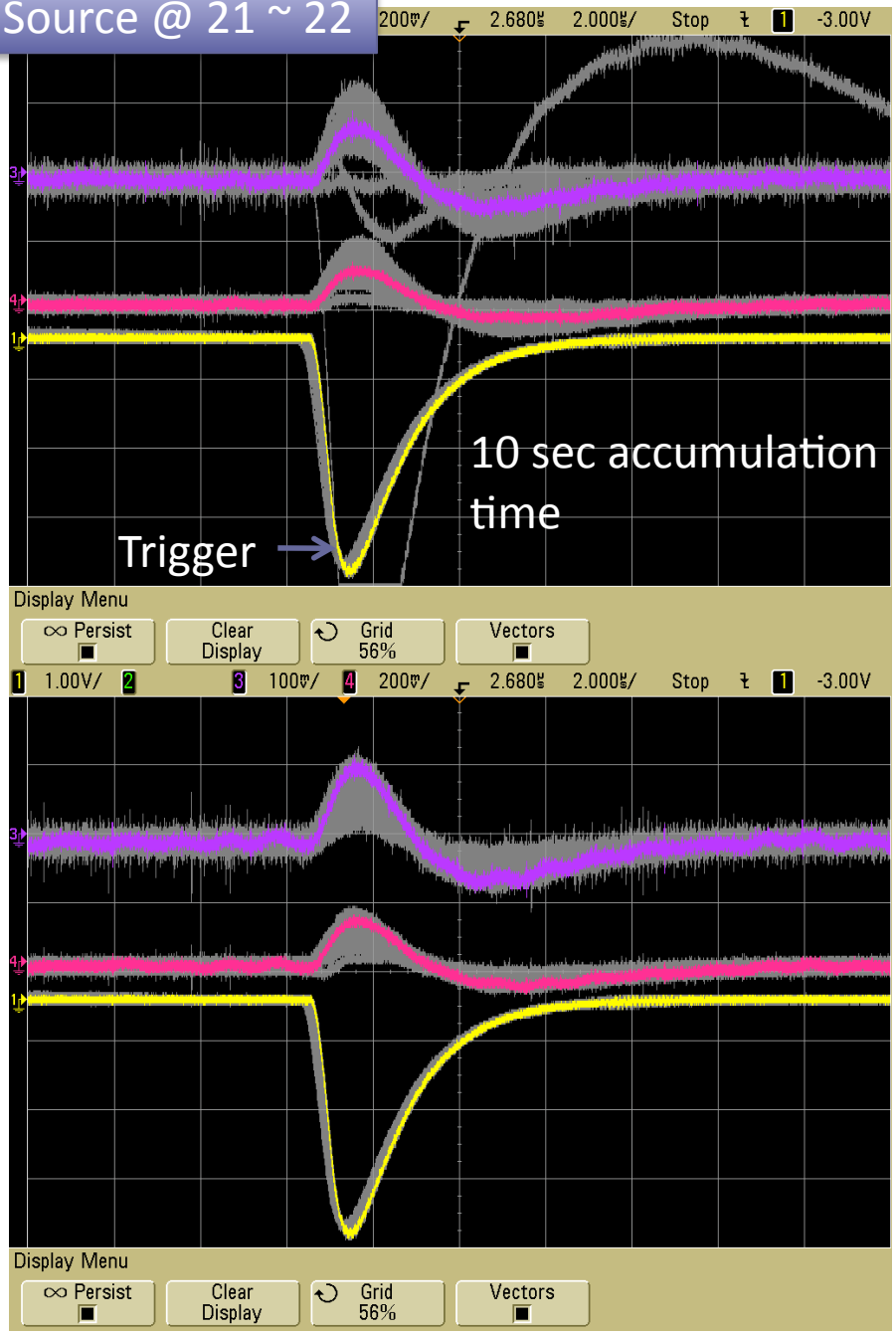


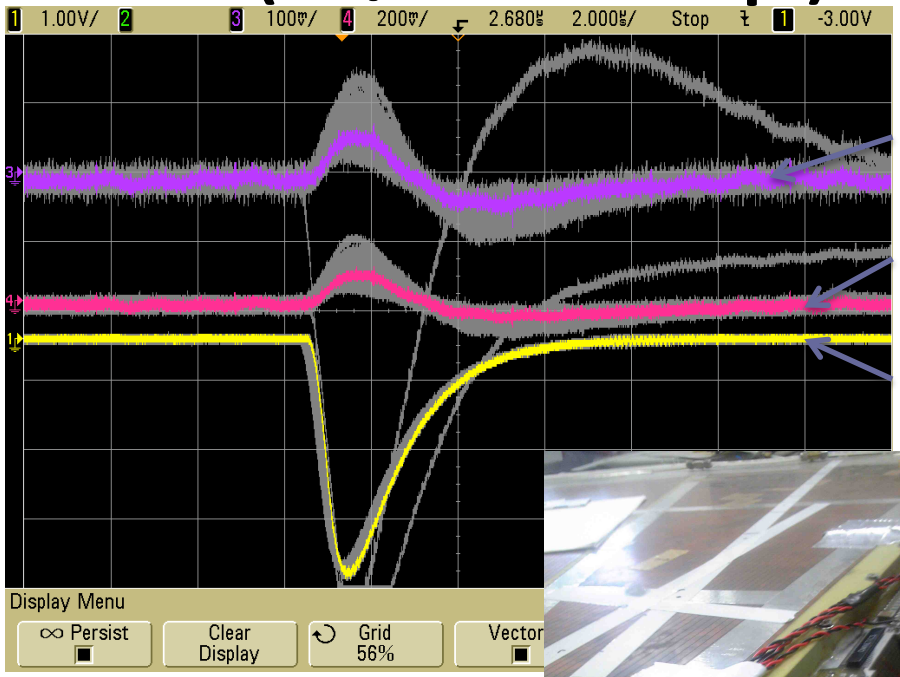


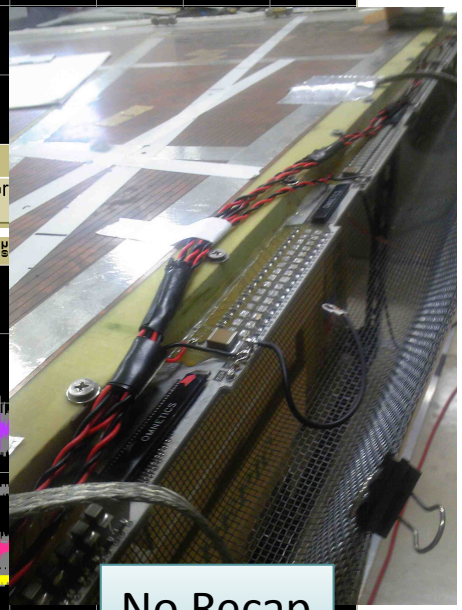
# Oscillo Snap Shot (w/o Recap)

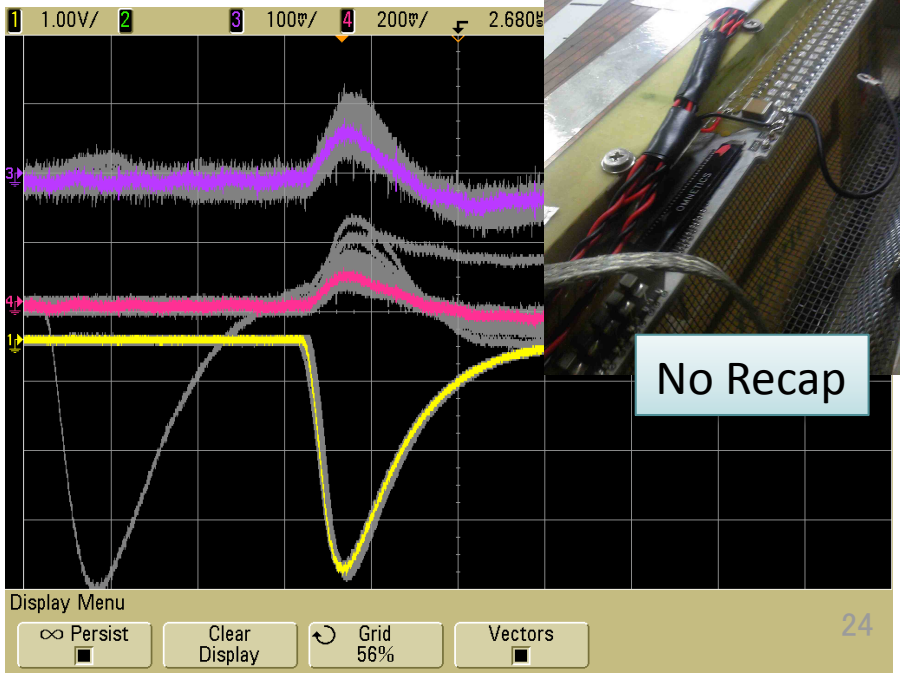
Strip#

Source @ 21 ~ 22



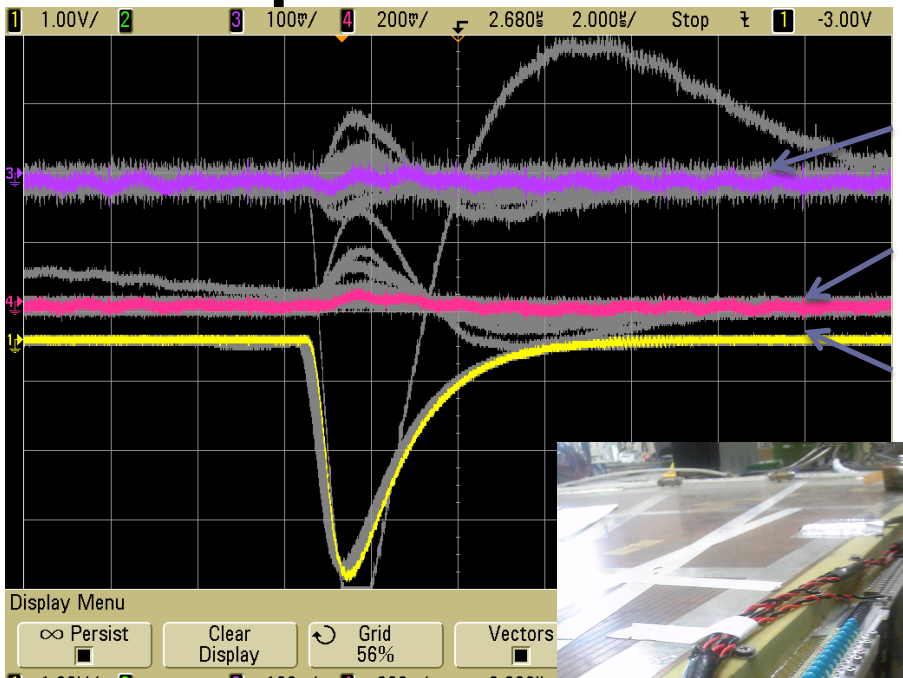



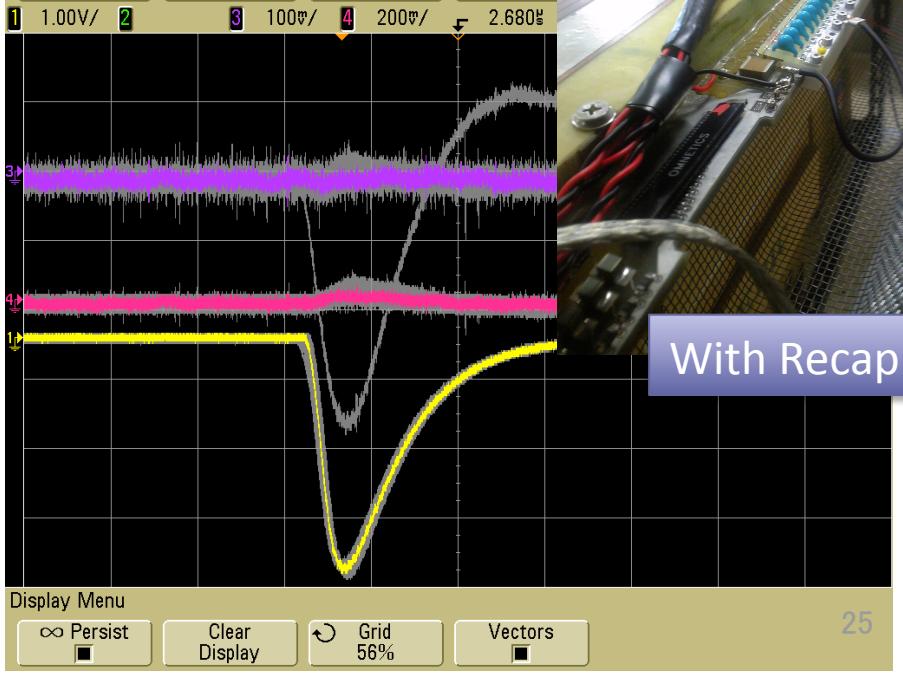



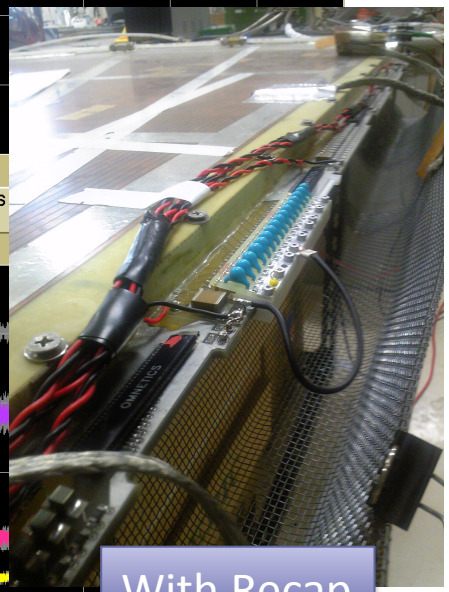



# With Recap

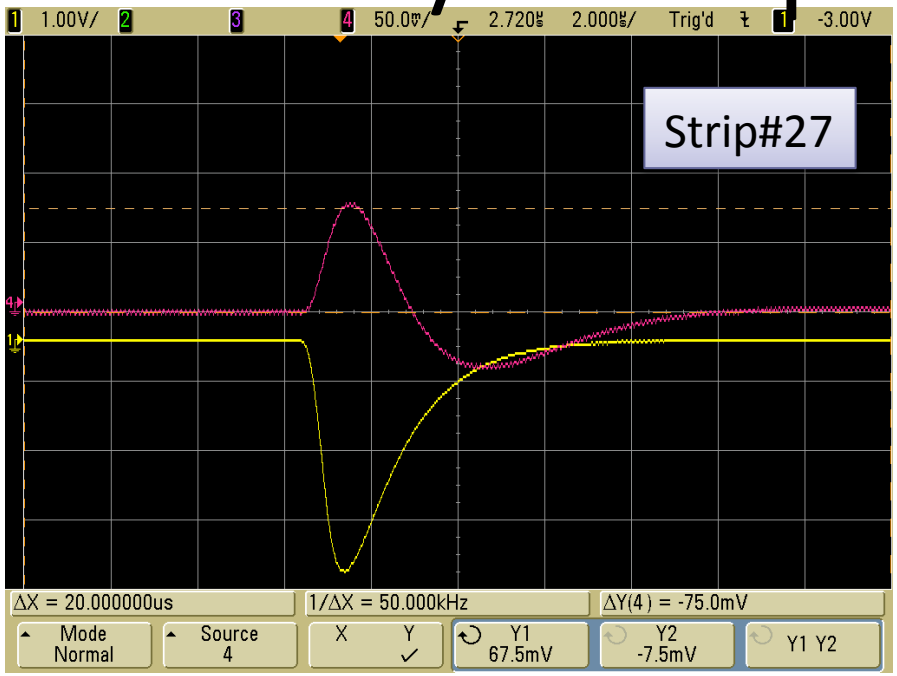
Source @ 21 ~ 22

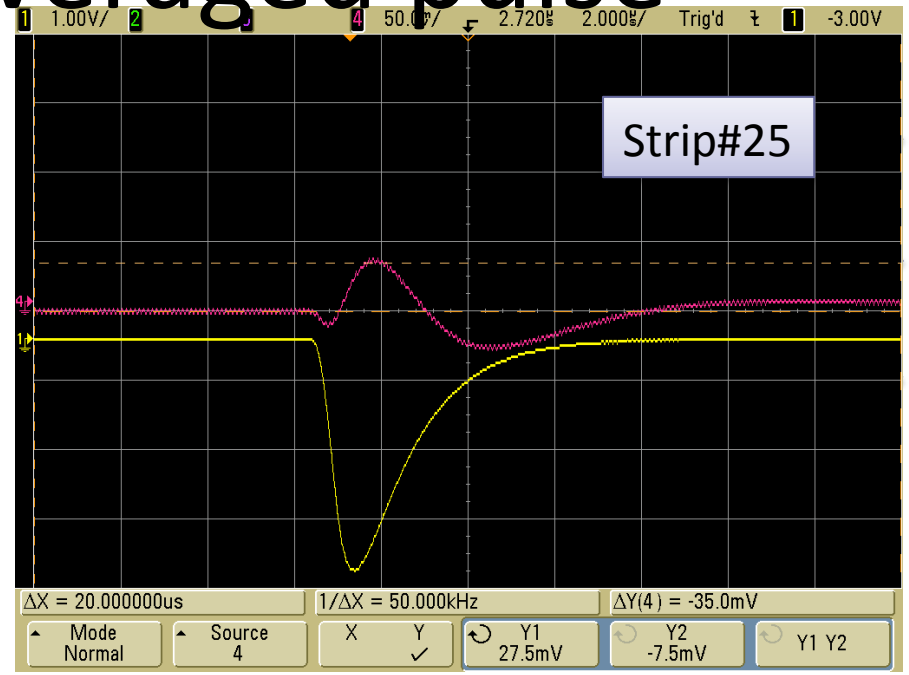


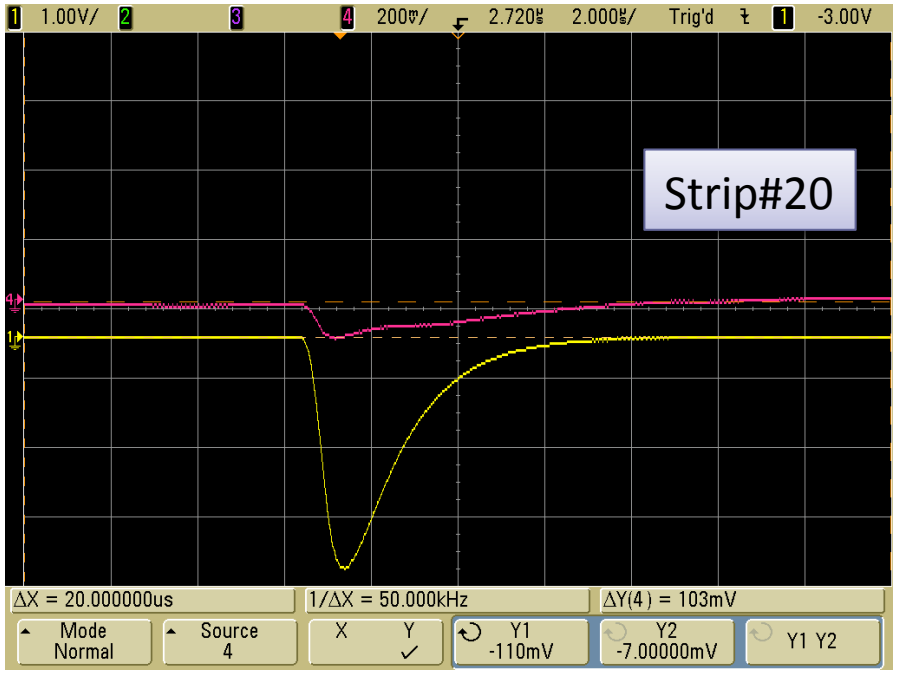


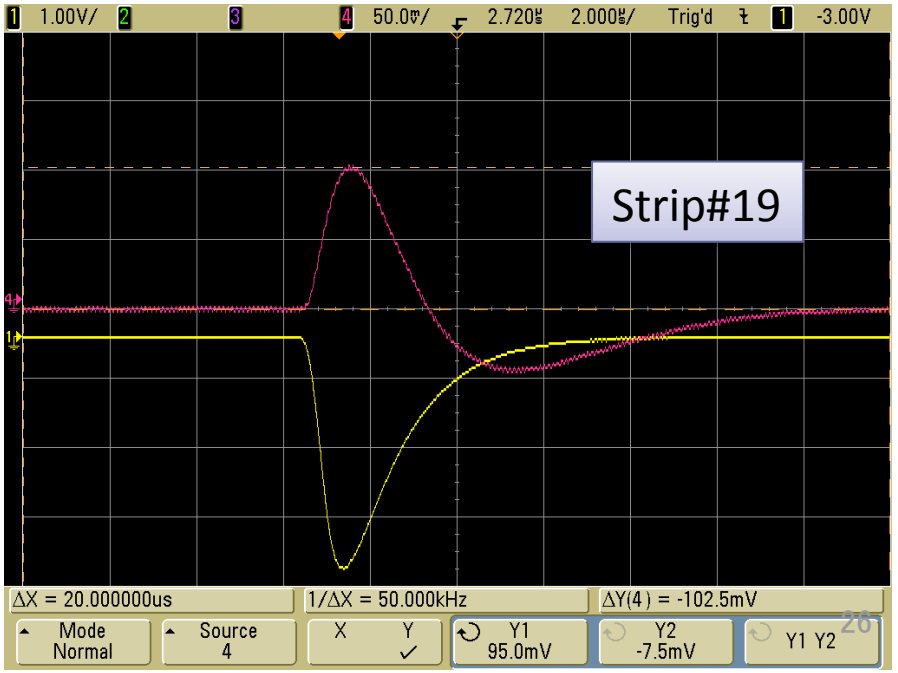



# Source @ 21 ~ 22 w/o recap averaged pulse

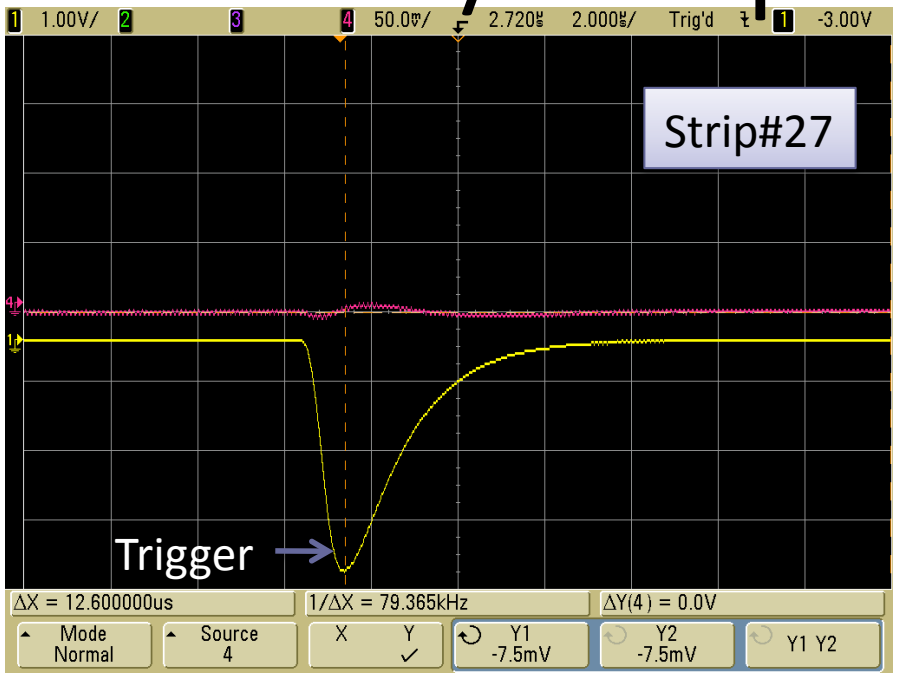


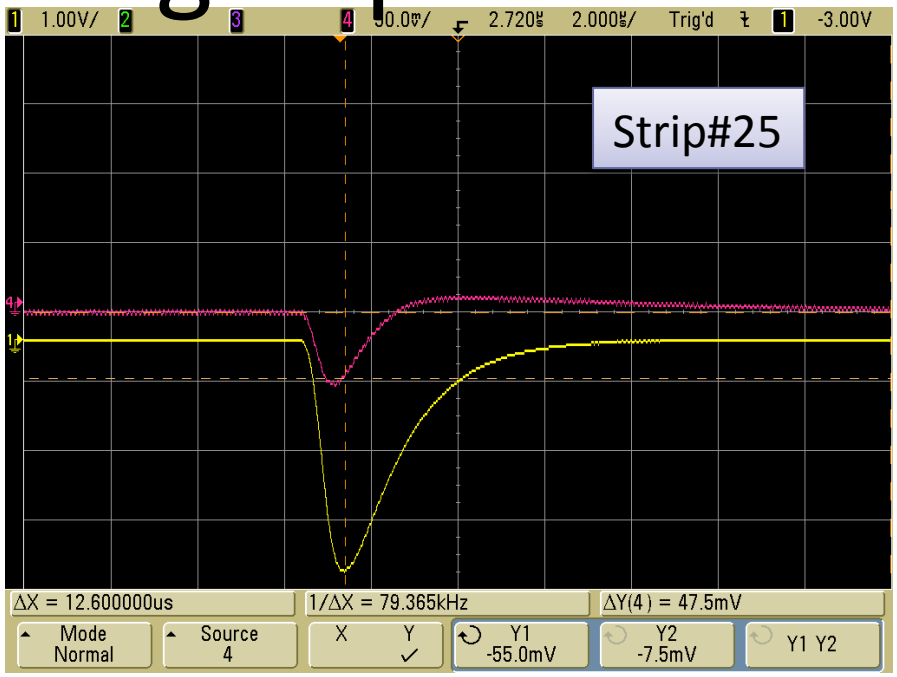



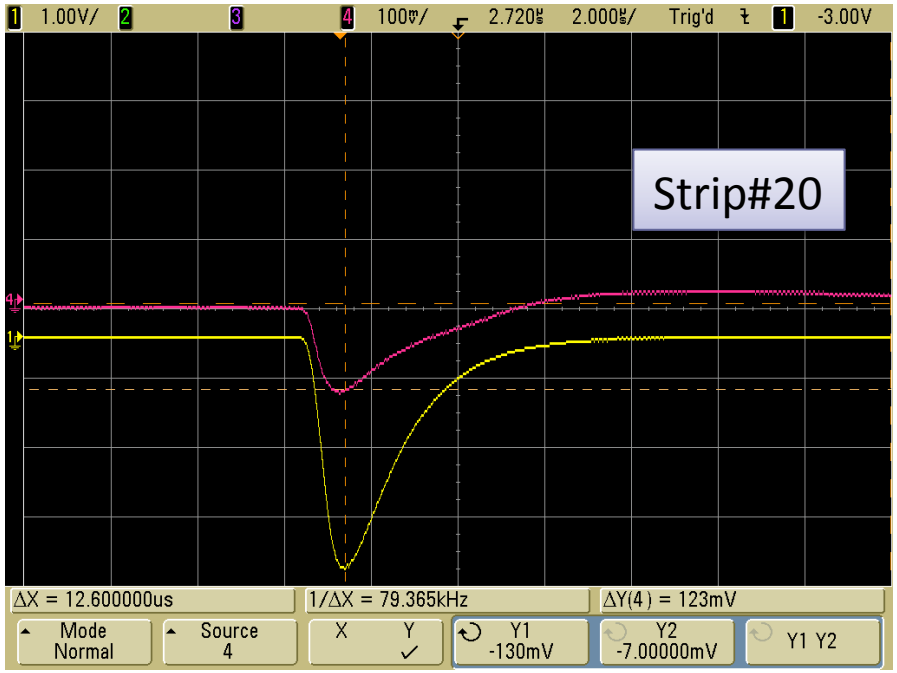



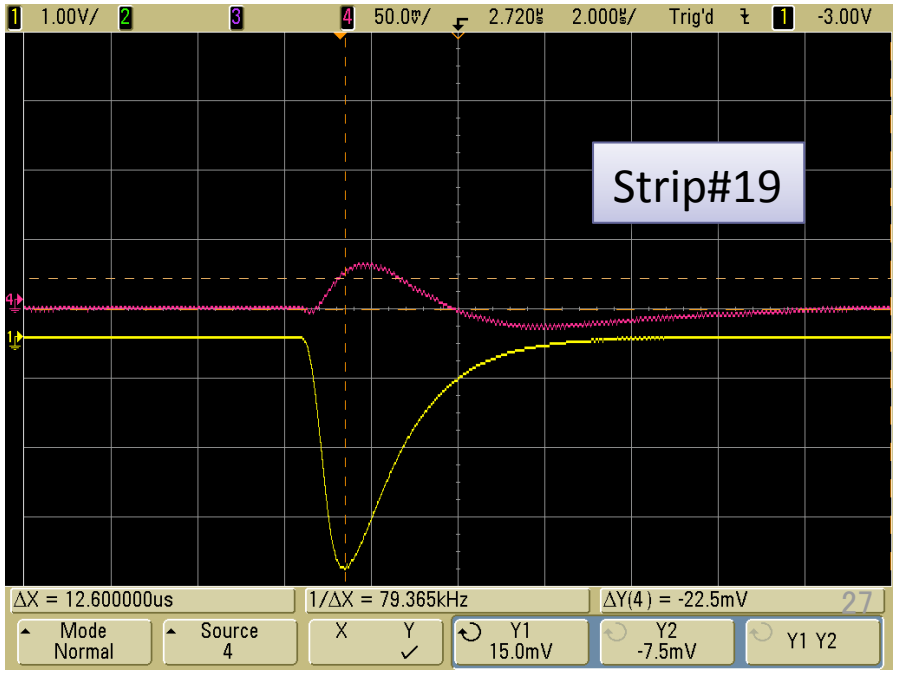



Source @ 21 ~ 22 # w/ recap averaged pulse

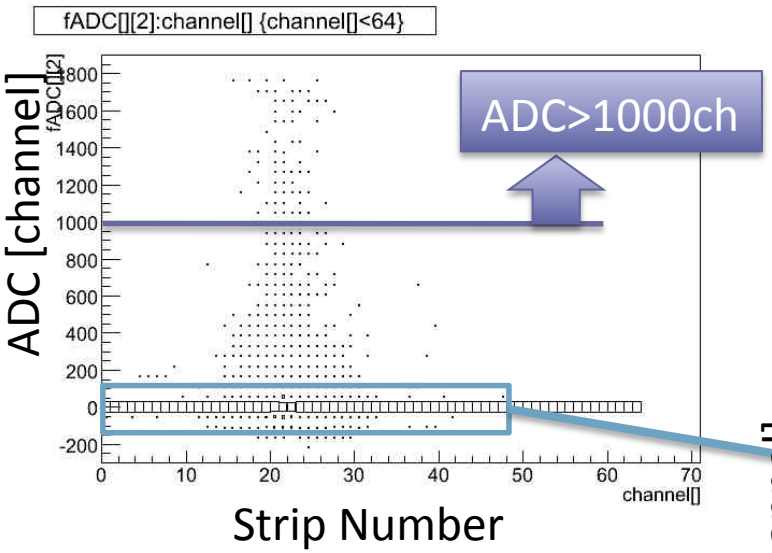


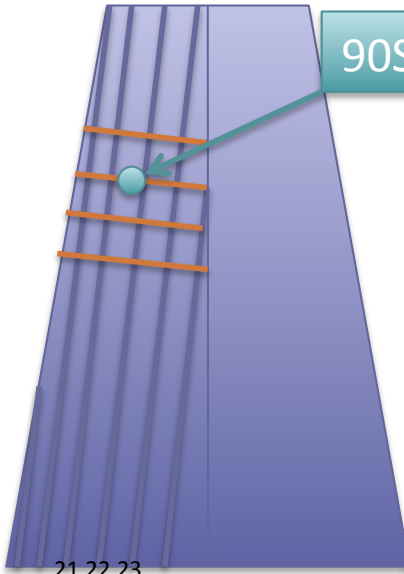



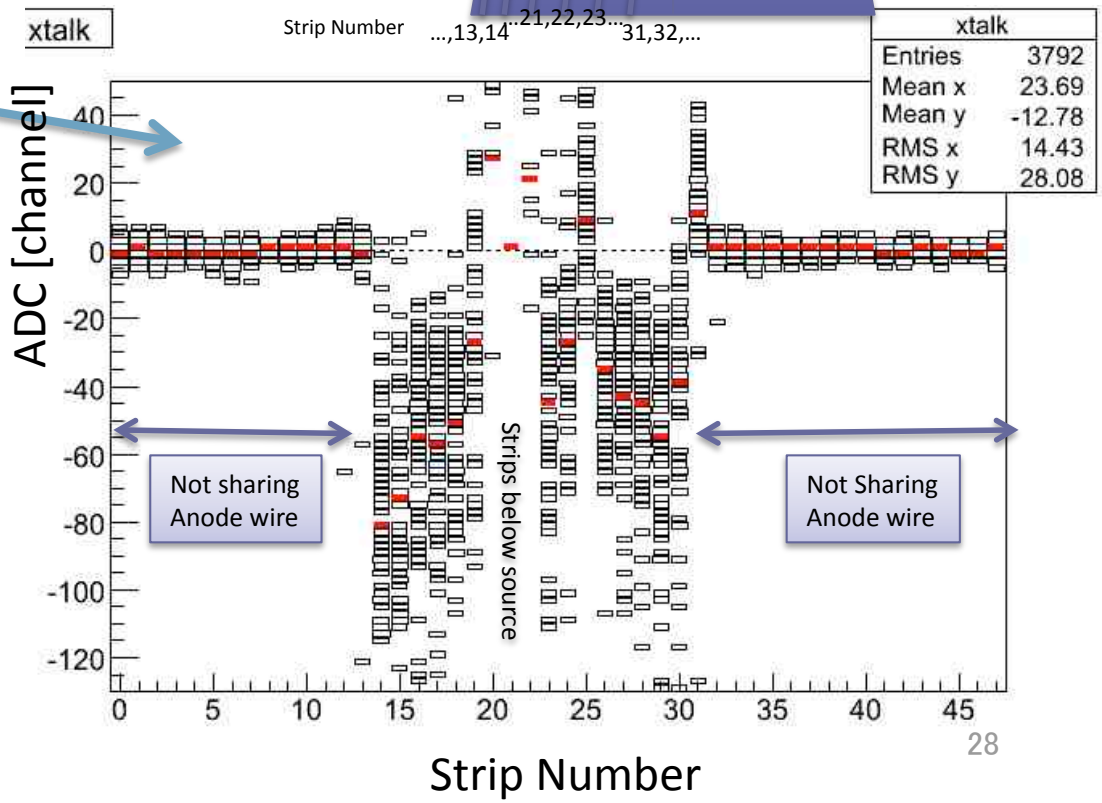
# Measurement w/ DAQ



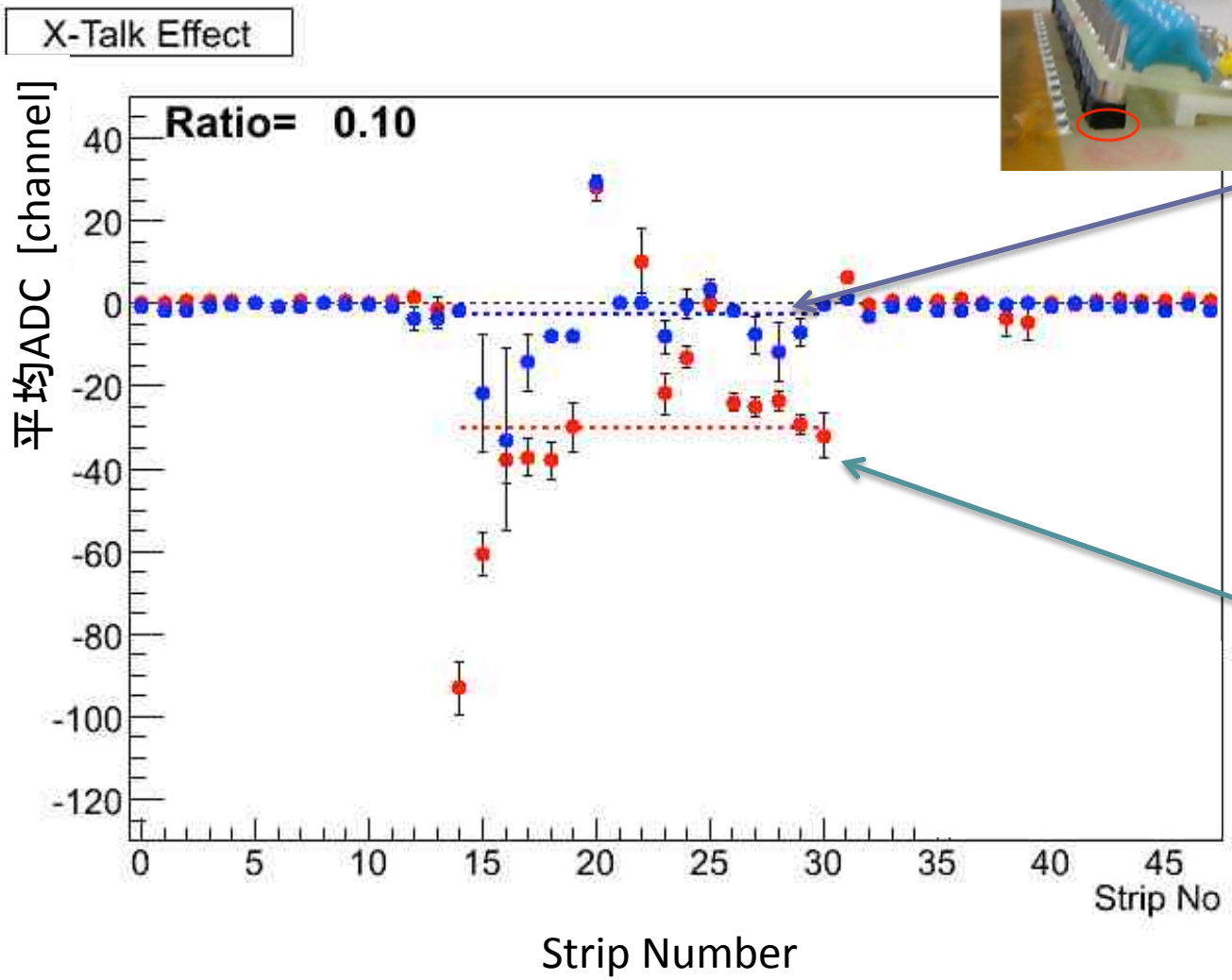

ADC>1000ch



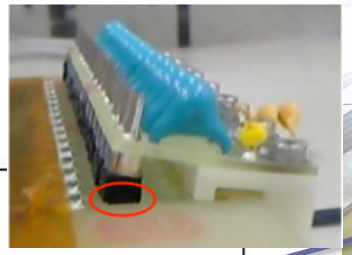

Strip Number ...,13,14...21,22,23...31,32,...

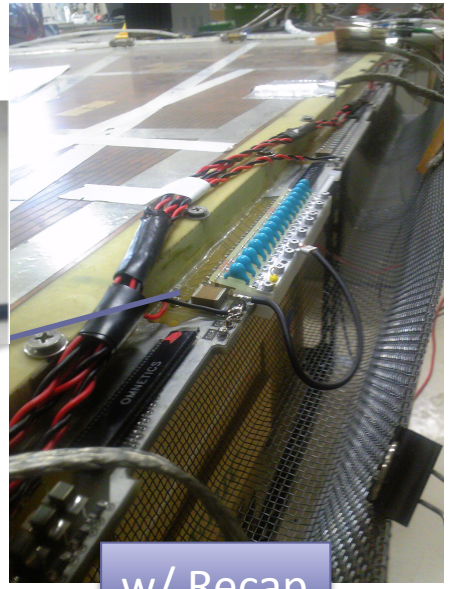


# Comparison w/ vs. w/o Recap

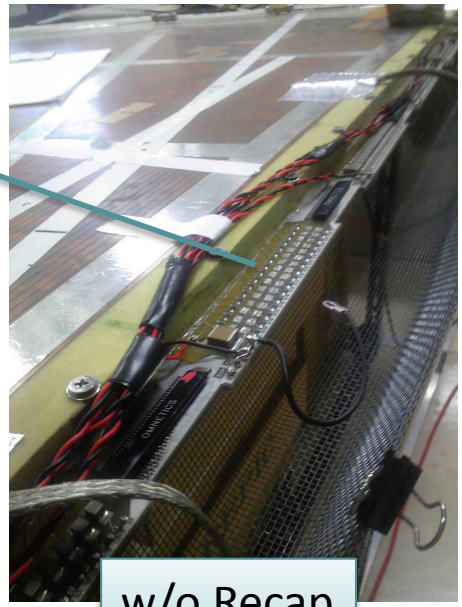



Conductive Rubber



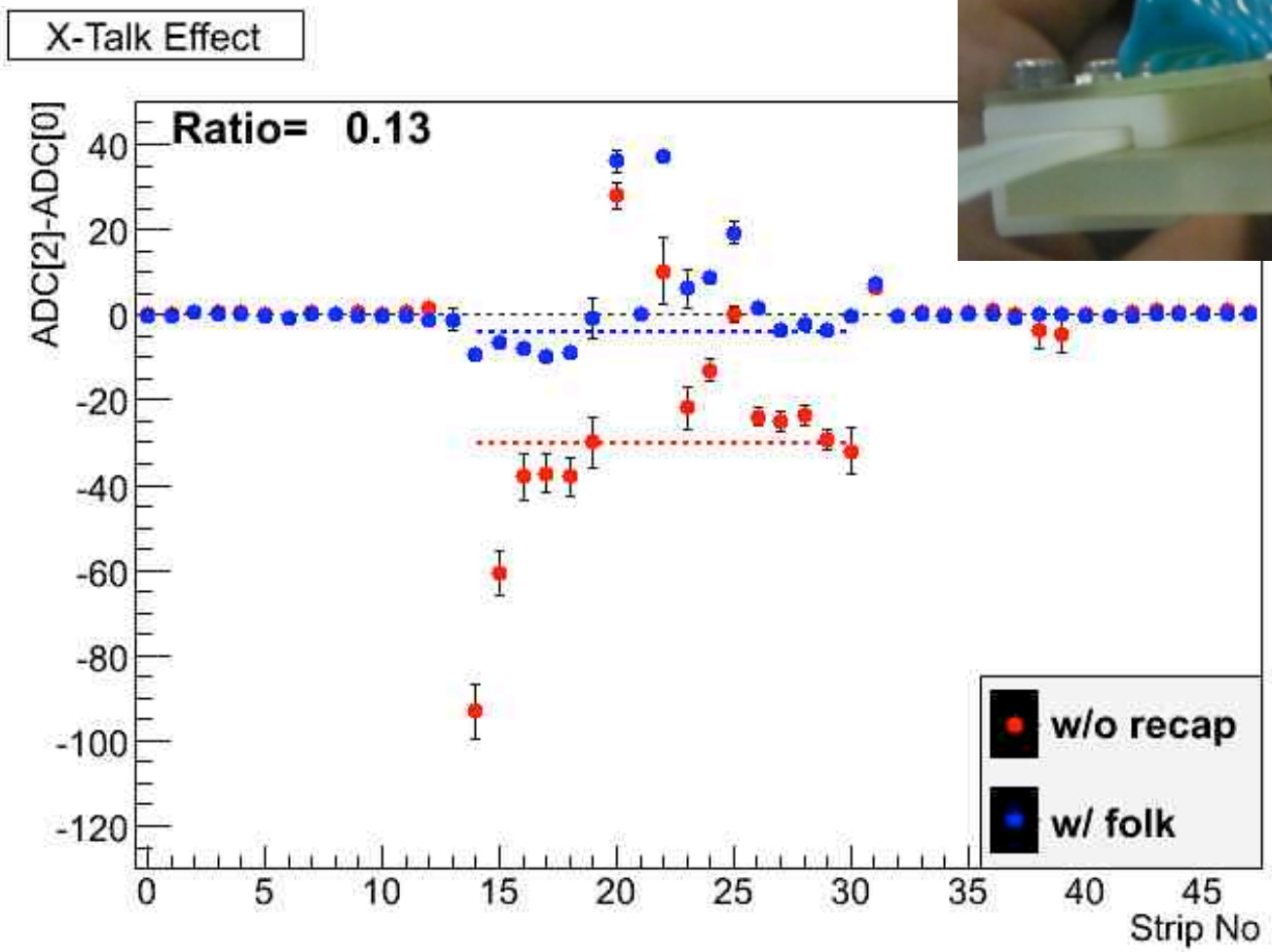


w/ Recap



w/o Recap

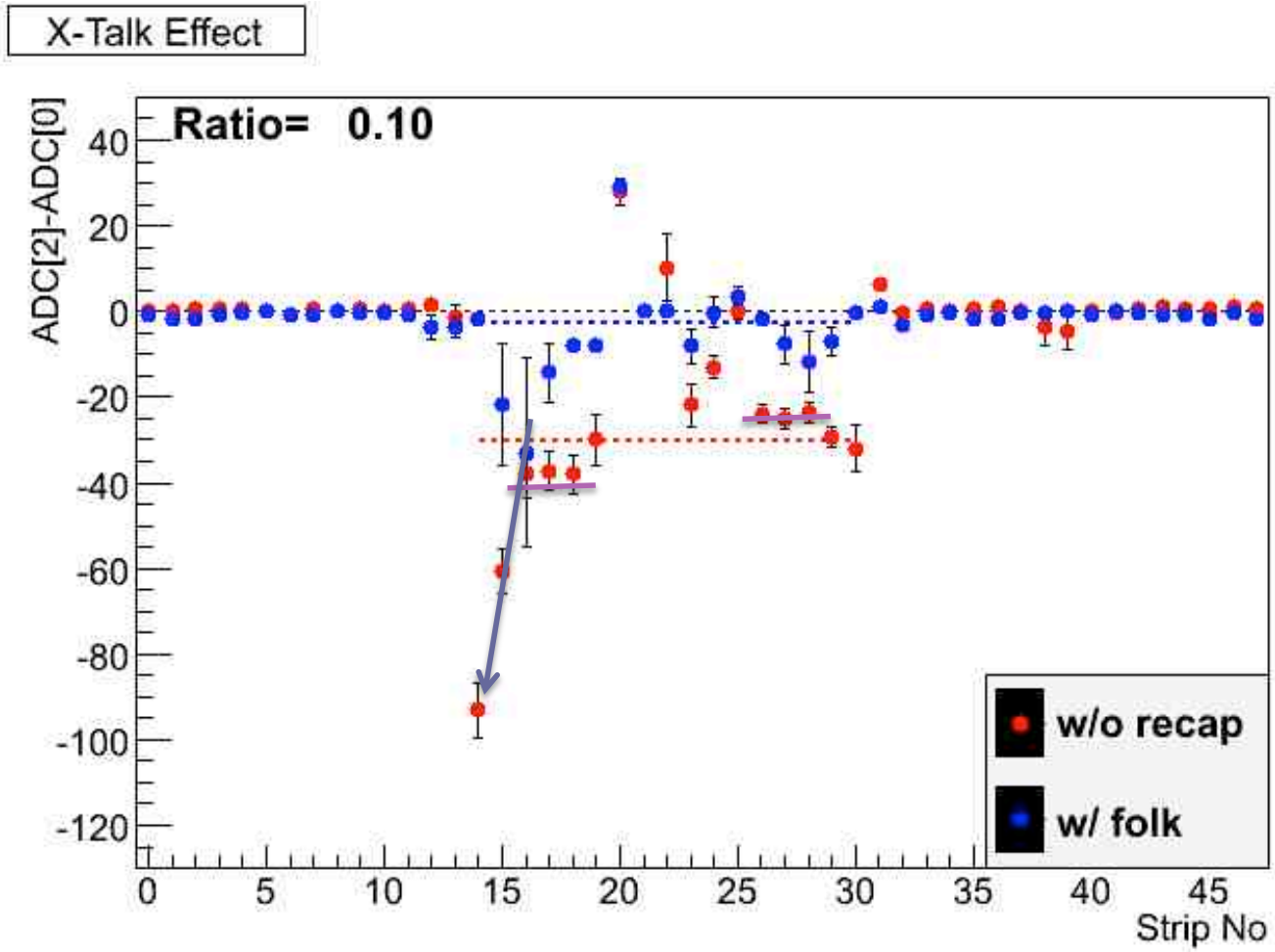
# Comparison w/ .vs w/o Recap



Folk Type

Similar effect can be achieved as long as good contact is secured.

# Some Open Questions

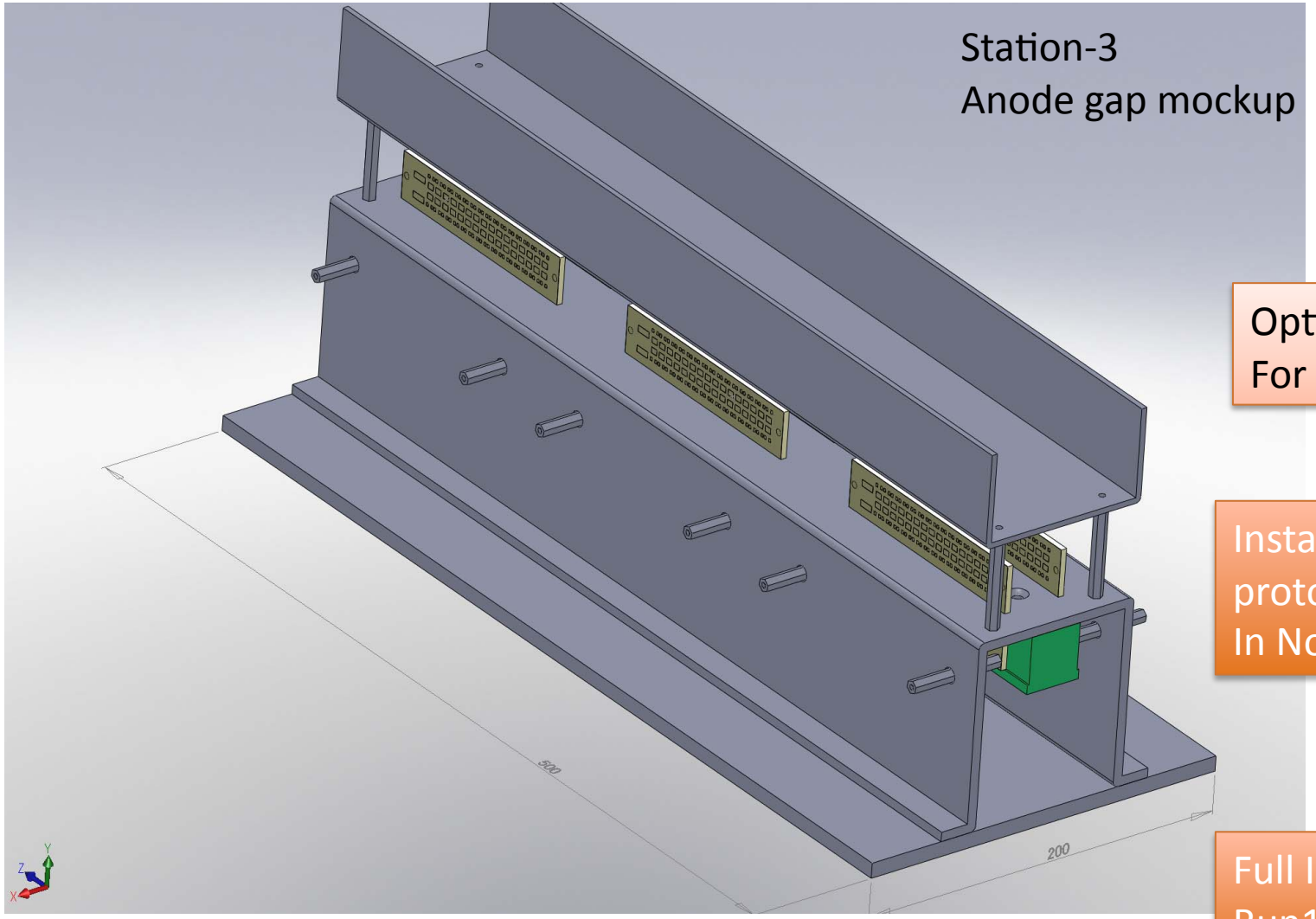



1. Asymmetric ADC btwn left and right side of central strip

2. Enhanced Effect of Cross talk towards the last strip of anode wire

3. Peak Strip > $\Sigma$ $xtalk_{strip}$

# Future Schedule




Optimize Utilities For Installation

Install folk/rubber prototypes partially In North Station-3

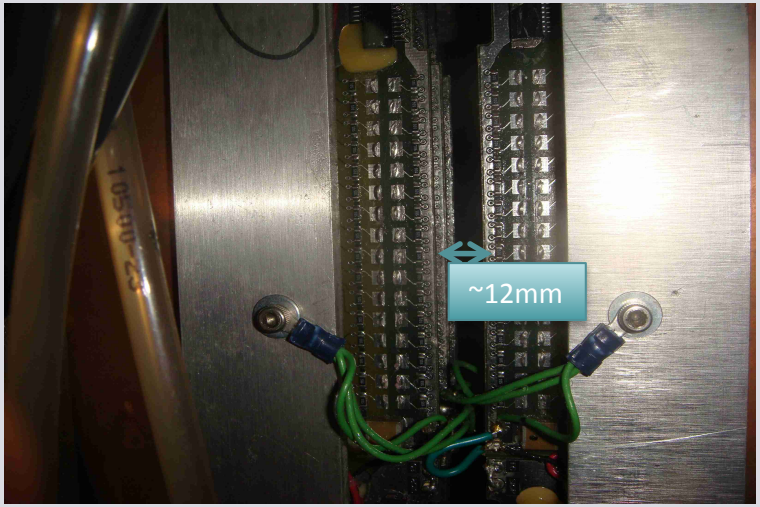
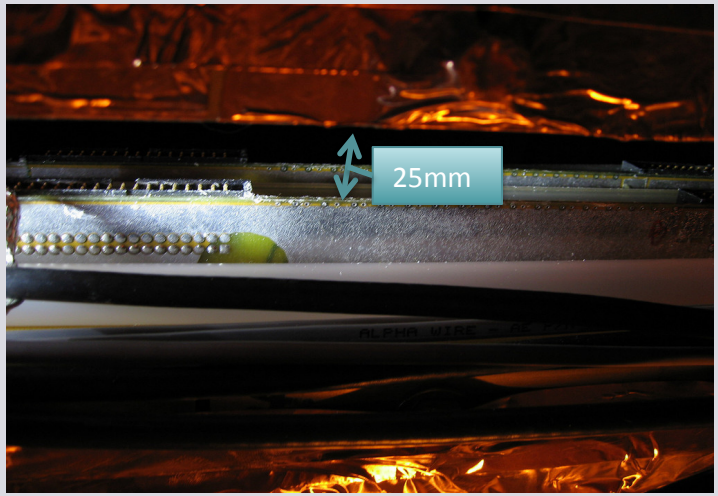
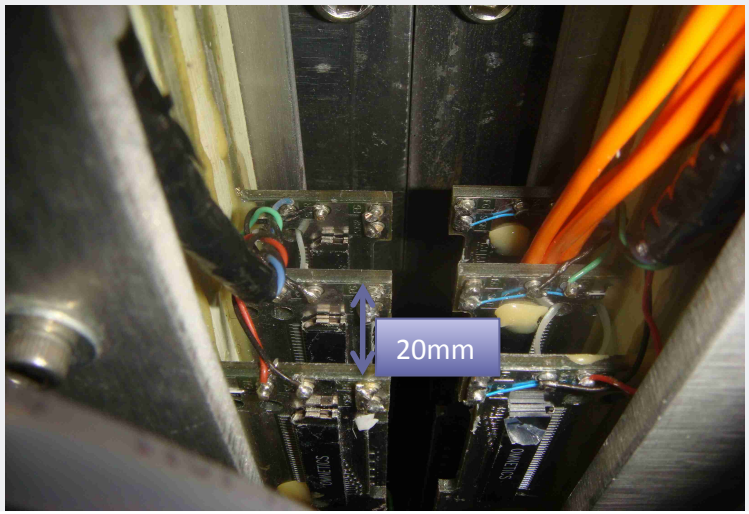
Full Installaiton after Run11

# Short Term Schedule

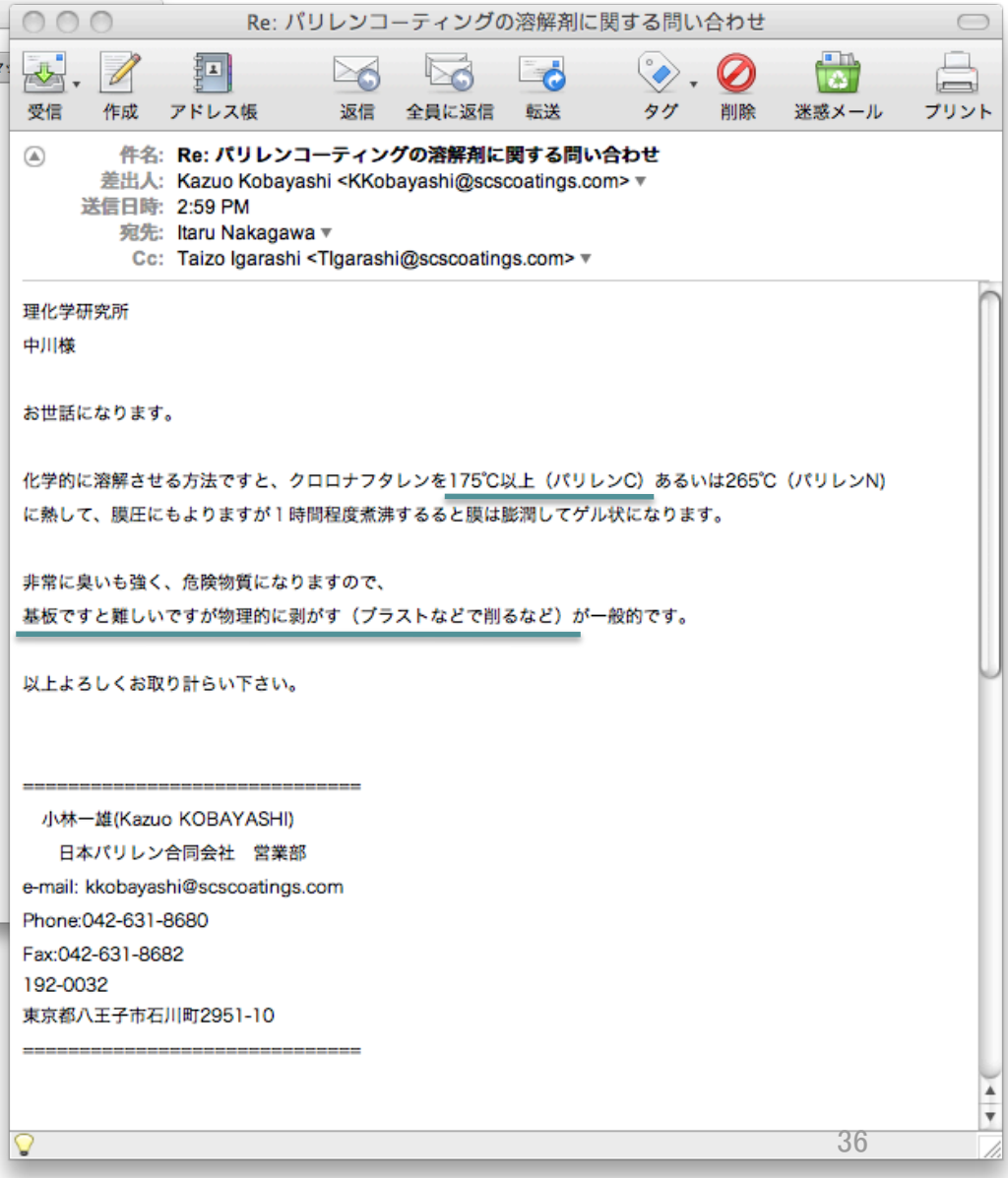
- End July : Station-3 Gap Mock Up Delivery
- Beg Aug : Different Capacitor/Resistance Combination (10pF, 56pF, 100pF, 1000pF, 0Ω, 360Ω, 1MΩ)
- Mid Aug : Station-3 Anode Card & Clamp Delivery
- Sept : Station-3 Clamp optimization
- Oct : Prototype Production
- Nov : Prototype Installation to N.Station-3

# Back Up Slides

# Station-1 vs. Station-3

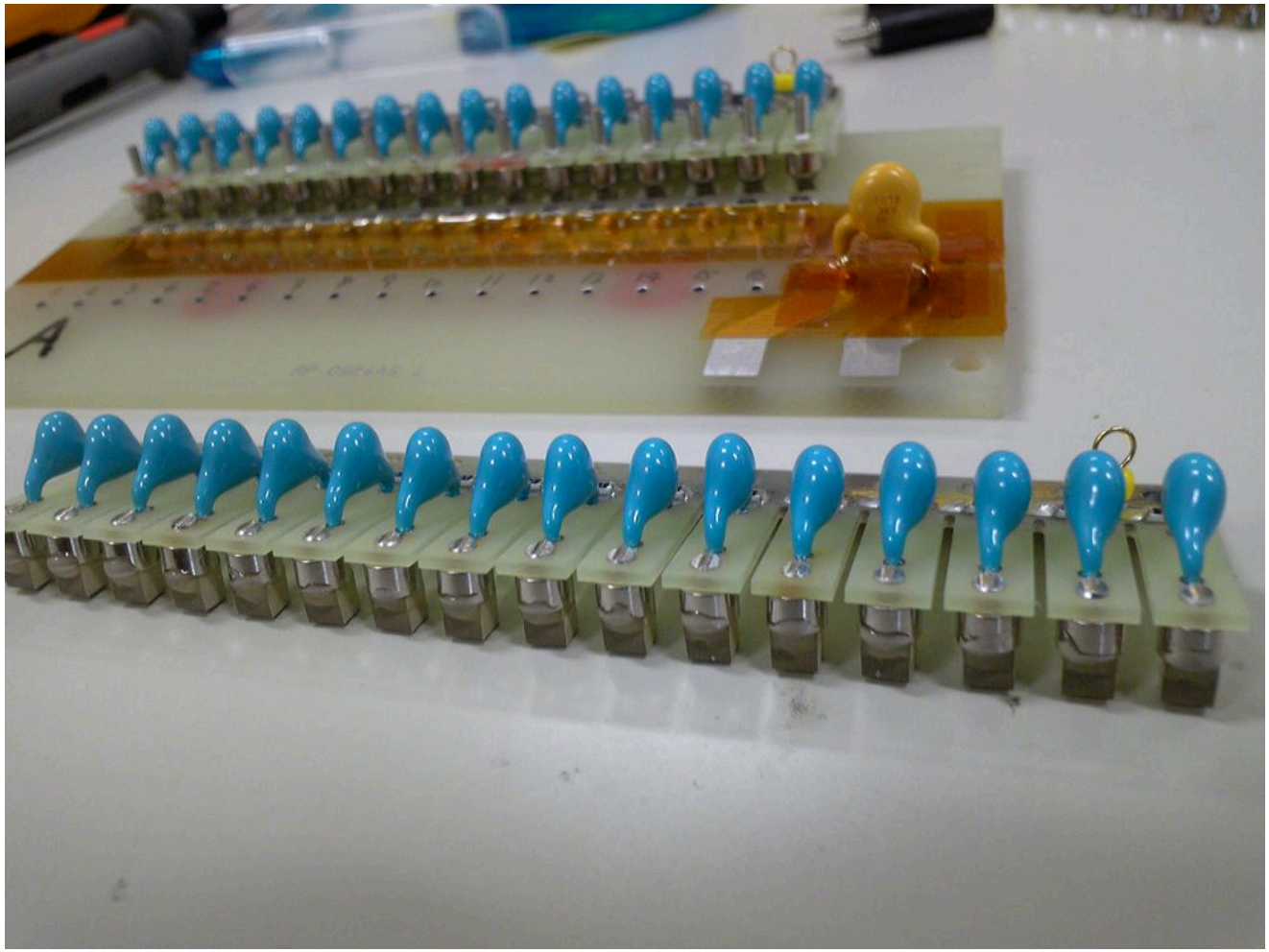
| | Station-1 | Station-3 |
|---|---|---|
| Between Anode & adjacent card (chamber) |  |  |
| Between Gaps |  | |

# Removing Palyrene Coating




We may need to give up removing palyrene Coating.

# Conductive Rubber Type

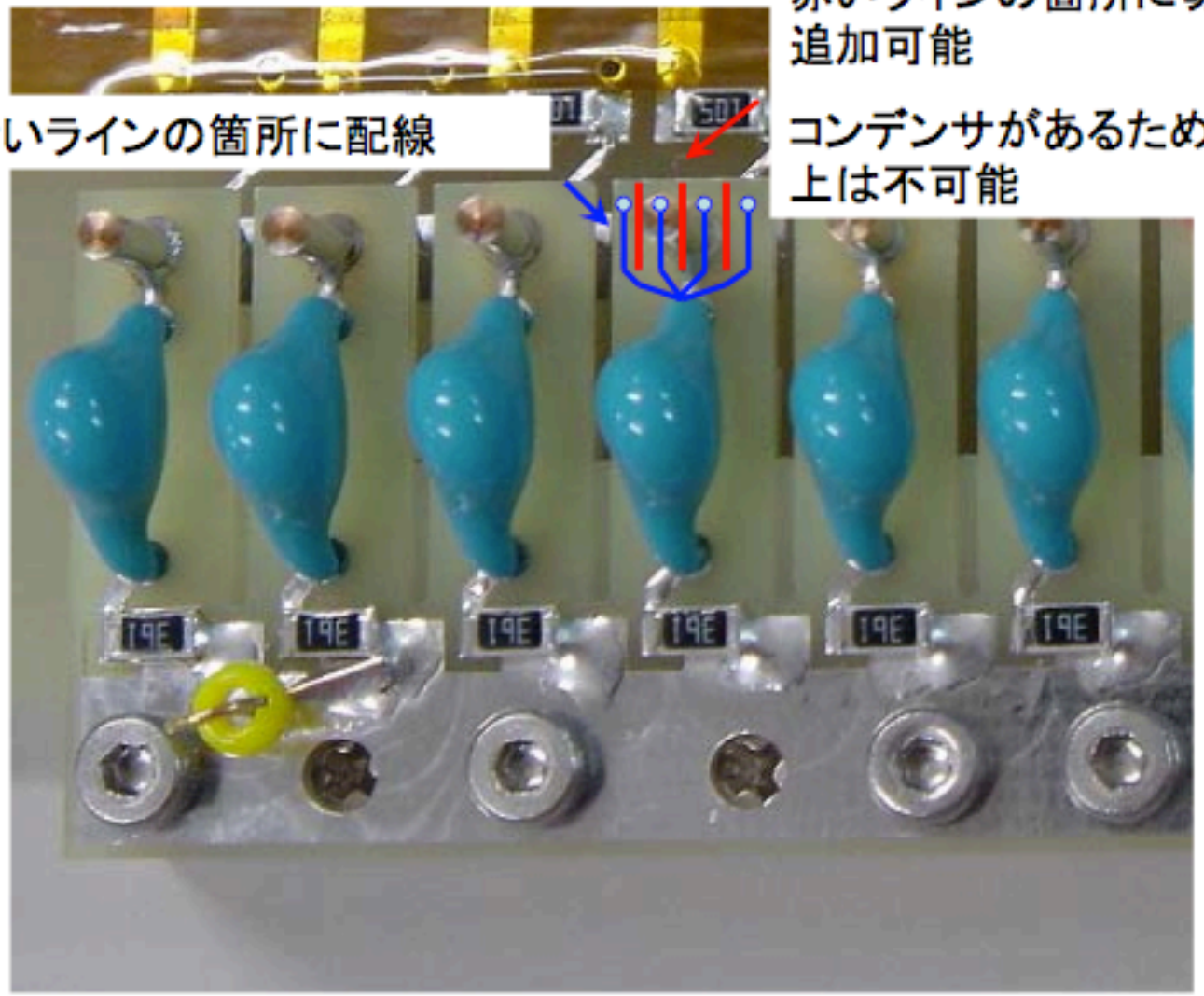


# 中川様案検討

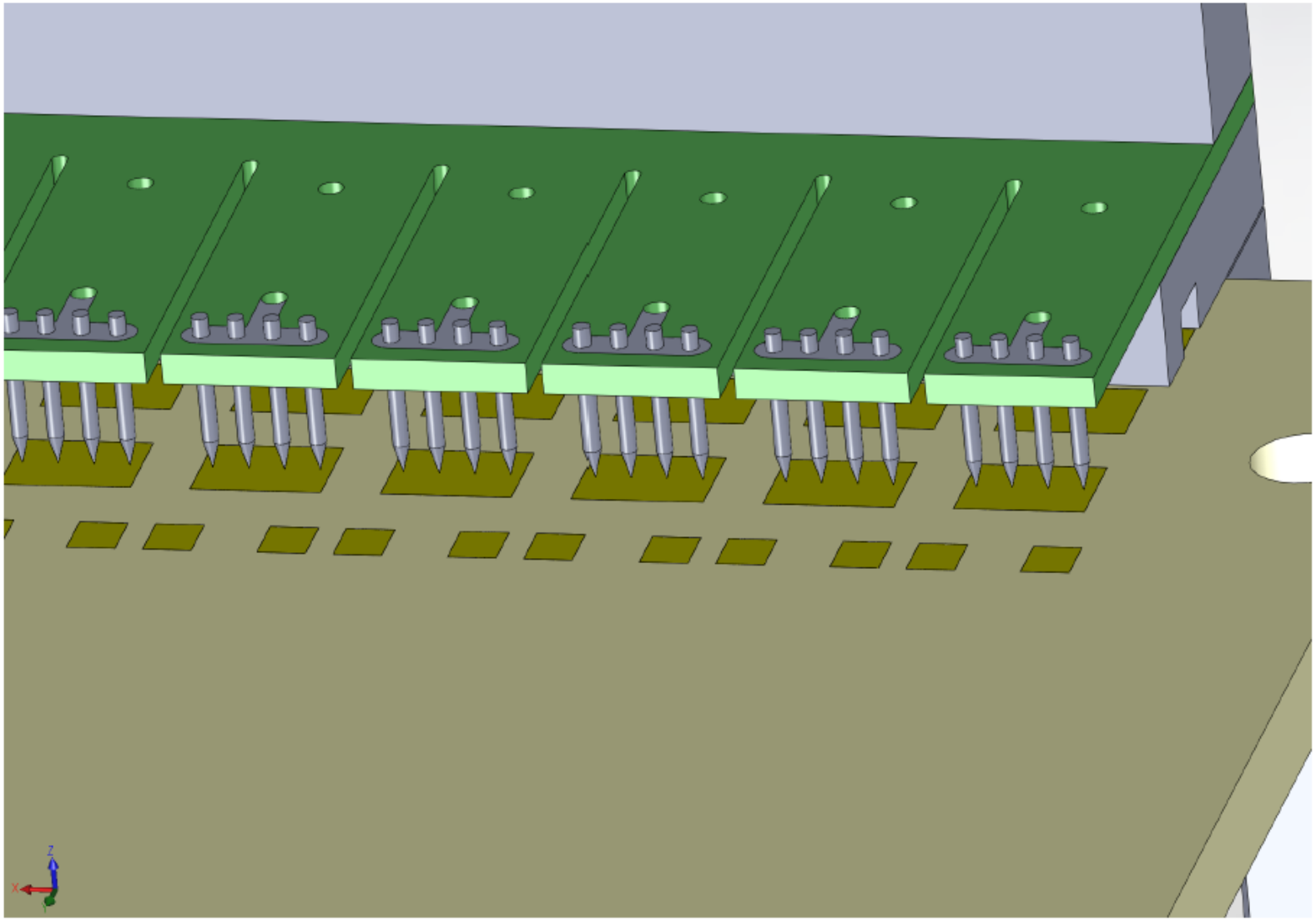
赤いラインの箇所に切込みを追加可能

青いラインの箇所に配線

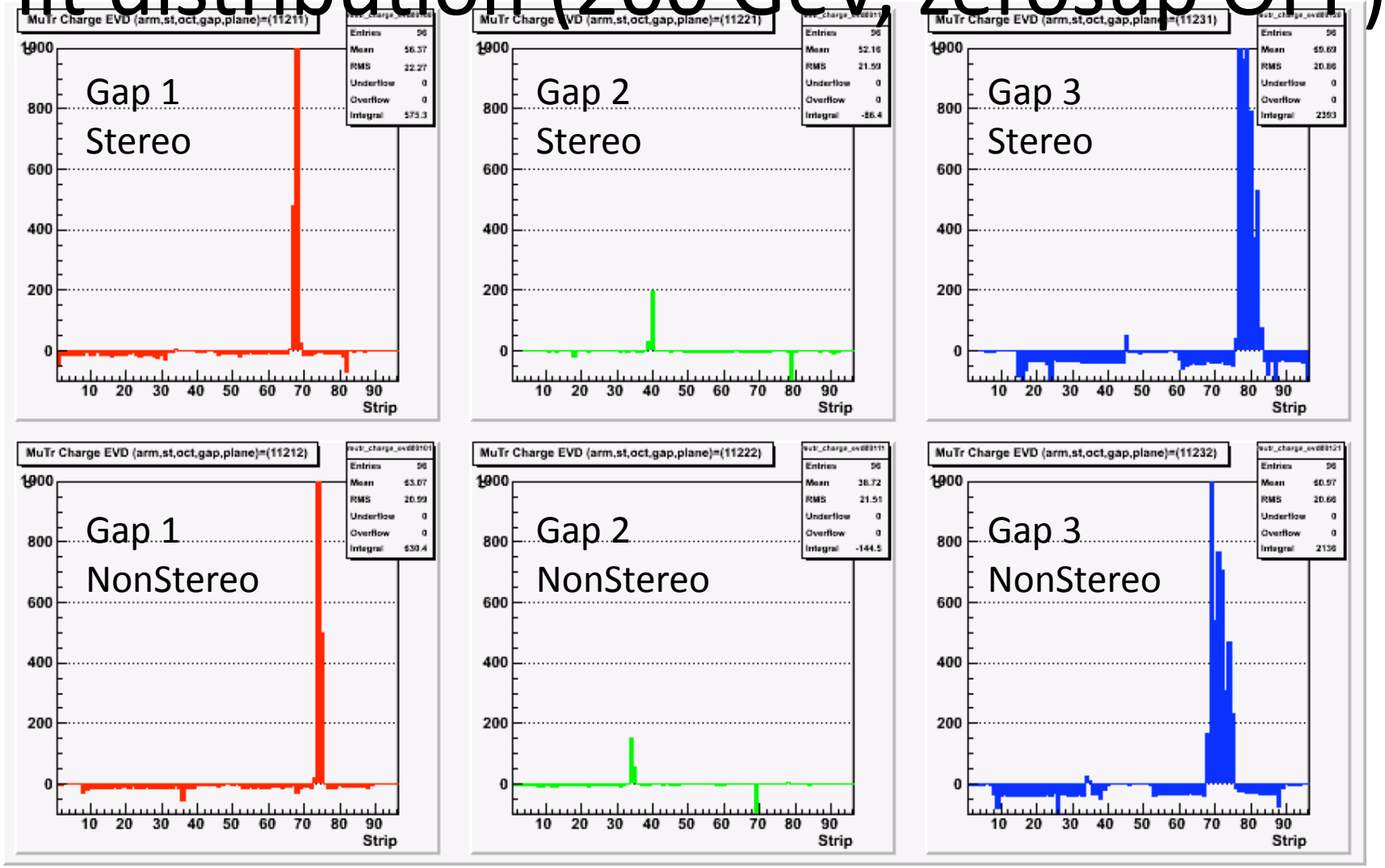
コンデンサがあるためこれ以上は不可能



# PHENIX　HV治具検討(鍬型)

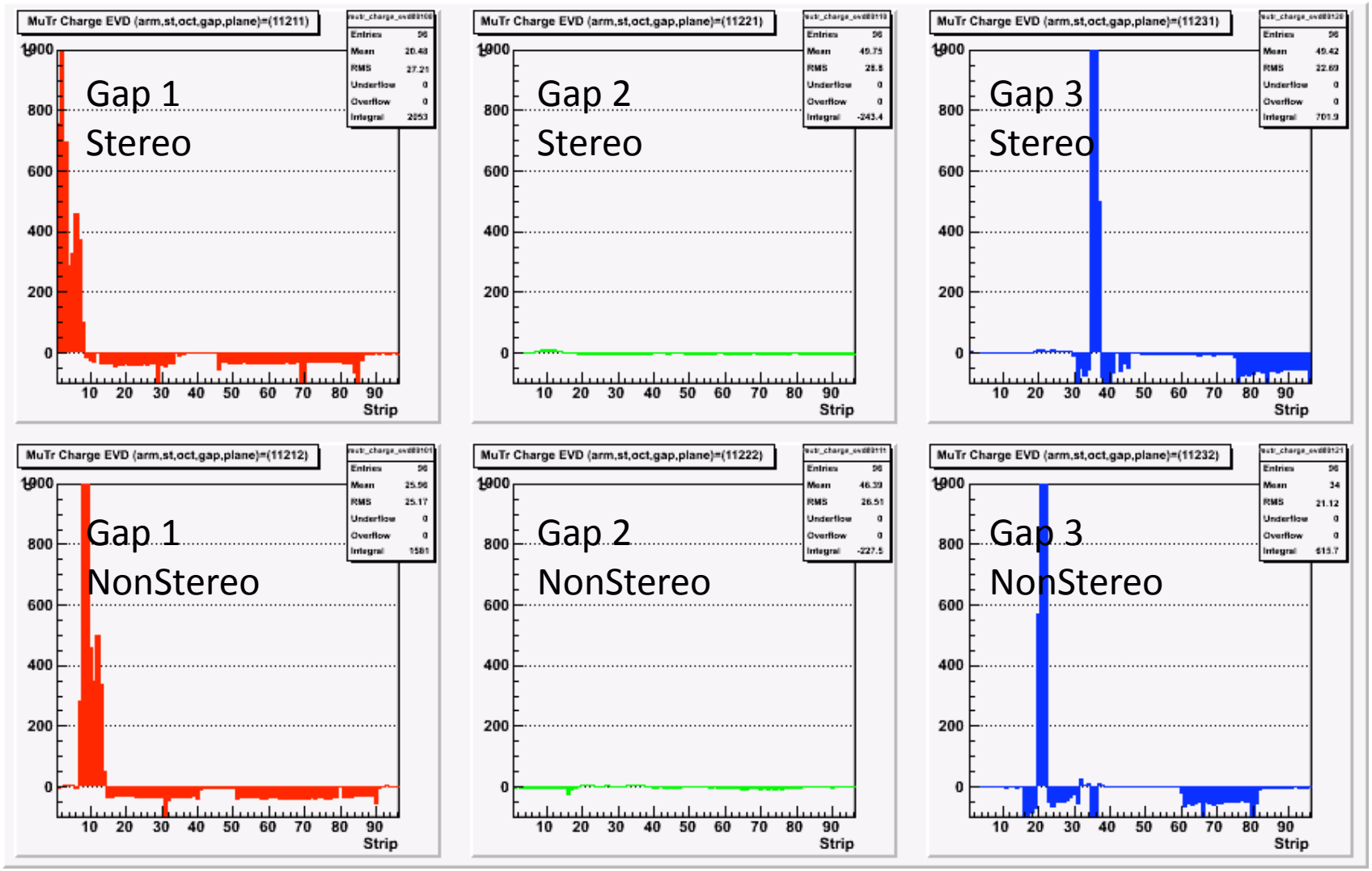


# Hit distribution (200 GeV, zerosup OFF)

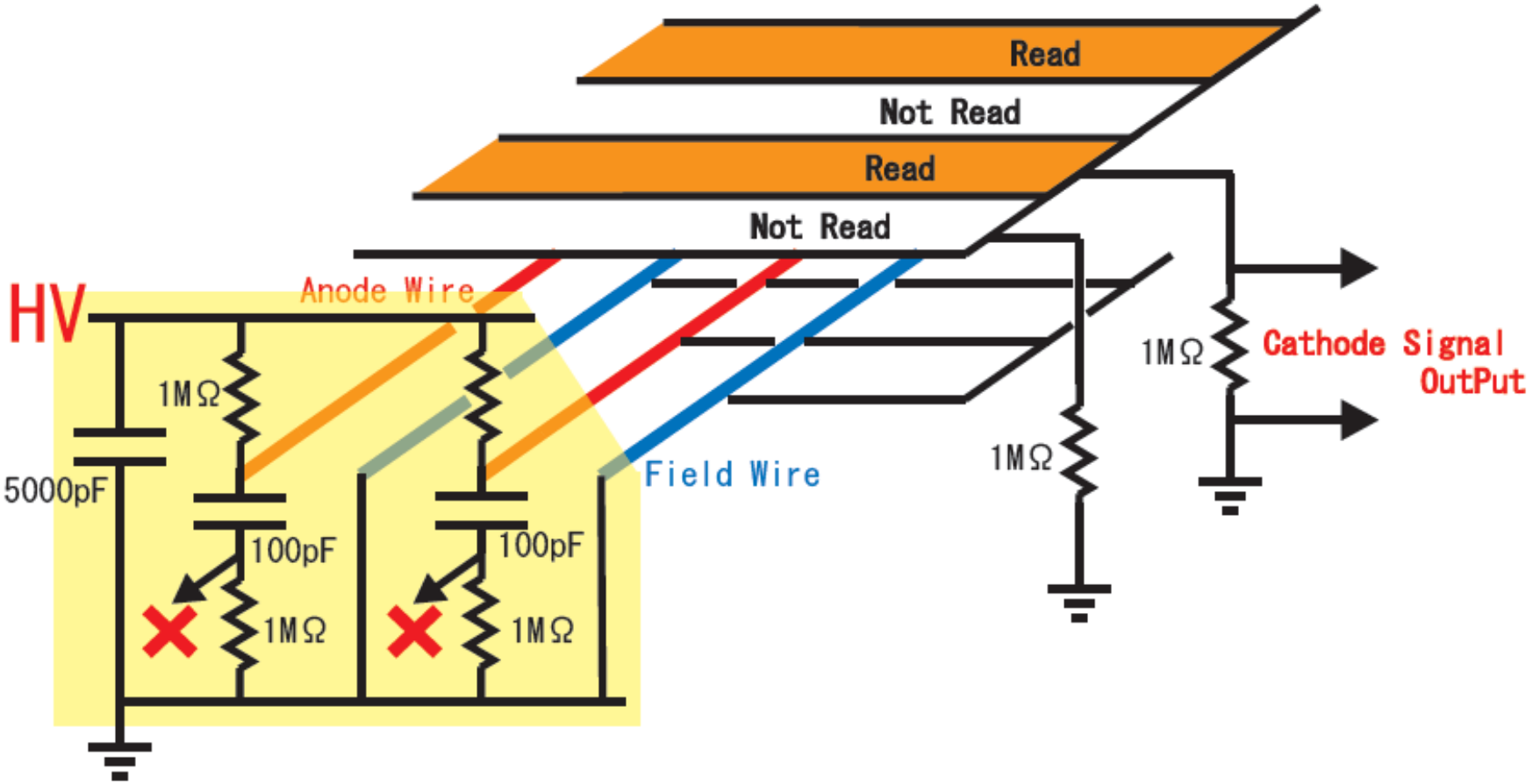



South arm, Station 1, Octant 1

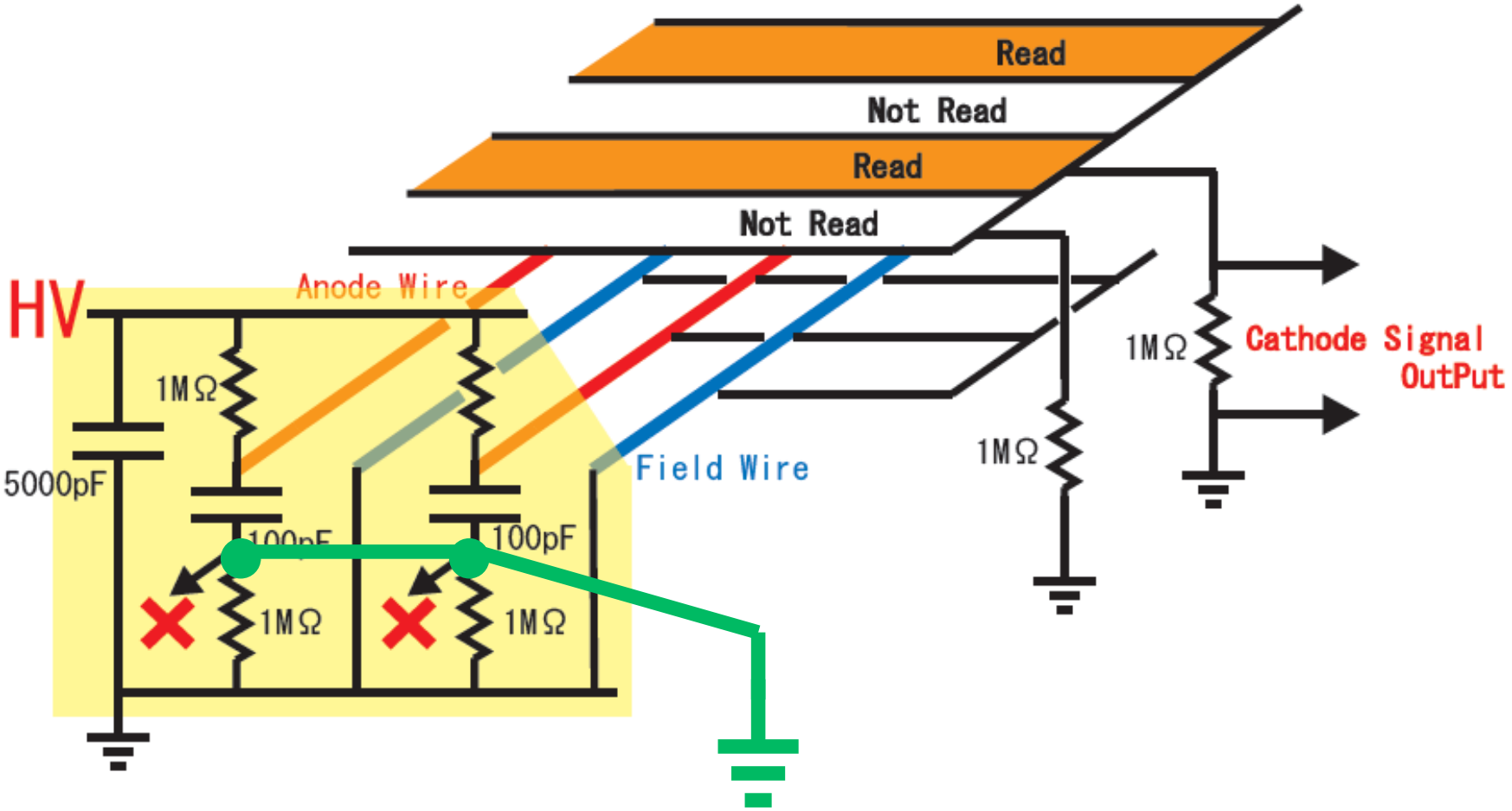
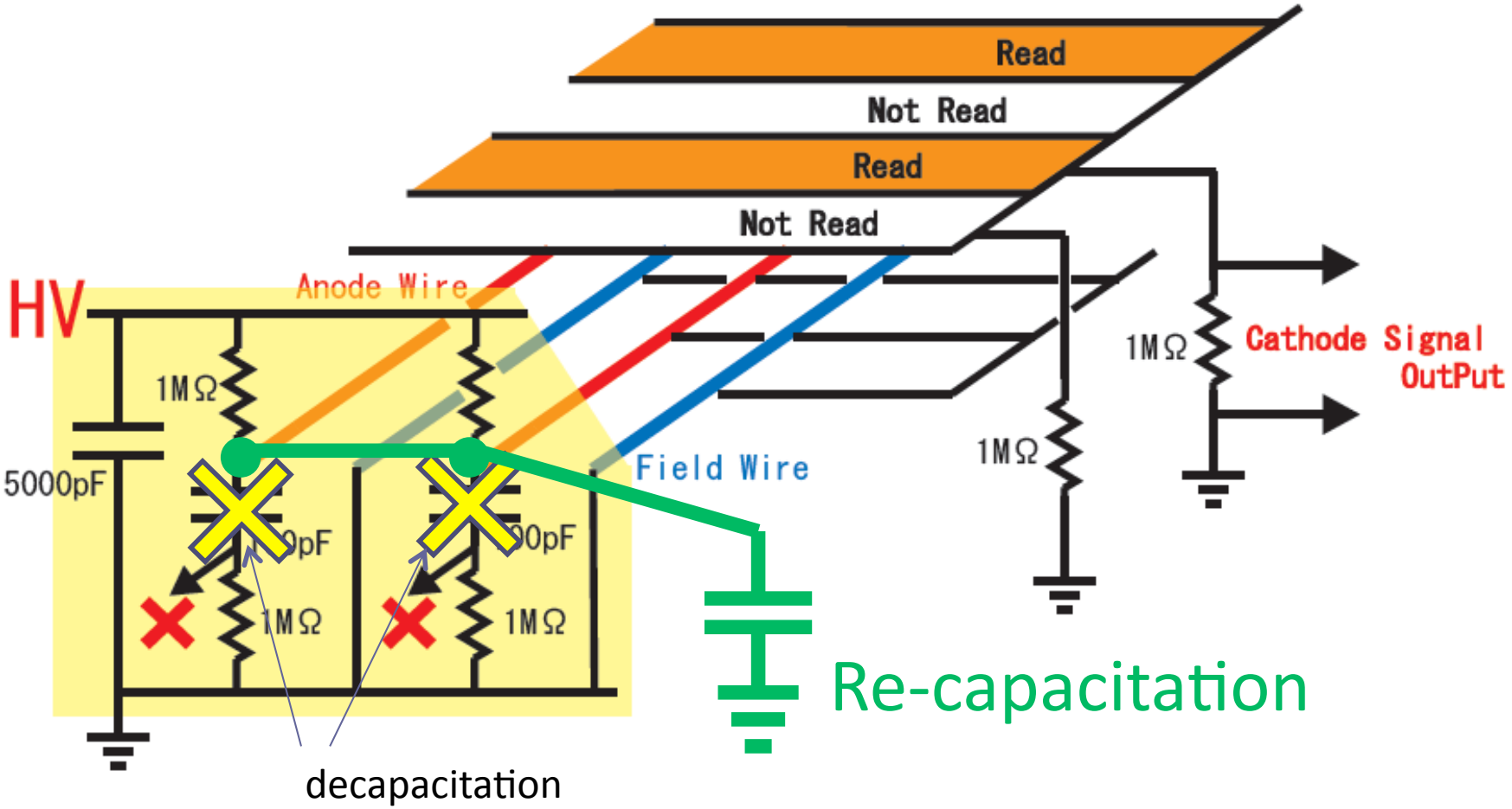
# Hit distribution (200 GeV, zerosup OFF)



# Current readout diagram



# Dumping to GND with C (100pF)



# Re-capacitation ?