Electronics

Electronics design

LV, HV power supply

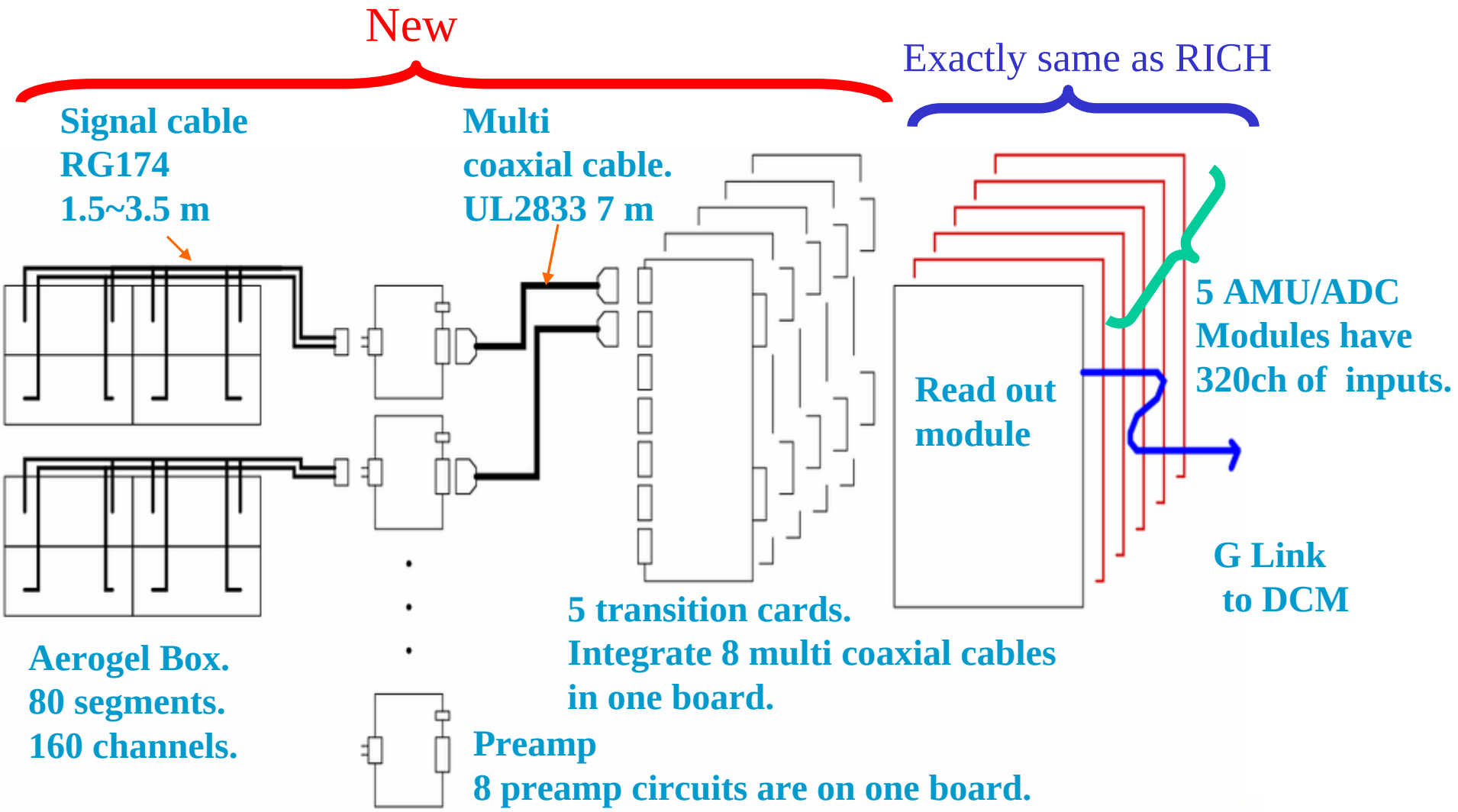
Fusing

Heat

Graduate School of Science
University of Tokyo
Center for Nuclear Study (CNS)

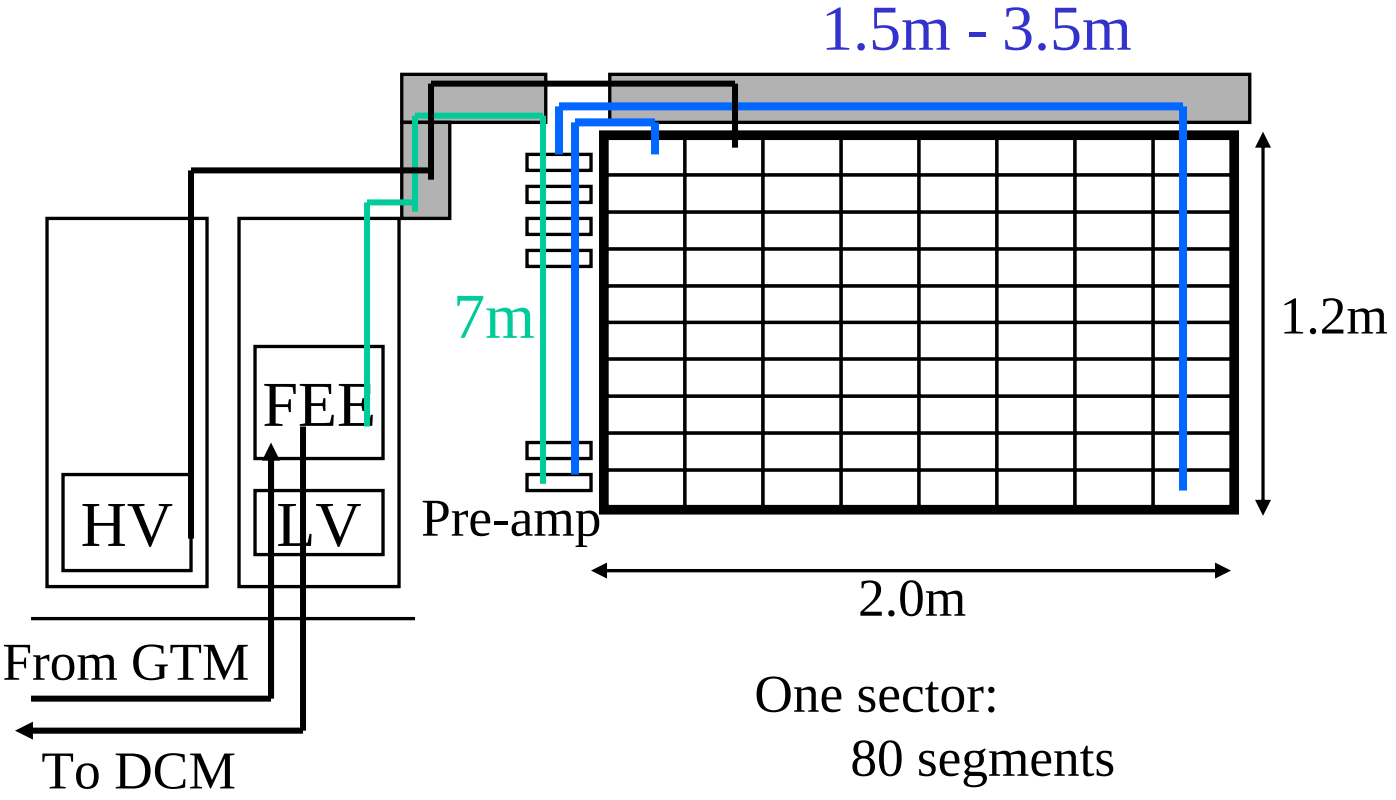
Concepts of readout electronics

The electronics of the Aerogel detector is based on RICH's.



Cable and electronics

These racks are properly monitored and connected to alarm system using the same way as other PHENIX racks.



One sector:
80 segments
160 channels

PMT to preamp cards
RG-174/U
160 x 2 sector

Preamp cards to FEE
UL2833
20 x 2 sector

Cables in one sector

Signal

- Cable from PMT to Pre-amp
  - RG174/U x 160
- Cable from Pre-amp to FEE
  - UL2833 x 20

HV

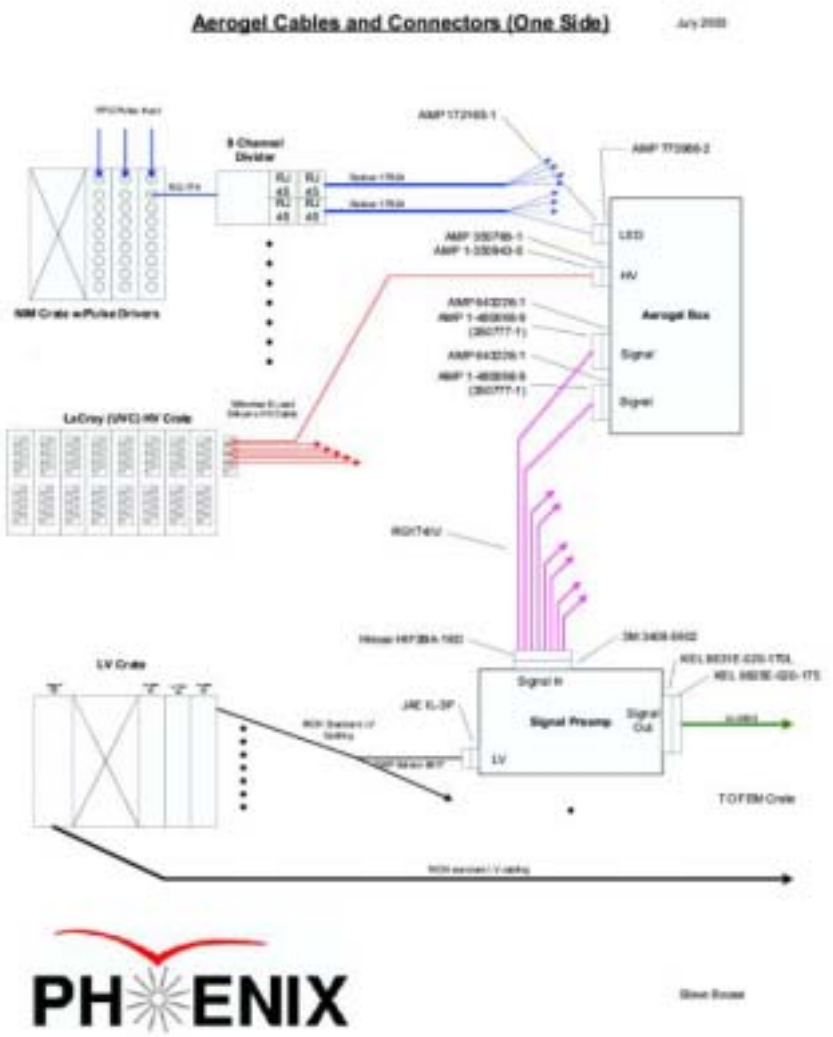
- SL-v2YCEH (KERPEN)
- Each cable is connected to 2 PMTs.

LED

- CTP-LAN5 cables x 20

LV

- RICH standard LV cable
- To Pre-amp
  - 4+4 pairs of AWG16 twisted (+6.5V, -6.5V)
  - Each pair drives 5 preamplifier cards
  - Daisy chains of AWG24 wires
- To FEE
  - Exactly same as RICH



These numbers are should be doubled, since they are for one sector.

Graduate School of Science
University of Tokyo
Center for Nuclear Study (CNS)

Low voltage distribution and fusing for FEE

LV distribution in the FEE crate

These modules are properly fused using the same way as RICH.

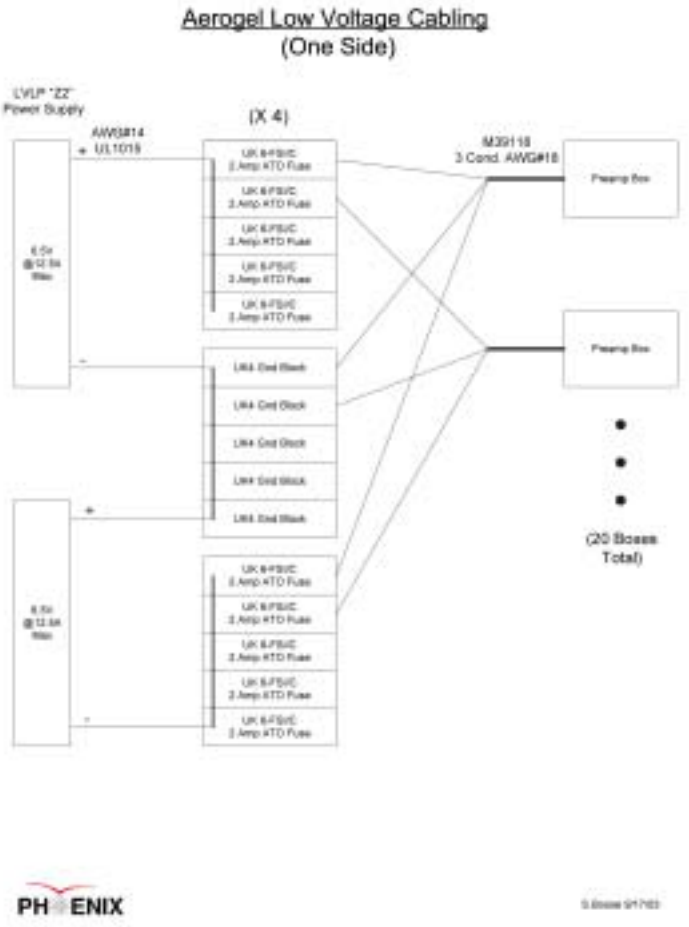
One LVHP module (High power module variant “S”)
Max 40A per channel@+5V, 2 channels
Max 10A per channel -5V, 1 channel
Max 10A per channel +8V, 1channel
LV distribution for the FEE
– power supply output : (2+1+1) pairs of AWG 10 wires
– distributed to (20+8+8) pairs of AWG 16 wires
    • distributors : PHOENIX UK6-FSI/C with 6 A fuses
– AMP soft shell connectors on the crate side
LV distribution in the FEE
    10 AMU/ADC modules
        4 A @ +5 V (fused @ 7 A)
        0.5 A @ +8 V (fused @ 3 A)
    2 readout modules
        2 A @ +5 V (fused @ 3 A)
    1 control module
        5 A @ +5 V (fused @ 7 A)

Graduate School of Science University of Tokyo
Center for Nuclear Study (CNS)

LV distribution and fusing for Preamp

PHENIX standard LVLP modules will be used.

One LVLP module
(Low power module variant “Z2”)
8channels and 12.5A output per each channel
4 channels for +6.5V
4 channels for -6.5V
4+4 +4 of AWG14 cables (+6.5V, GND, -6.5V)
One channel for 5 preamps
distributed to 20 pairs of AWG 18 wires
• distributors : UK6-FSI/C with 2 A fuses



pre-amplifier card

fused @ 1 A for both +6.5V and -6.5V

All parts on the card work well with 1A current.

Graduate School of Science
University of Tokyo
Center for Nuclear Study (CNS)

Preamp circuit and Heat

Op-amp

AD8009

slew rate: 5500uV/s

Bandwidth: 1GHz

Regulator

MIC2954 +5V, minimum drop 0.5V

LM2990 - 5V, minimum drop 0.5V

Operation drop voltage will be 1.5V

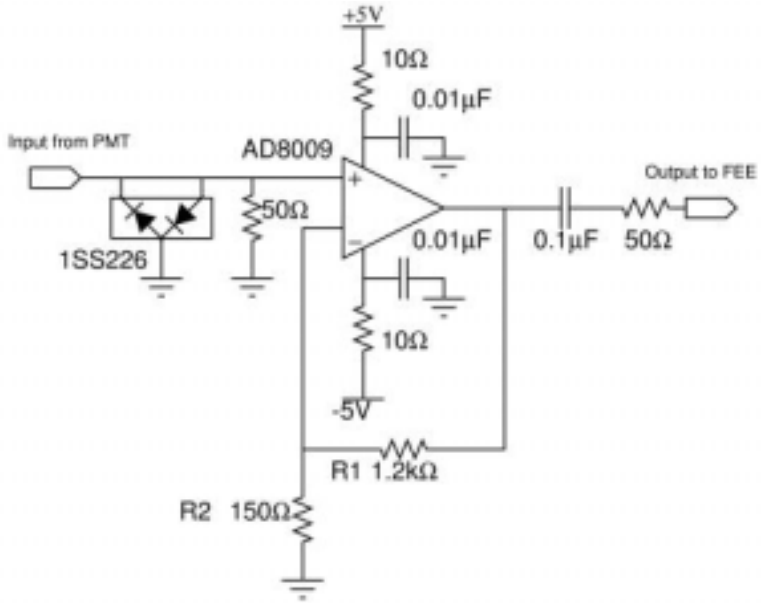
(Input voltage : 6.5V)

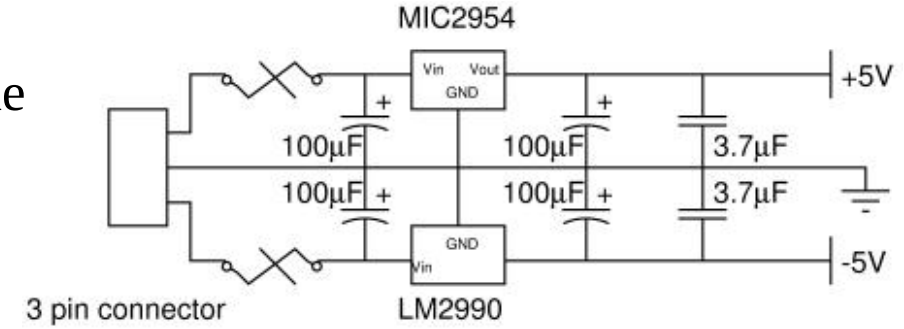
Heat

The measured current is 0.12A.

0.12A x 6.5V x 2 (positive and negative) = 1.5W

All preamplifier cards are located in the open air and this heat can be removed by the ambient air.

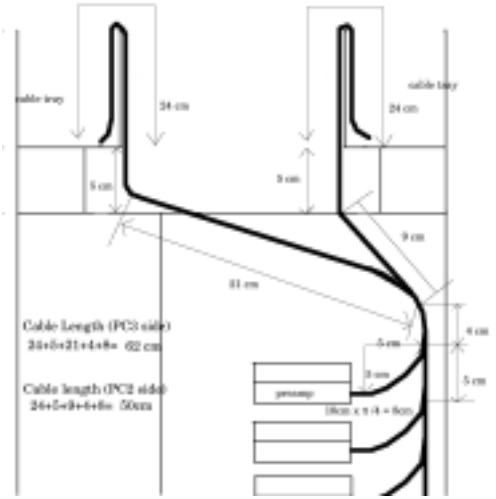


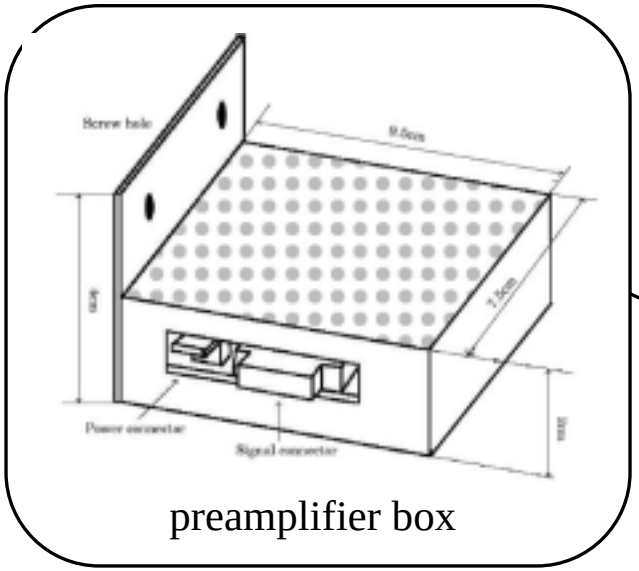


Location of preamplifier

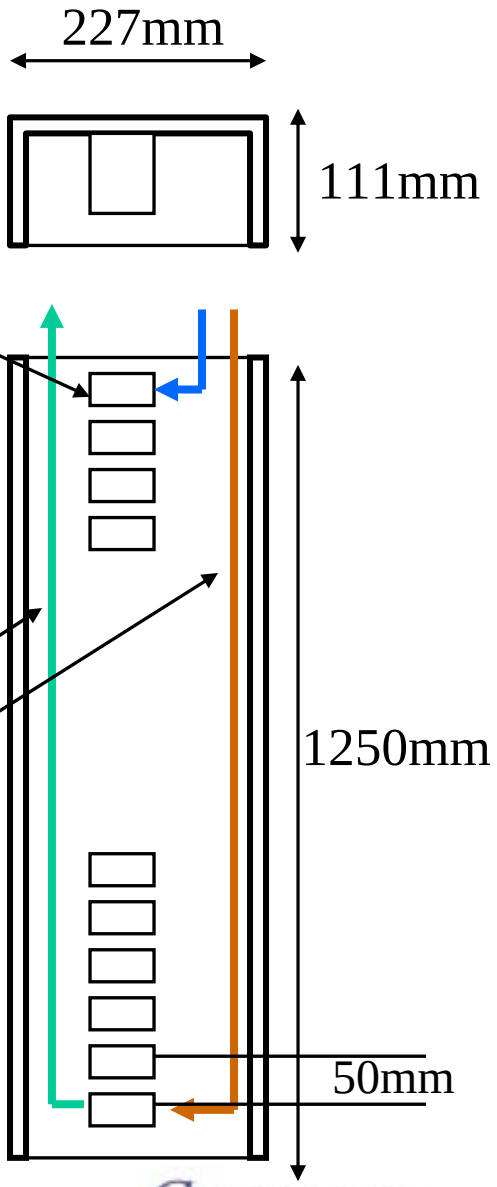
Top view

Side view





preamplifier box



UL2833 x 20

RG-174 x 160

Cooling issue

1.5 W x 20 = 30 W

holes on box

Temperature of Preamp

- Temperature of Op-amp surface reach 44℃
  Air Temp + 20℃
- Temperature of Box surface reach 32℃
  Air Temp + 7℃