

HRS detector: Status and Plan

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- ❖ HRS basic package
- ❖ HRS VDC and FPP
- ❖ Trigger hodoscopes
- ❖ HRS Particle Identification: ToF, GasCher, Shower, Aerogel(s), RICH: plan for a PID working group
- ❖ Maintenance and upgrades: “hardening”

Detector Packages

VDC

S1 hodoscope

S2 hodoscope

Gas Cherenkov

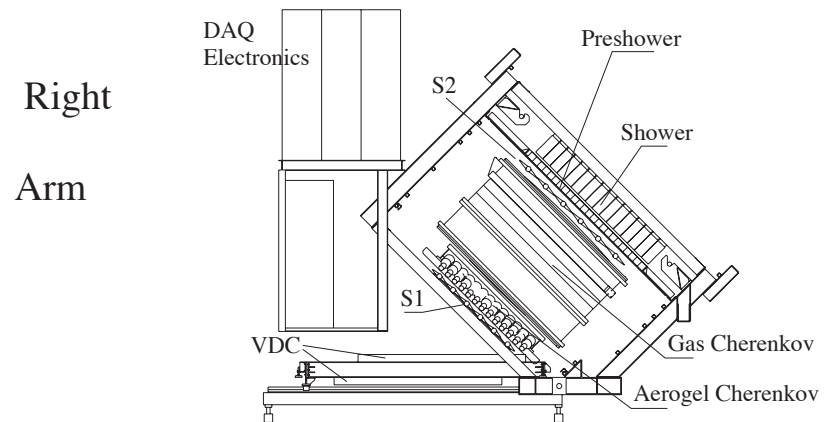
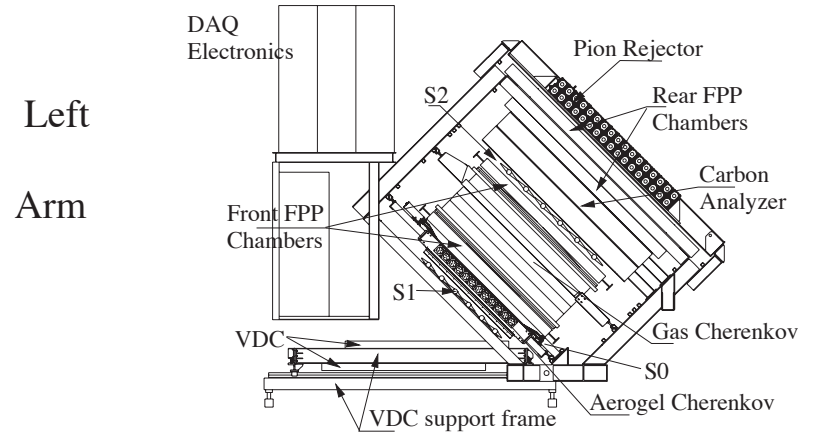
Lead-glass calorimeter

FPP front chambers

FPP rear chambers

Aerogel A1, A2 counters

RICH



Status of Detectors

VDC, upgrade of electronics

S1 hodoscope: ready for S1m

S2m operates with 0.25 ns timing

Gas Cherenkov needs new mirrors,
regular replacement of PMTs

Lead-glass, in good shape, add trigger

FPP front, plan to restring ~100 wires

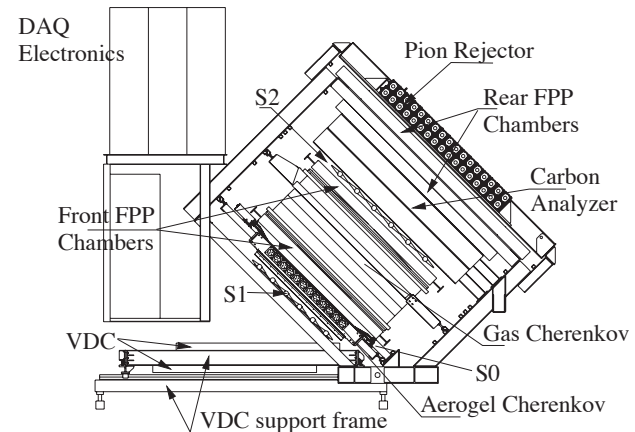
FPP rear ----- upgrade/status

Aerogel A1, A2 ---- is experiment

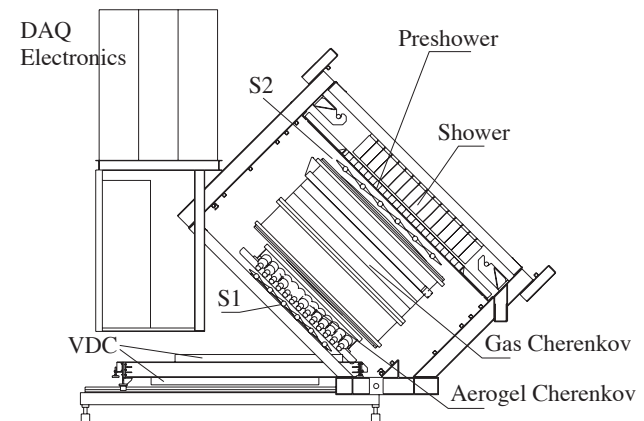
RICH ----- driven

Left

Arm



Right

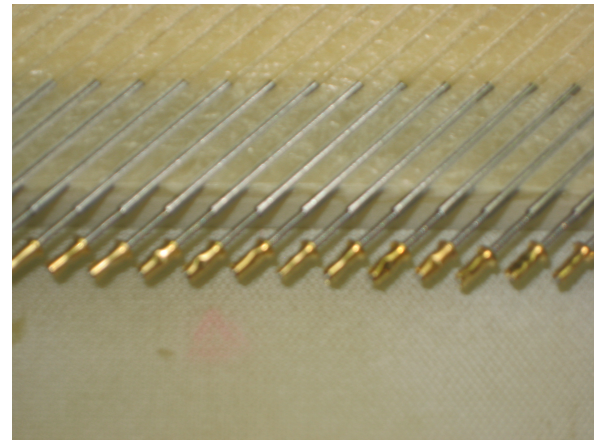
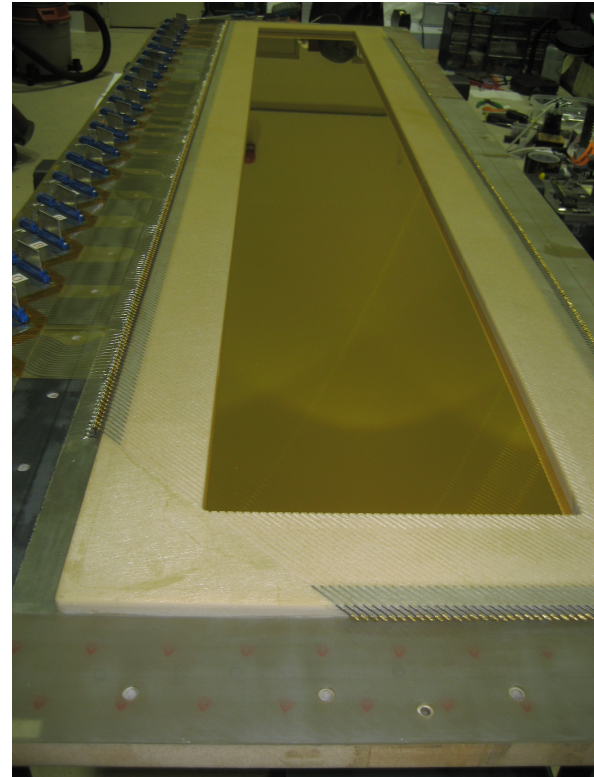


VDC

Observations : atm. pressure UP/DOWN -> sparking;
after 15 years of work, VDC#4 failed.

The cause: gas leaks-> air between windows; poor
quality of the window and frame-PC gluing.

Done: rebuilt all windows (new technique);
milled-out all bumps in the frames etc.;
strung all new wires; tested chamber for leaks,
signals with Fe55; copper cladding on the frame.



VDC status

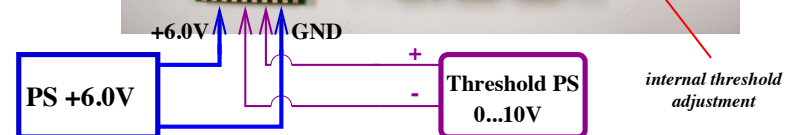
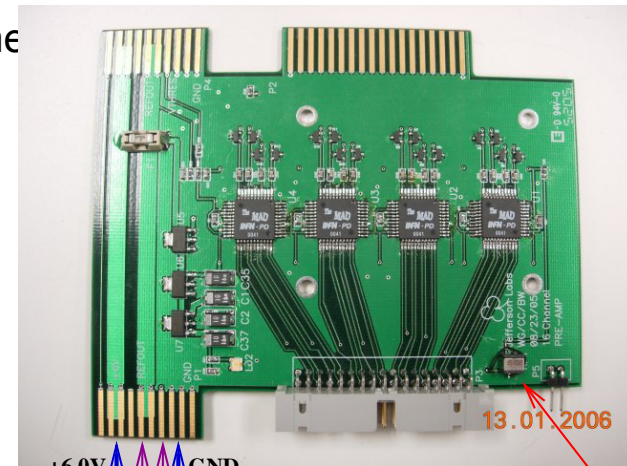
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STATUS: VDCs (all six) are in good shape

Plan – upgrade front-end electronics (reuse Qweak's)
Very good stability against oscillation
Rate capability of 8 MHz (in full chamber) was shown



FPP (front)

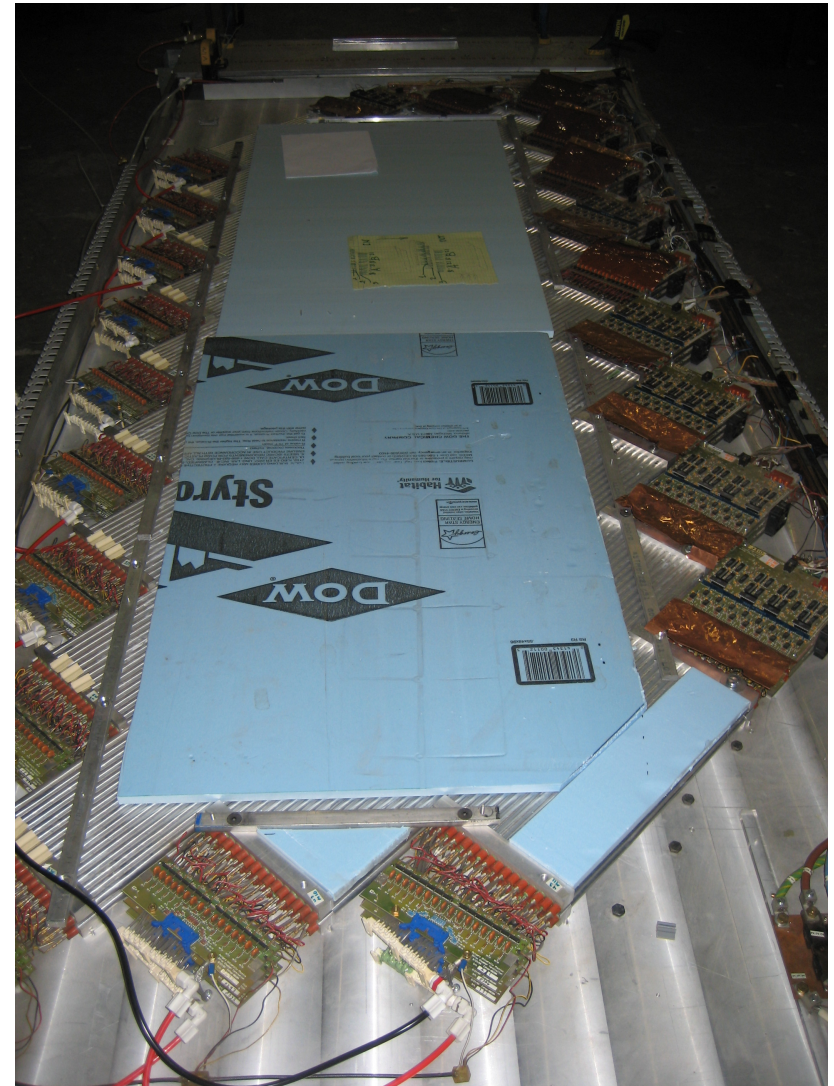
Problems: gas consumption > 50 l/h
often HV trips due to gas
many dead wires/some

electronics

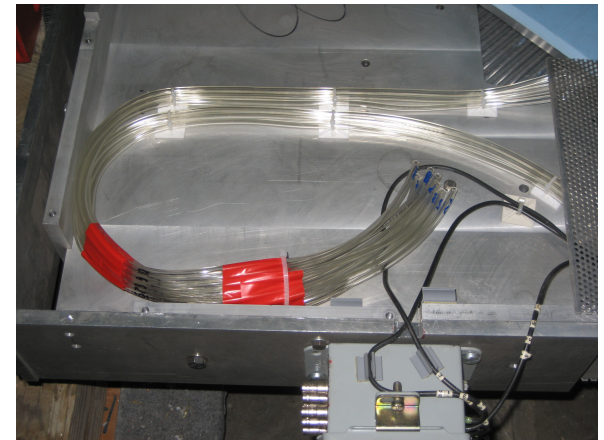
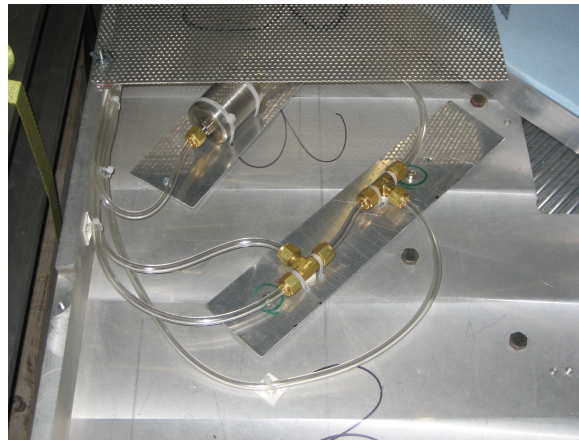
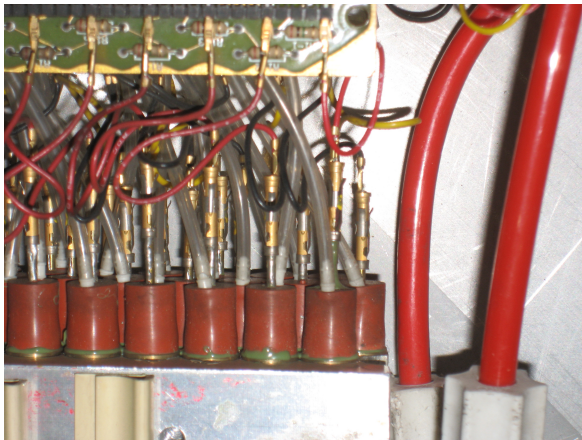
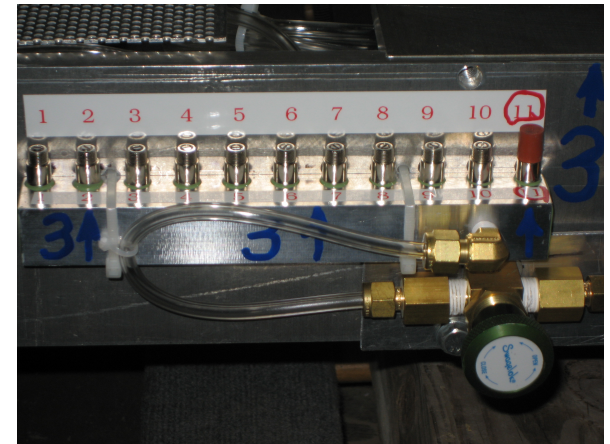
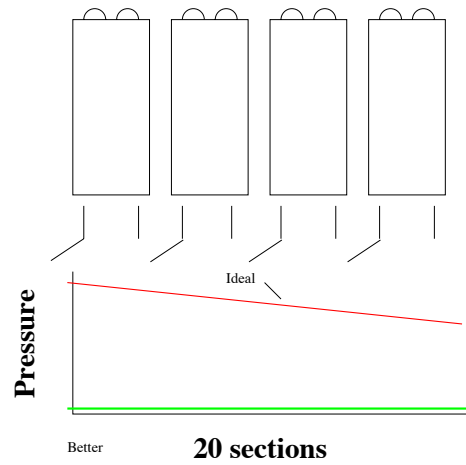
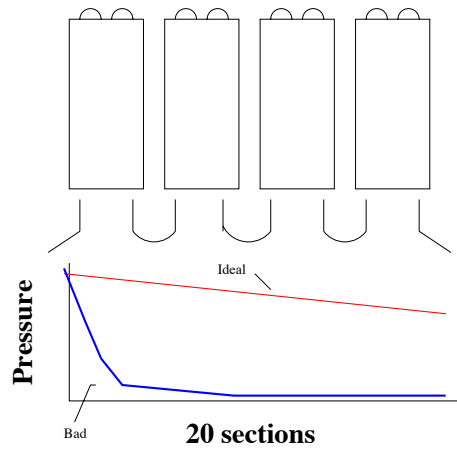
Done: repair dead electronics
built parallel gas distribution
tests of each wire/
disconnect dead

More: HV distribution on one layer
need: Gas distribution should be as
wide as a straw block

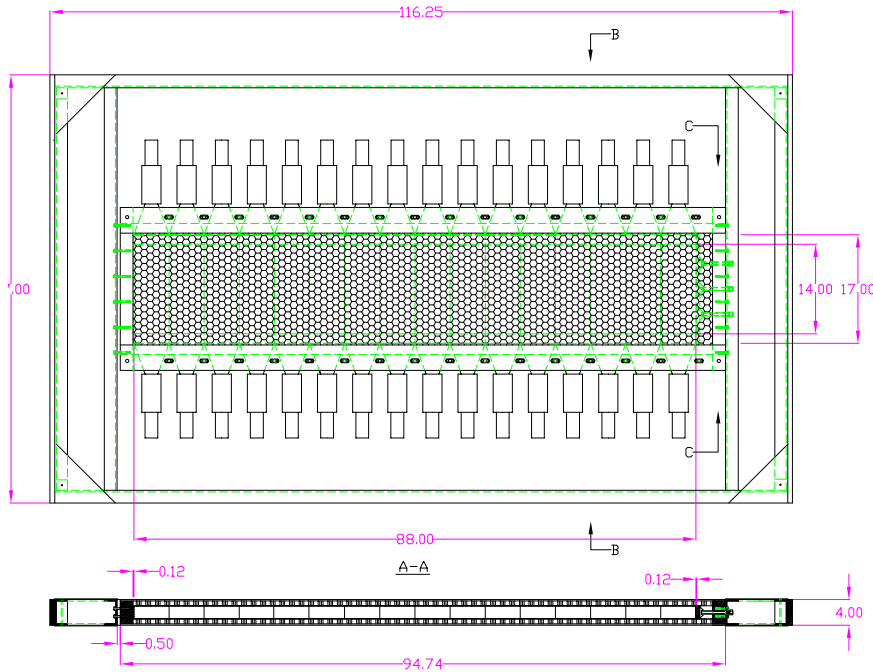
to be: tension test for each wire
done: ~ 100 wires need to
restrung



FPP (front) repair



S2m hodoscope



5 cm thickness
16 paddles

Time resolution
of 0.25 ns

User name Markowitz

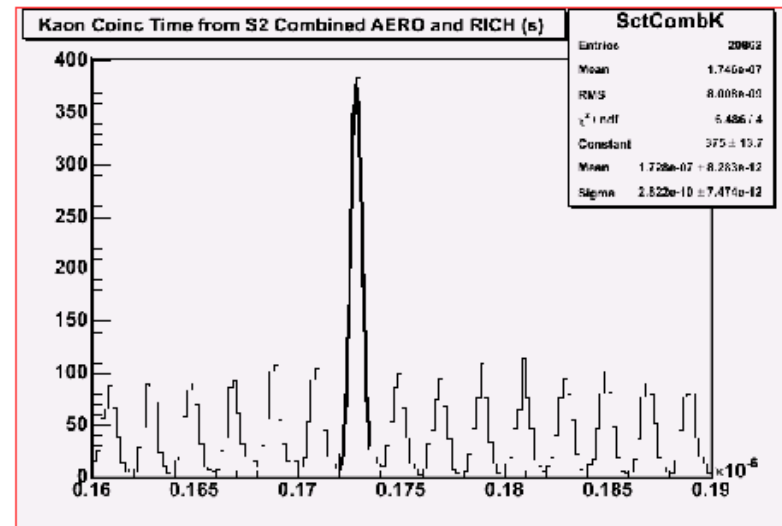
Log entry time 17:18:14 on June 19, 2005

Entry number 146626

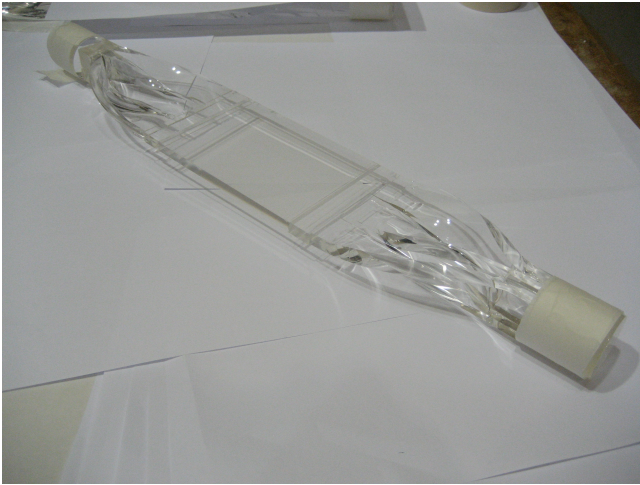
keyword=Kaon coincidence timing

coincidence timing for kaons, using the RICH and A1/A2 combo shows very clean spectra, with a narrow TOF

Figure 1



S1m and S1f



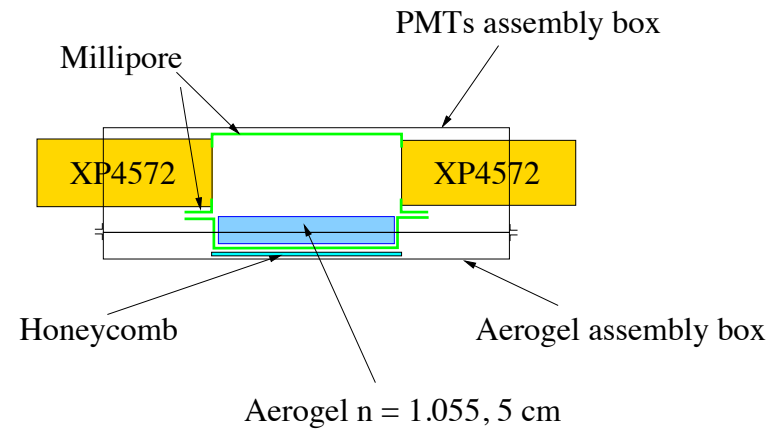
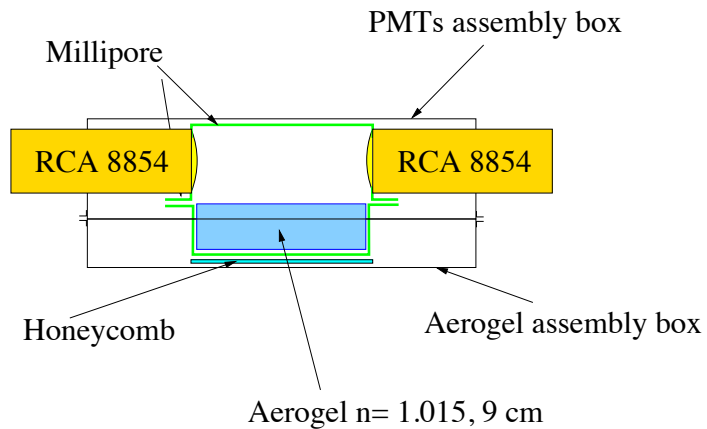
Scintillator of 1 cm thickness,
16 paddles; 0.2 ns time resolution

Will be ready for use in HRS
(thanks to UCLA) in August

Scintillator of 0.5 cm thickness
The light guide without a twist
Novel s-shape acrylic plates



Aerogel counters

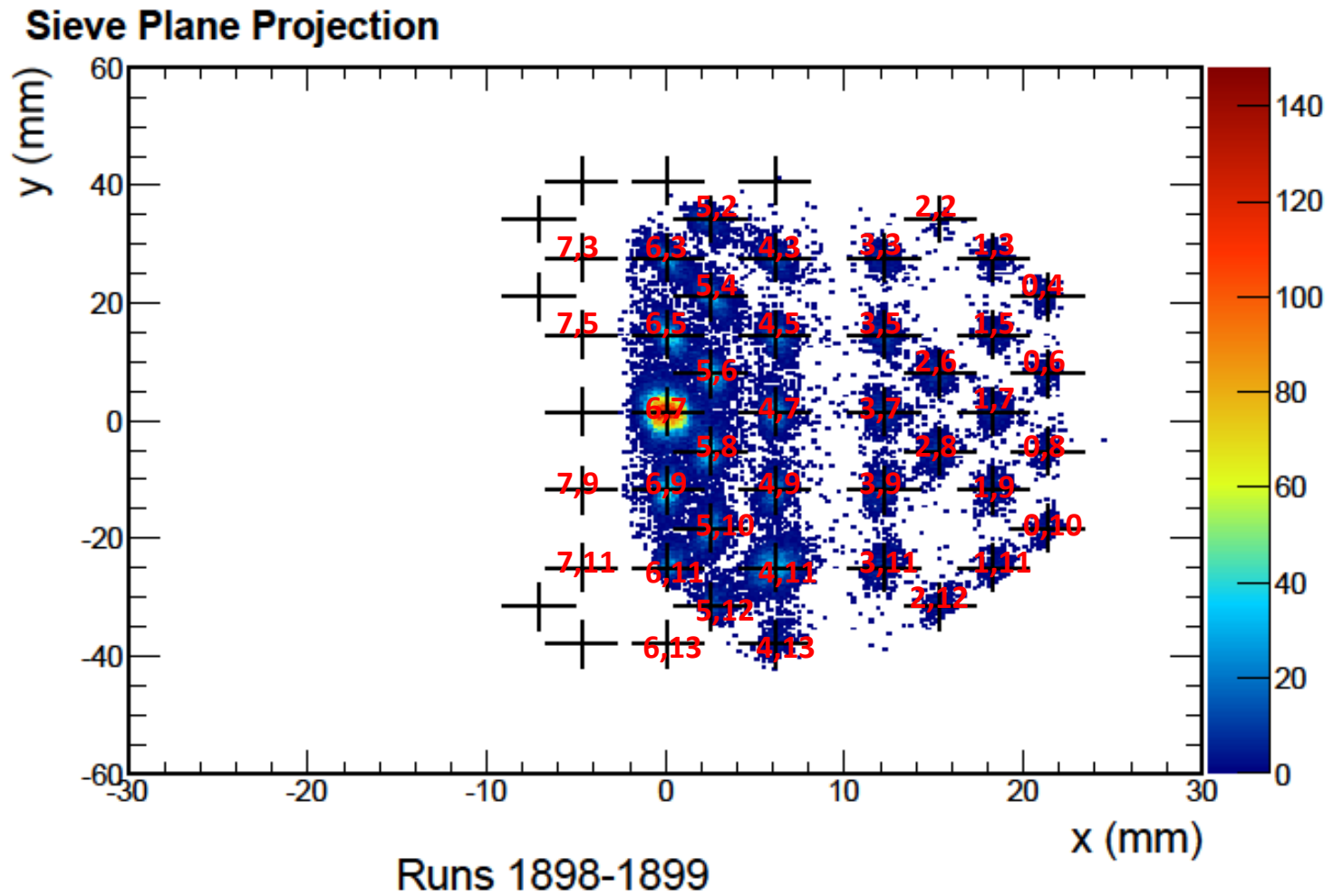


PMTs used in these counters are not produced any more

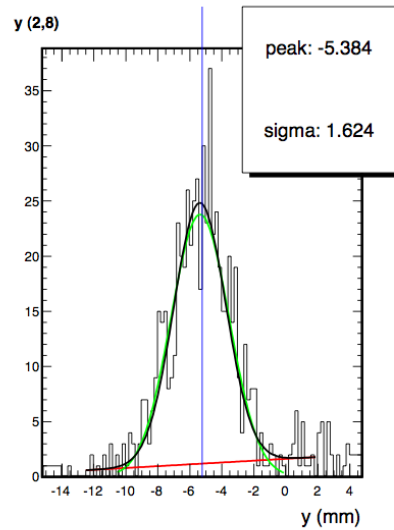
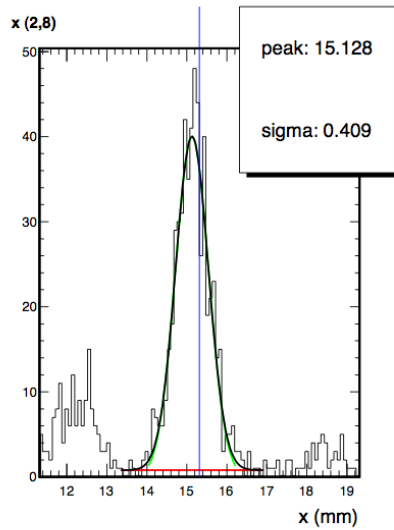
We have ~ 30 XP4572 for the A2 counter

The A1 counter maintenance is not possible, need redesign
with different PMTs

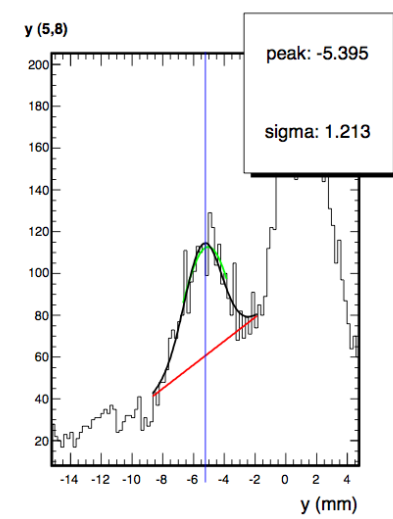
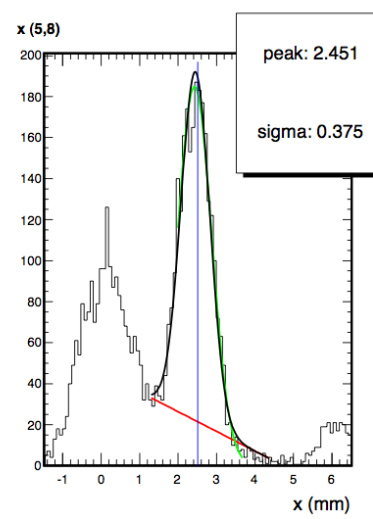
HRS optics



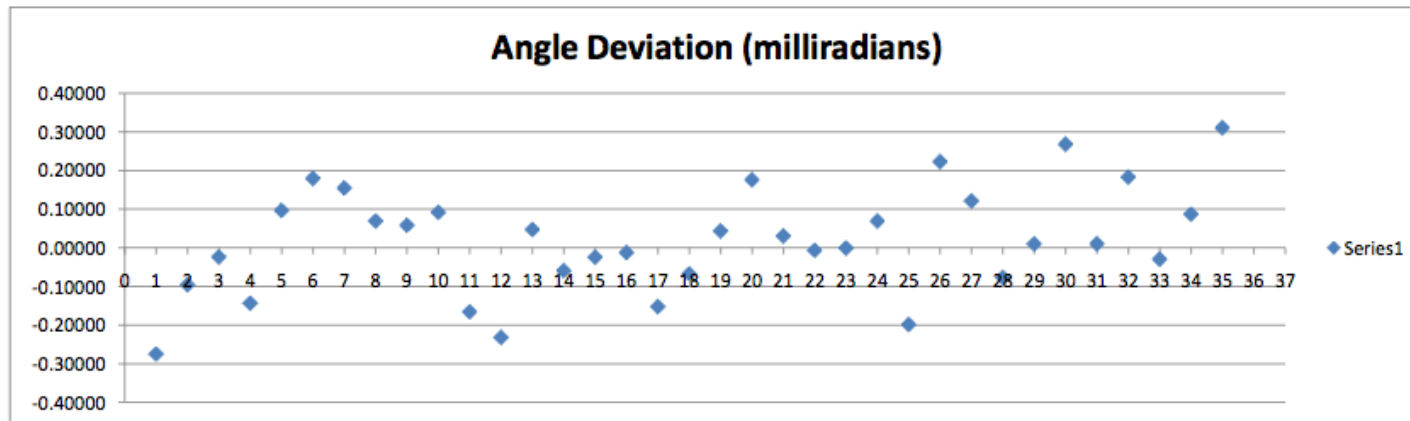
HRS optics for APEX



Left Sieve Run 1898-1899

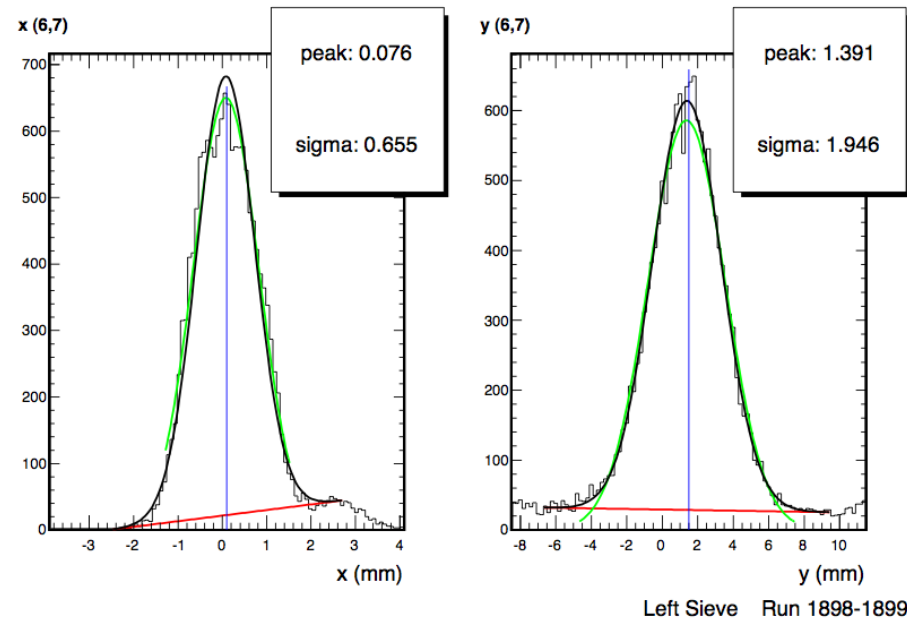


Left Sieve Run 1898-1899



HRS optics for APEX

BIG HOLE



Big hole: diameter 0.105" ; observed sigma ~ 0.66 mm approx. due to the hole size

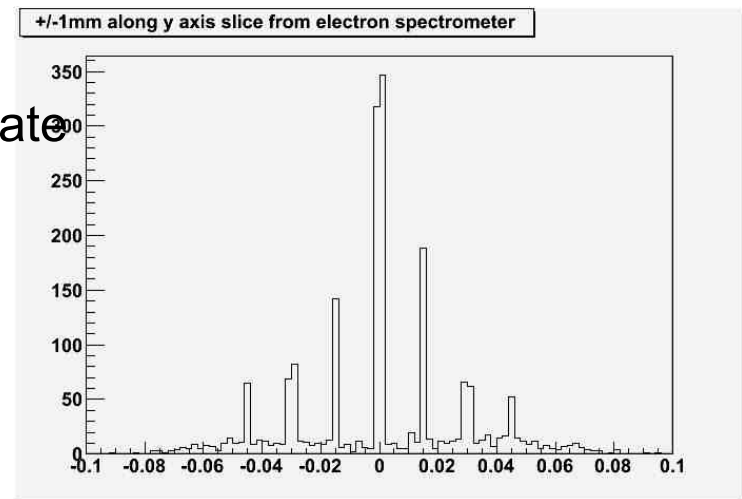
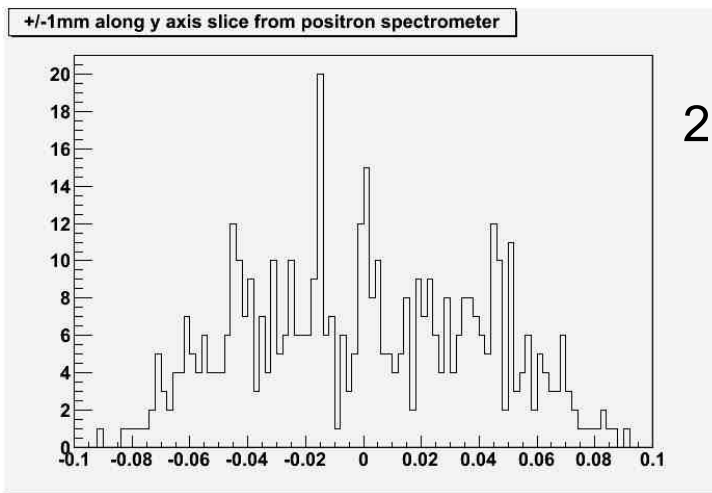
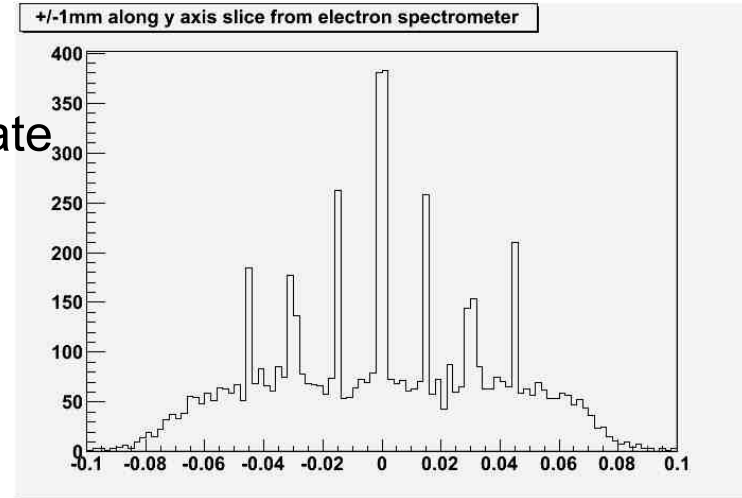
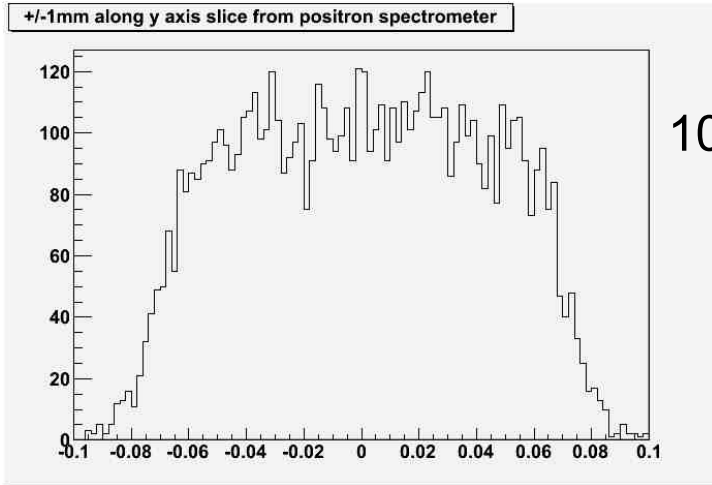
Small hole: diameter 0.055" ; observed sigma ~ 0.40 mm -> angular resolution

Angular resolution (horizontal, at the hole) < 0.3 mrad

MC of HRS sieve slit

Positive polarity

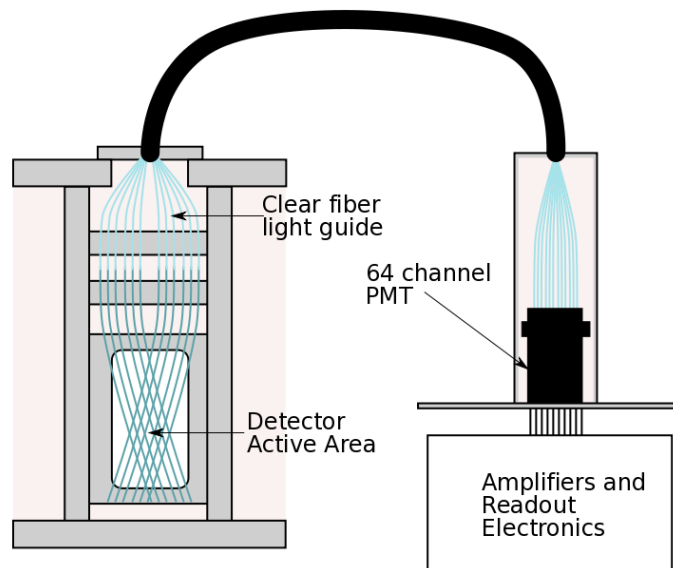
Negative polarity



HRS optics

Active “sieve slit”: tagging by
a Sci Fiber detector

1 mm fibers with 1/16” pitch connected
to a maPMT



Readout to via 1877s TDC

1-3 MHz rate per fiber

Off-line time window of < 5 ns

All components are available and tested
Prototype is under development by
Neil Goeckner-Wald and Tyson Price

Summary

Basic detector is always ready

Aging scintillator S1 will be replaced

VDC electronics will be upgraded

Optics calibration detector is under development

The plan for high performance PID needs to
be decided