E949 Collaboration Meeting

Transparencies

July 16, 2000

Agenda

Page	Time	Topic	Speaker
3	09:00-09:10	Welcome/Overview	(S. Kettell)
7	09:15-10:00	RSSC	(T. Numao)
19	10:05-10:20	RS 2-5 Update	(J. Frank)
31	10:35-10:50	T-counter update	(J. Frank)
37	10:55-11:15	RS Monitor System	(T. Nomura, A. Kozhevnikov)
44	11:20-11:40	Detector Schedule	(K. Li)
45	11:45-12:10	Beam Instrumentation	(P. Kitching)
62	12:15-12:30	Other PV	(S. Kettell)
71	13:30-13:45	UTC	(T. Numao)
75	14:05-14:40	Trigger	(M. Nomachi)
83		new triggers (3g,pgg, ke4...)	(L. Littenberg)
84		1g trigger	(T. Komatsubara)
87		calibration triggers	(S. Kettell)
88	14:45-15:30	DAQ	(G. Redlinger)
91		RS TDC	(E. Ramberg)
96		Monitoring systems	(G. Redlinger)
102	15:45-15:50	Monte Carlo	(T. Komatsubara)
109	16:00	next meeting/other business	

Overview (S. Kettell)

E949 Collaboration Meeting July 16, 2000

- Budget (President's FY01 budget $704M, House $704M, Senate $677M)
- Schedule (depends on RHIC schedule)
- LESB3
- Operating Conditions

Important Points:

- Give your transparecies to Dick to make copies.
- Tell me where an electronic version is located (or email it)
- Sign the E949 Work Planning document in the counting house (next to Dibbuk)
- Notify me if you are planning any work not covered in that document
- Make sure you have a Lab ID, and a film badge (with appropriate training)

Budget

- President's FY01 budget $704M
- DOE HEP Budget: House $704M, Senate $677M (expect $690M)
- Expected BNL HEP budget (President's budget)
  - AGS Operations $5.92M (DOE guideline $3M g-2, $3M E949)
  - BNL HEP Capital $1.6M (E949)
- BNL management plan:
  - 15 weeks g-2 (finish g-2)
  - 10 weeks E949 (engineering run)

LESB3

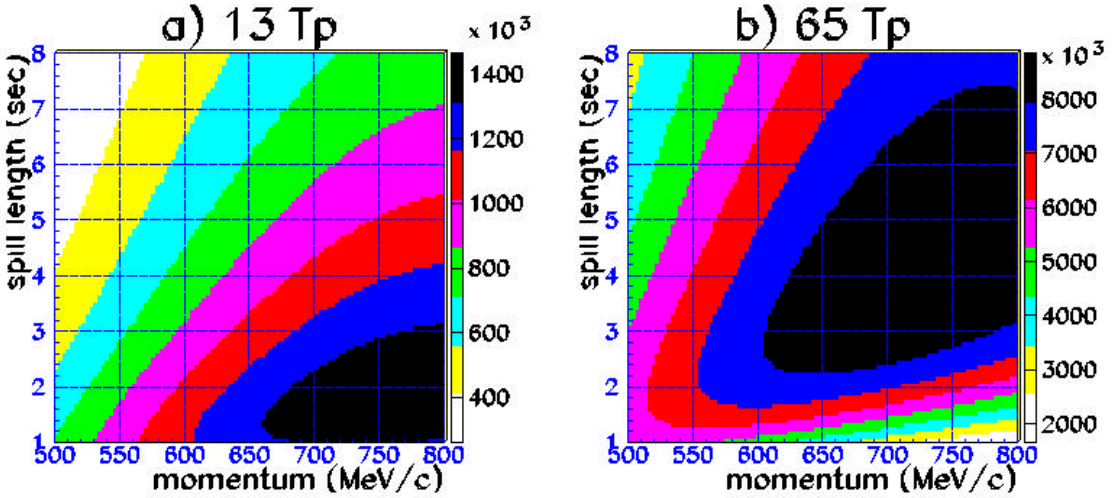
- FY00:
  - Complete Separator #1 Standoff upgrade (test 9/00)
  - Initiate H_2O upgrade
- run with current Q01-02 (keep spares as spares)
- FY01 (critical path):
  - H_2O upgrade
  - beam instrumentation (SEC, SWIC, telescope,...)
  - restore D02
  - verify Separators
- FY01 (non-critical path):

- replace Q01–02
- 2^{nd} spare Q01–02
- two new C-targets
- spare D01 (cancelled?)
- C-line beam dump (cancelled)

Schedule

- **Schedule is Uncertain!**
- Original RHIC schedule for FY01 (January-August); current best guess (March, 2001–May, 2002)
- Original E949 schedule (5/15/01–7/31/00); current best guess (June – August). Note! In the current scenario our long FY02 run would start again in October, 2001.
- Current statement from CAD is NO pulse-on-demand for E949.
- RHIC FY00 run ends 9/18/00
- NASA run 10/1–15/00
- Replace Booster F6–7 (10 weeks)
- g-2 cryo 1/1/01
- g-2 run and RHIC cryo 2/1/01
- 3/1/01 suspend g-2, start RHIC
- 4/1/01 resume g-2 (continue to 15 weeks)
- 6/1/01 E949 (E930, E931)
- (Not in this schedule SNS pulse-on-demand in C-line from g-2; 1 week of FEB to proton radiography; SEB pulse-on-demand; RHIC polarized protons)

Operating Conditions (S. Kettell)



The maximum sensitivity for the 1995 conditions is 1.46×10^{-6}/hr at 780 MeV/c and a 1.7 sec spill.

The maximum sensitivity at 65 Tp is 8.9×10^{-6}/hr at 730 MeV/c and 4.1 sec spill every 6.4 sec, which is 6 times larger than the 1995 sensitivity.

After the proposed running time of 6,000 hours (~2 years), the expected sensitivity will be $(5.3 \times 10^{10})^{-1} = 1.9 \times 10^{-11}$. Combined with the E787 result, the sensitivity should reach 1.5×10^{-11} with 0.8 expected background events. With the added acceptance from the region below the $K^+ \rightarrow \pi^+\pi^\circ$, the sensitivity should reach 8.4×10^{-12}. Therefore the expected number of SM events is 7–12, if the branching ratio is the central SM value of 10^{-10}.

year	KB_L (10^{12})	$\lvert\vec{p_K}\rvert$	DF (%)	sf (%)	$(S.E.S.)^{-1}$ (10^{10})	bck events
1995	1.49	790	41	18.7	0.24	0.08
1995–98	6.2	670–790	47	24	1.2	0.16
2001–02	18	730	64	26	5.3	0.7

Results of model calculation											
Conditions										Totals	
Int. (Tp)	$\lvert\vec{p_K}\rvert$ (MeV/c)	spill (sec)	sens/hr (10^6)	KB/sp (M)	KB/sec (MHz)	KB/Teff (MHz)	Ck/Teff (MHz)	Acc (%)	KB_L/sp (M)	KB_L (10^{12})	sens (10^{10})
13	780	*1.6	1.5	1.0	0.7	0.8	4.0	*0.18	0.8	*5.0	2.28
65	730	4.1	8.8	6.1	1.5	1.6	5.5	0.30	5.1	17.4	6.68
65	670	5.5	7.8	5.1	0.9	1.0	3.0	0.36	4.6	12.8	6.07
65	750	2.5	7.9	6.3	2.5	2.8	9.9	0.22	4.8	21.4	6.12
100	714	5.3	10.2	9.0	1.7	1.9	6.0	0.29	7.4	21.2	7.53
100	770	3.5	15.9	10.0	2.9	3.2	11.9	*0.35	7.3	27.1	10.95
100	770	3.5	8.7	10.0	2.9	3.2	11.9	0.19	7.3	27.1	6.62

RSSC (T. Numao)

TTD

- Use existing cables
- Mod./add electronics
  X-talk
  - Establish X-talk loc.
  - Pulse shape diff. ?
  - 2 threshold levels ?
- Complete design/tests
  1~2 months

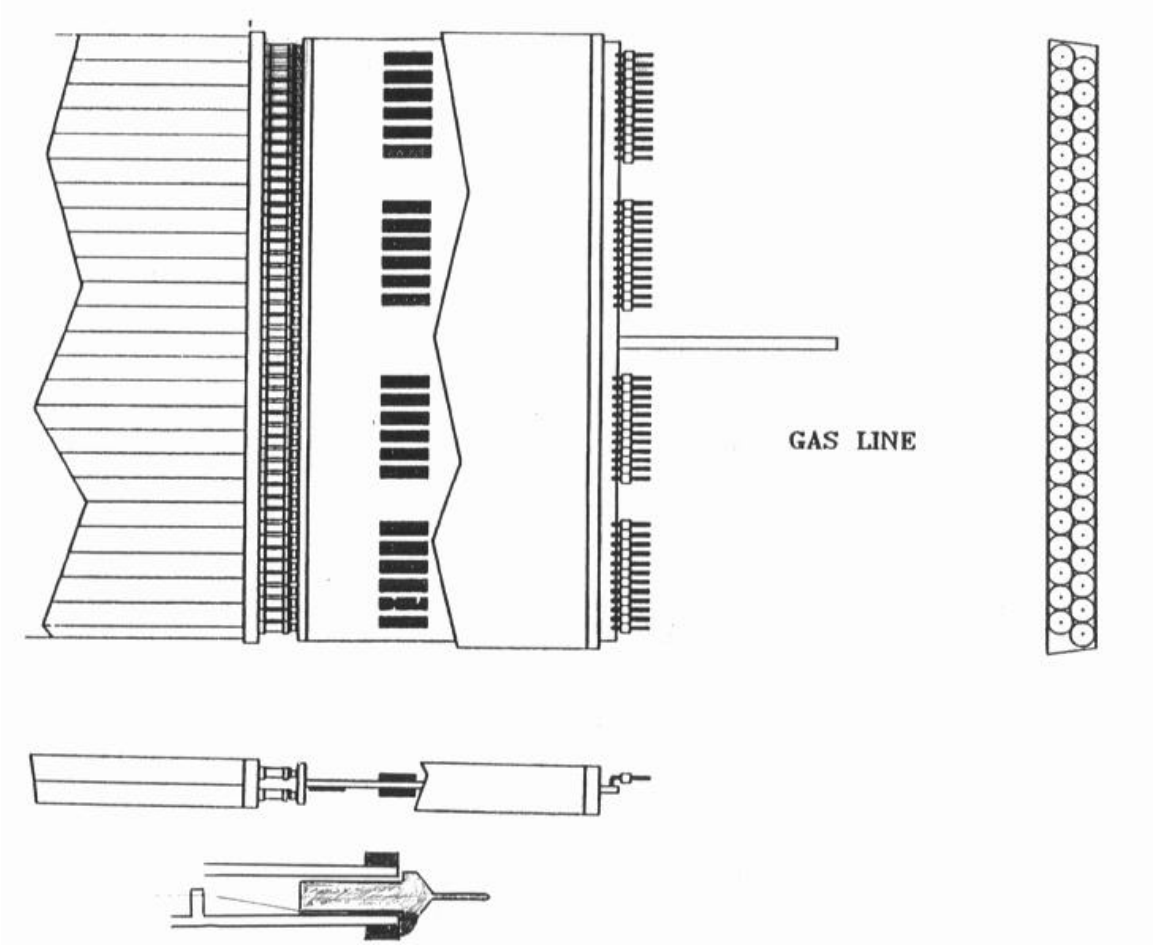

RSSC
3 dead ones to TRIUMF
–repair
–remove wire
–no RSSC
Z tail
–symptoms
–Tests at TRIUMF

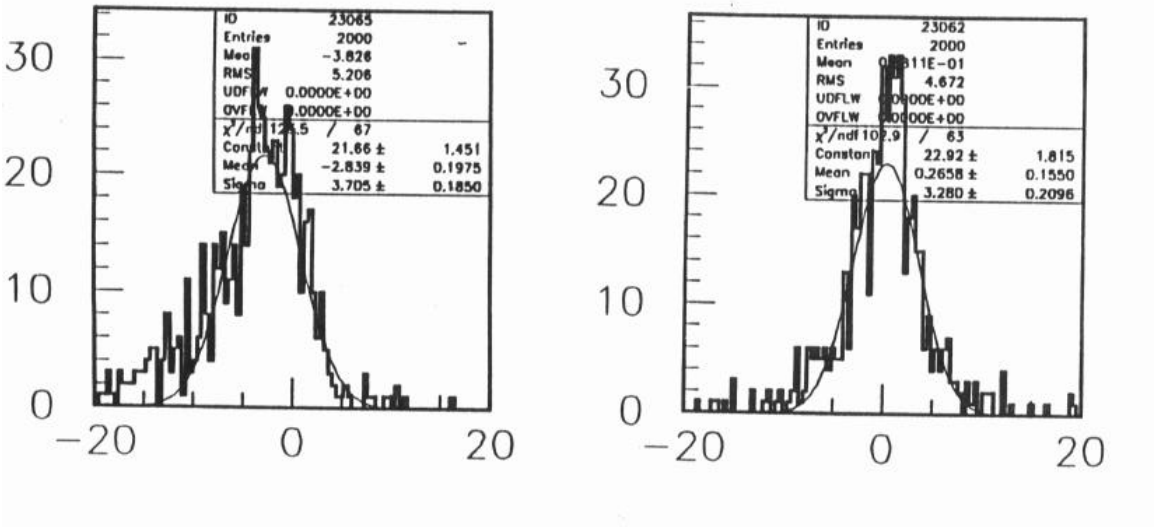
RSSC repair

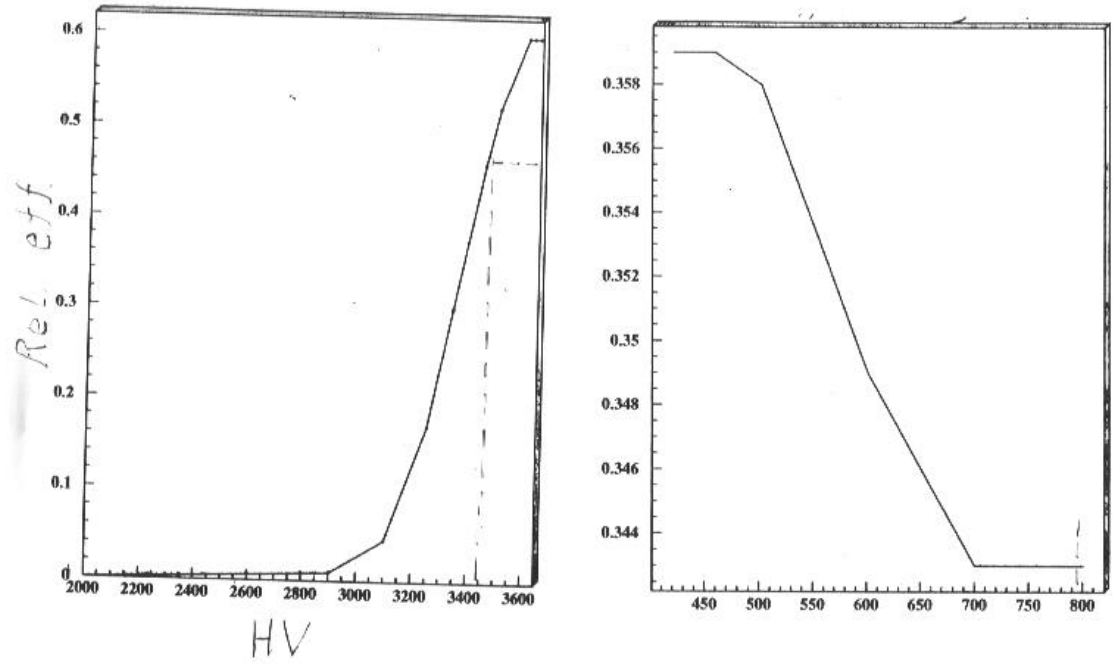
- Repaired 3 RSSCs
  - 2; loose wire
  - 2; bad insulation
- Test in June / '98 run
  - 1 plugged, 1 leaking
  - 3 to 6 potentially bad
- Send 4 to TRIUMF

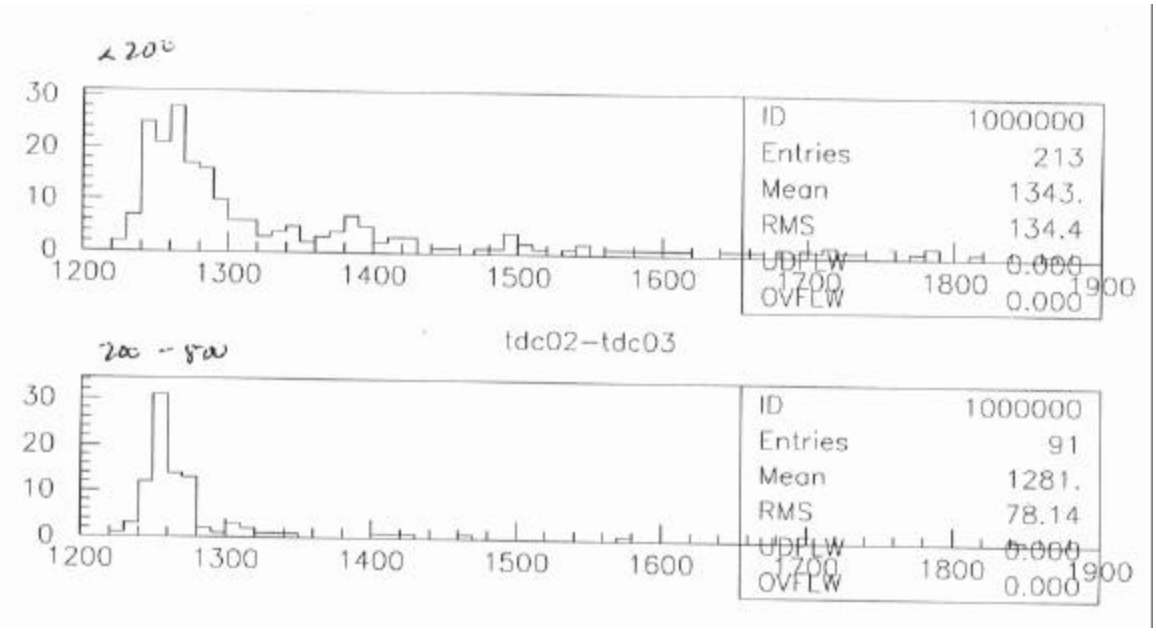
RSSC problems

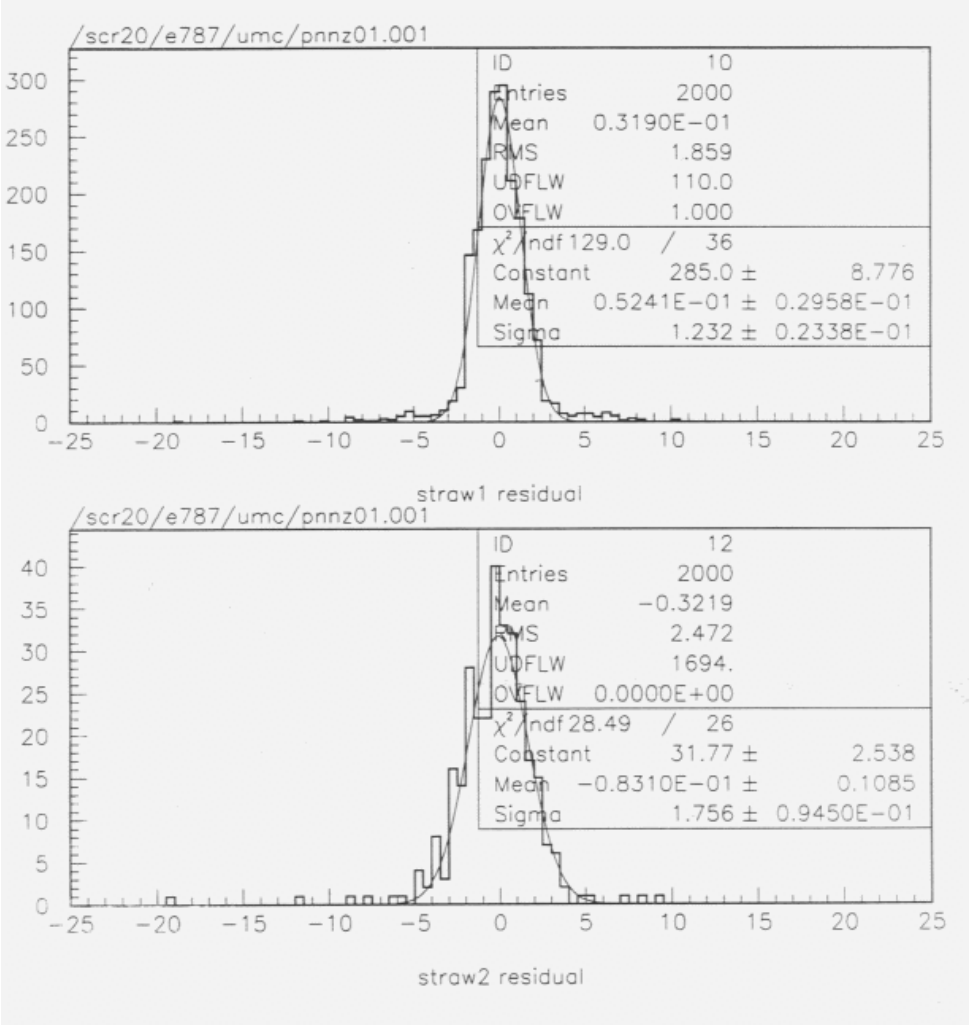
- Dead/nearly dead 3/6
- Z tail
  - Origin ?
  - Cross talk ?
- Efficiency
  - Single hit 30 %

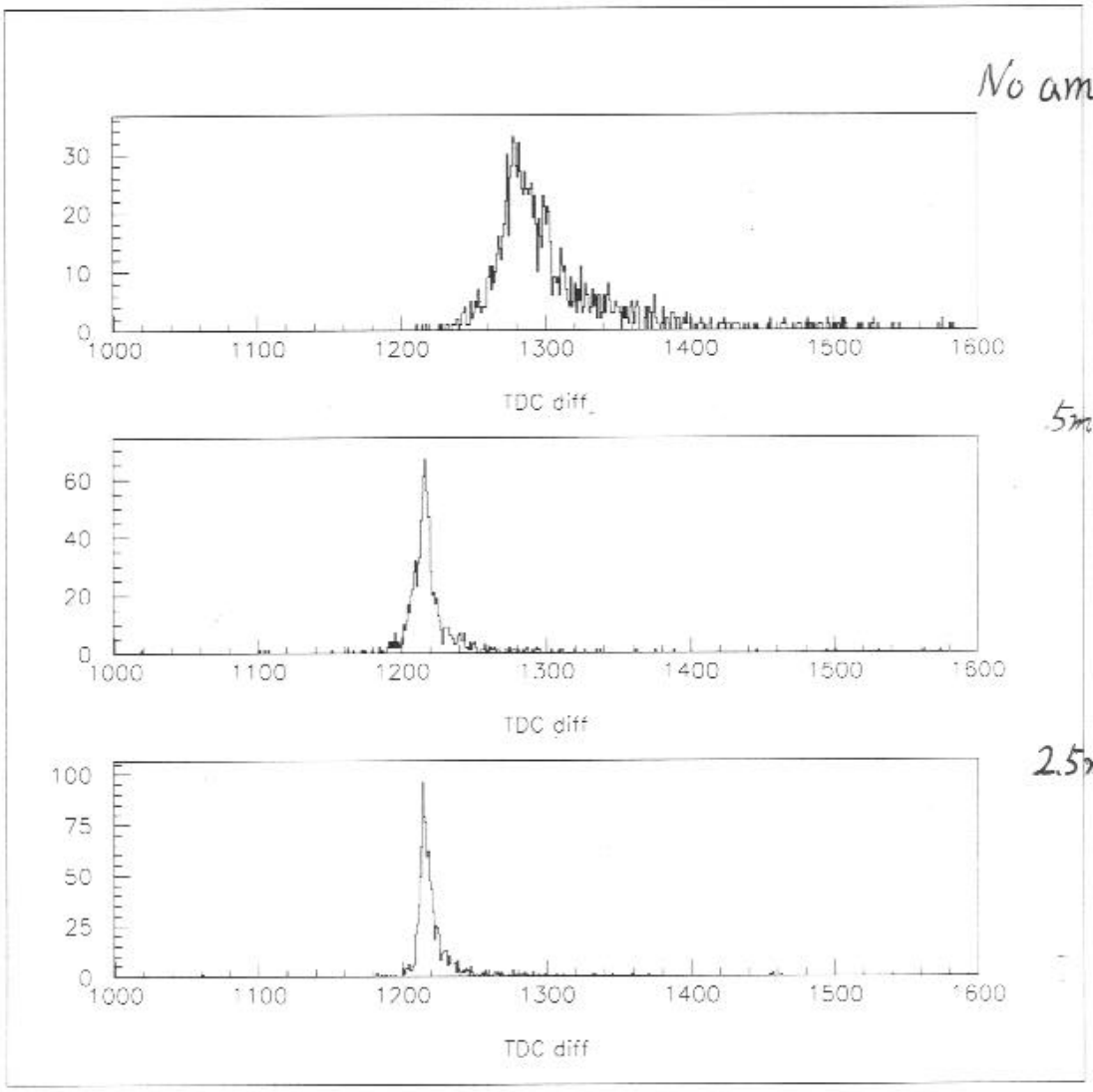

GAS LINE

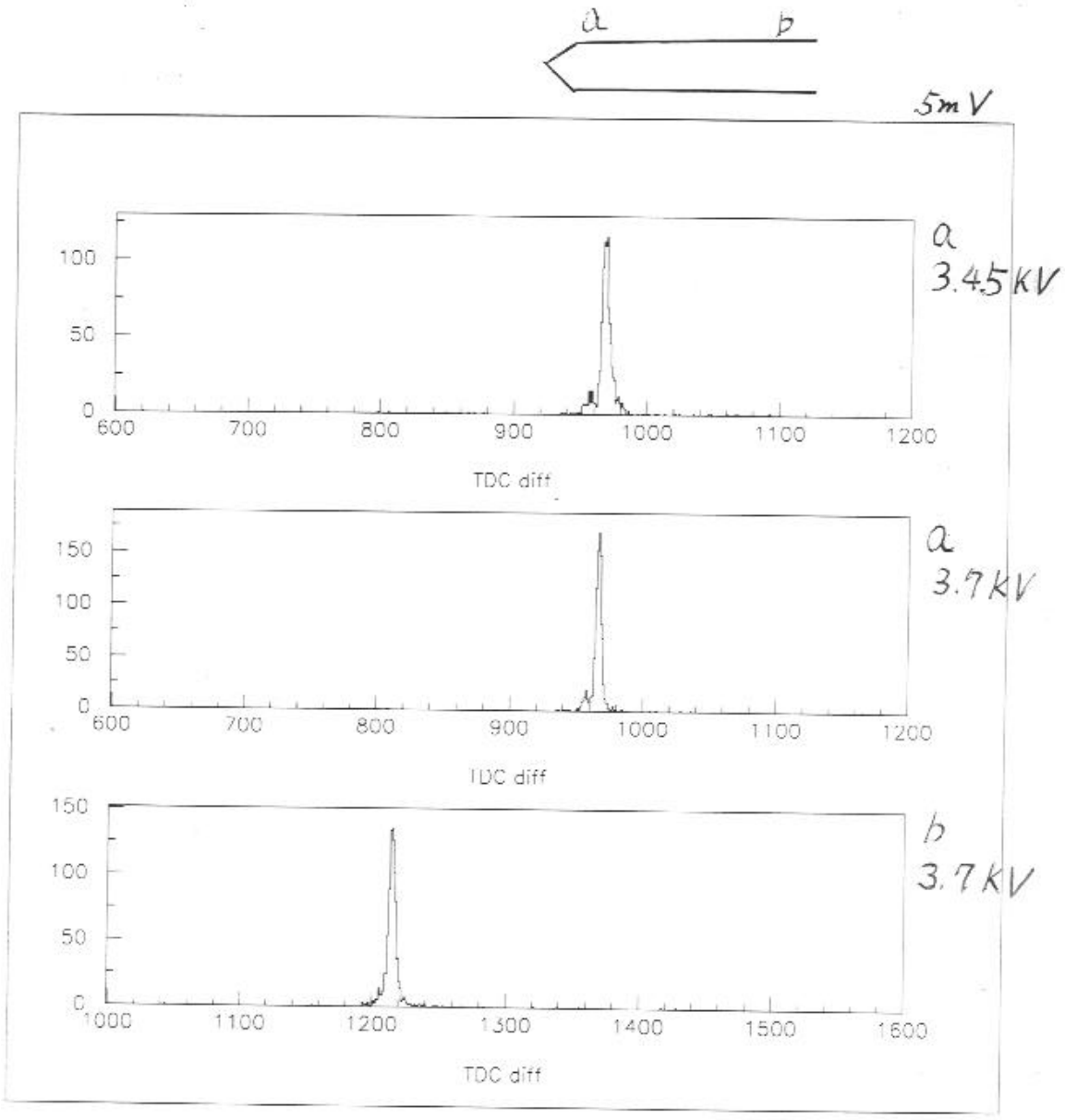

ID 23065
Entries 2000
Mean -3.826
RMS 5.206
UDFLW 0.0000E+00
OVFLW 0.0000E+00
χ²/ndf 125.5 / 67
Constant 21.66 ± 1.451
Mean -2.839 ± 0.1975
Sigma 3.705 ± 0.1850
30
20
10
0
−20
0
20
ID 23062
Entries 2000
Mean 0.2811E-01
RMS 4.672
UDFLW 0.0000E+00
OVFLW 0.0000E+00
χ²/ndf 102.9 / 63
Constant 22.92 ± 1.815
Mean 0.2658 ± 0.1550
Sigma 3.280 ± 0.2096
30
20
10
0
−20
0
20

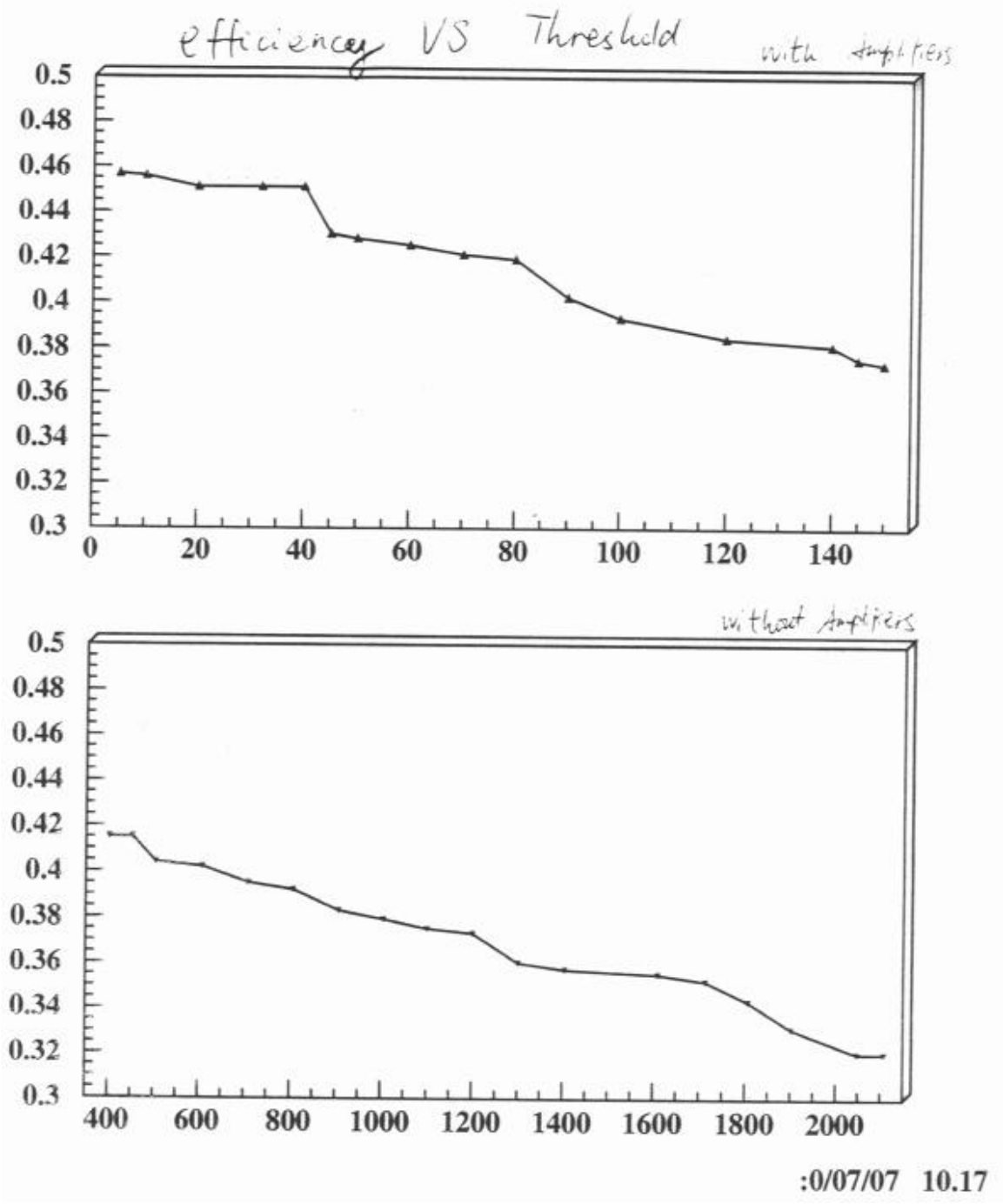

Rel. eff.
0.6
0.5
0.4
0.3
0.2
0.1
0
2000
2200
2400
2600
2800
3000
3200
3400
3600
HV
0.358
0.356
0.354
0.352
0.35
0.348
0.346
0.344
450
500
550
600
650
700
750
800

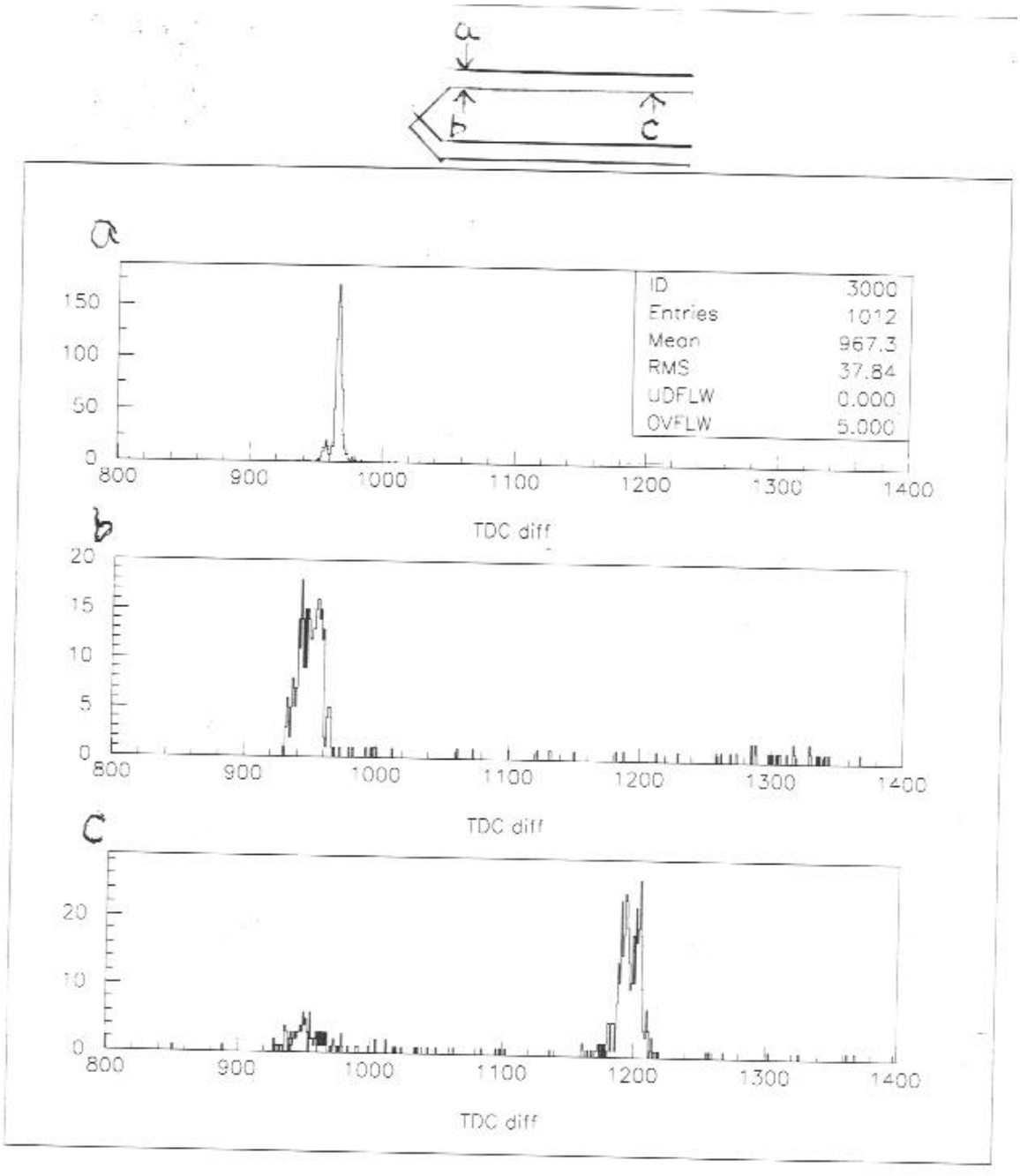

ID 1000000
Entries 213
Mean 1343.
RMS 134.4
UDFLW 0.000
OVFLW 0.000
tdc02−tdc03
ID 1000000
Entries 91
Mean 1281.
RMS 78.14
UDFLW 0.000
OVFLW 0.000


/scr20/e787/umc/pnnz01.001
ID 10
Entries 2000
Mean 0.3190E−01
RMS 1.859
UDFLW 110.0
OVFLW 1.000
χ²/ndf 129.0 / 36
Constant 285.0 ± 8.776
Mean 0.5241E−01 ± 0.2958E−01
Sigma 1.232 ± 0.2338E−01
straw1 residual
/scr20/e787/umc/pnnz01.001
ID 12
Entries 2000
Mean −0.3219
RMS 2.472
UDFLW 1694.
OVFLW 0.0000E+00
χ²/ndf 28.49 / 26
Constant 31.77 ± 2.538
Mean −0.8310E−01 ± 0.1085
Sigma 1.756 ± 0.9450E−01
straw2 residual


No amp.
30
20
10
0
1000
1100
1200
1300
1400
1500
1600
TDC diff
5mV
60
40
20
0
1000
1100
1200
1300
1400
1500
1600
TDC diff
2.5mV
100
75
50
25
0
1000
1100
1200
1300
1400
1500
1600
TDC diff


a
b
5mV
100
50
0
600
700
800
900
1000
1100
1200
TDC diff
a
3.45kV
150
100
50
0
600
700
800
900
1000
1100
1200
TDC diff
a
3.7kV
150
100
50
0
1000
1100
1200
1300
1400
1500
1600
TDC diff
b
3.7kV


efficiency VS Threshold
with amplifiers
0.5
0.48
0.46
0.44
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0
20
40
60
80
100
120
140
without amplifiers
0.5
0.48
0.46
0.44
0.42
0.4
0.38
0.36
0.34
0.32
0.3
400
600
800
1000
1200
1400
1600
1800
2000
:0/07/07 10.17


a
b
c
a
ID 3000
Entries 1012
Mean 967.3
RMS 37.84
UDFLW 0.000
OVFLW 5.000
150
100
50
0
800 900 1000 1100 1200 1300 1400
TDC diff
b
20
15
10
5
0
800 900 1000 1100 1200 1300 1400
TDC diff
c
20
10
0
800 900 1000 1100 1200 1300 1400
TDC diff

trig wire

	1	2	7	12	19	24
1	60	3.6	0.4	0	0	0.8
2	3.6	60	0.8	0	0	0.6
3	2.8	3.6	1.0	0	0	0.4
4	1.6	2.4	1.4	0	0	0.2
5	1.2	1.6	2.2	0.4	0	0
6	0.8	1.2	3.0	0.4	0	0
7	0.5	0.8	60	0.6	0	0
8	0.4	0.4	4	0.8	0	0
9	0.3	0.4	2	1.4	0	0
10	0	0.4	1.2	2.2	0	0
11	0	0	0.8	3.2	0	0
12	0	0	0.6	60	0	0
13	0	0	0.4	1.2	0.4	0
14	0	0	0	1.0	0.6	0
15	0	0	0	0.6	0.8	0
16	0	0	0	0.4	1.4	0
17	0	0	0	0.4	2.2	0
18	0	0	0	0	3.0	0.4
19	0	0	0	0	60	0.6
20	0	0	0	0	3.0	1.0
21	0	0	0	0	2.2	1.6
22	0.2	0.2	0	0	1.2	2.2
23	0.4	0.4	0	0	0.8	3.2
24	0.8	0.5	0	0	0.5	60

X ta.k (t wire n

RS Layer 2-5 Update (J. Frank)

RS update

JF 16 July 00

1. Status of L2-5
   - delivery
   - schedule
   - tests
2. RS pmt selection for E949
   - tests
   - next step
3. other items

Motivation

Evidence that Range Stack photoelectron yield is poor; attenuation length getting worse + demonstration that we can do better ⇒ E949 would be "better" with R.S. upgrade. Layer 2-5 ~~was~~ is being replaced (only) 'cause

a) easiest b) cheapest

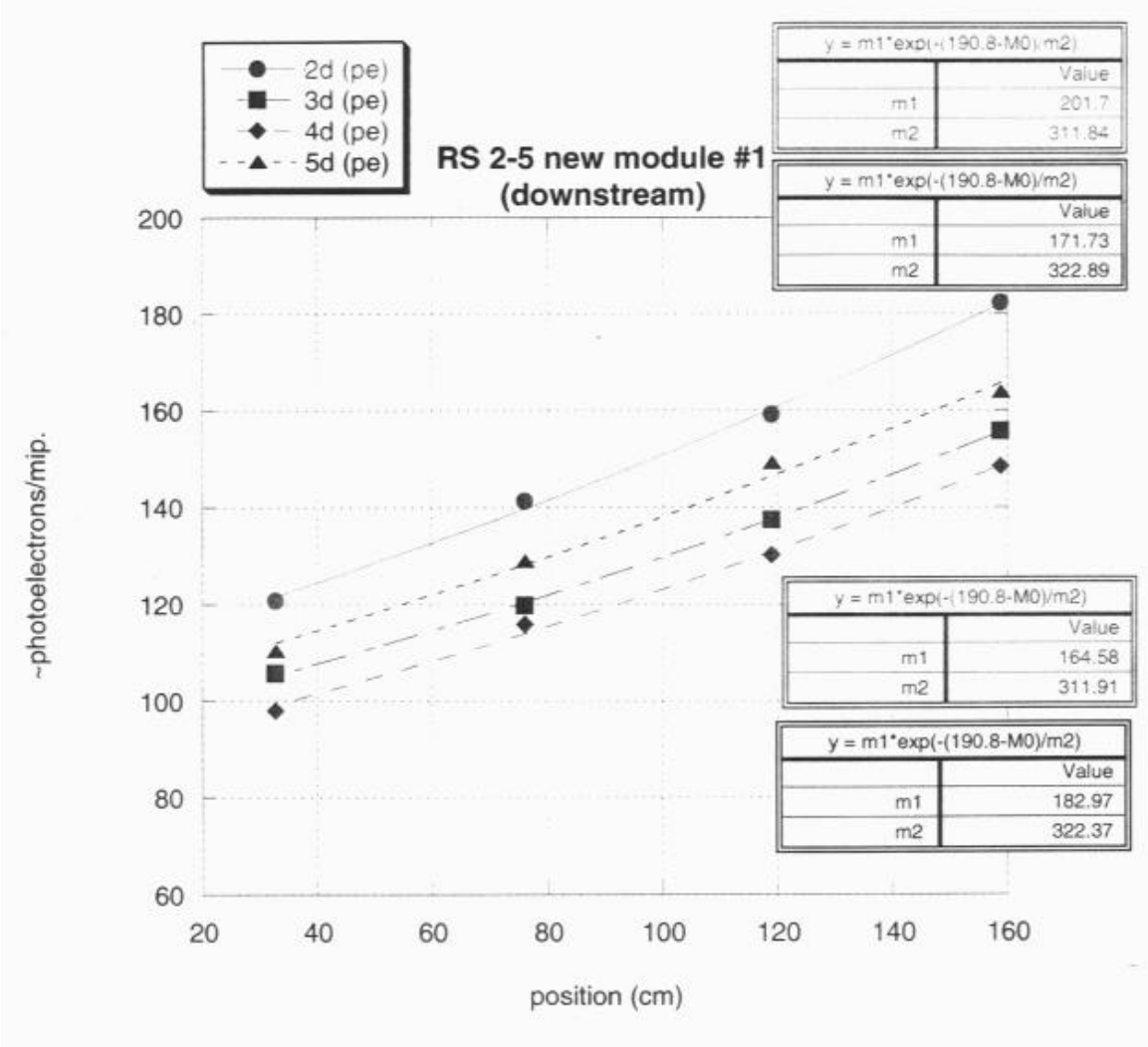
c) doesn't delay readiness beyond ~ 1/01

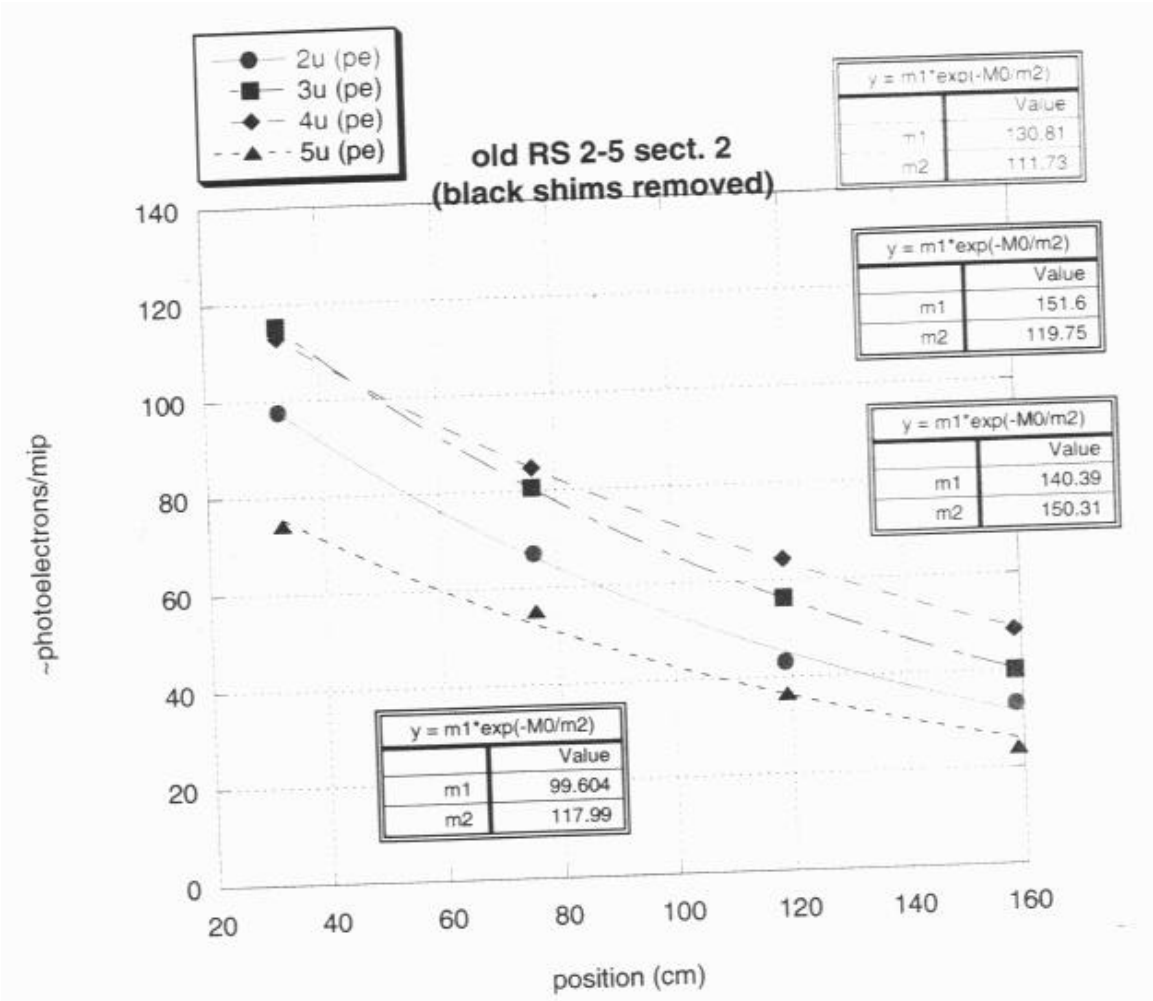
d) all the above.

STATUS of RS 2-5

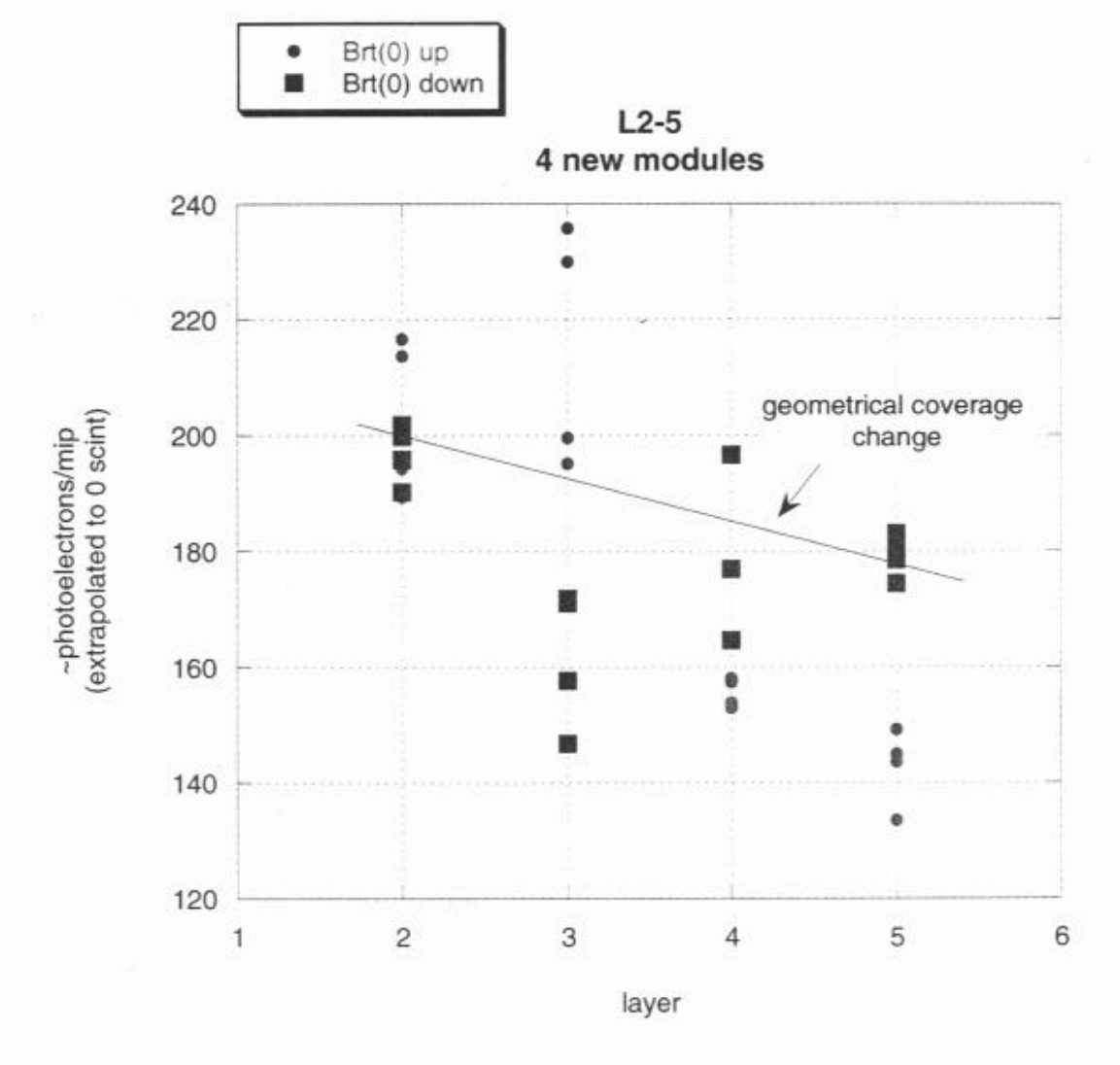
- BIDS WERE OPENED DURING LAST COLLABORATION MTG.
- BICRON WAS LOW BIDDER for Σ [light guide + scint]
- ASKED BICRON TO EPOXY L.G. ↔ SCINT.
- TESTS OF L.G. MATERIAL NOT GOOD
- WE WERE ABLE TO SECURE SOME GOOD WVT (BICRON MAT'L "FOUND" + NEW PURCHASE)

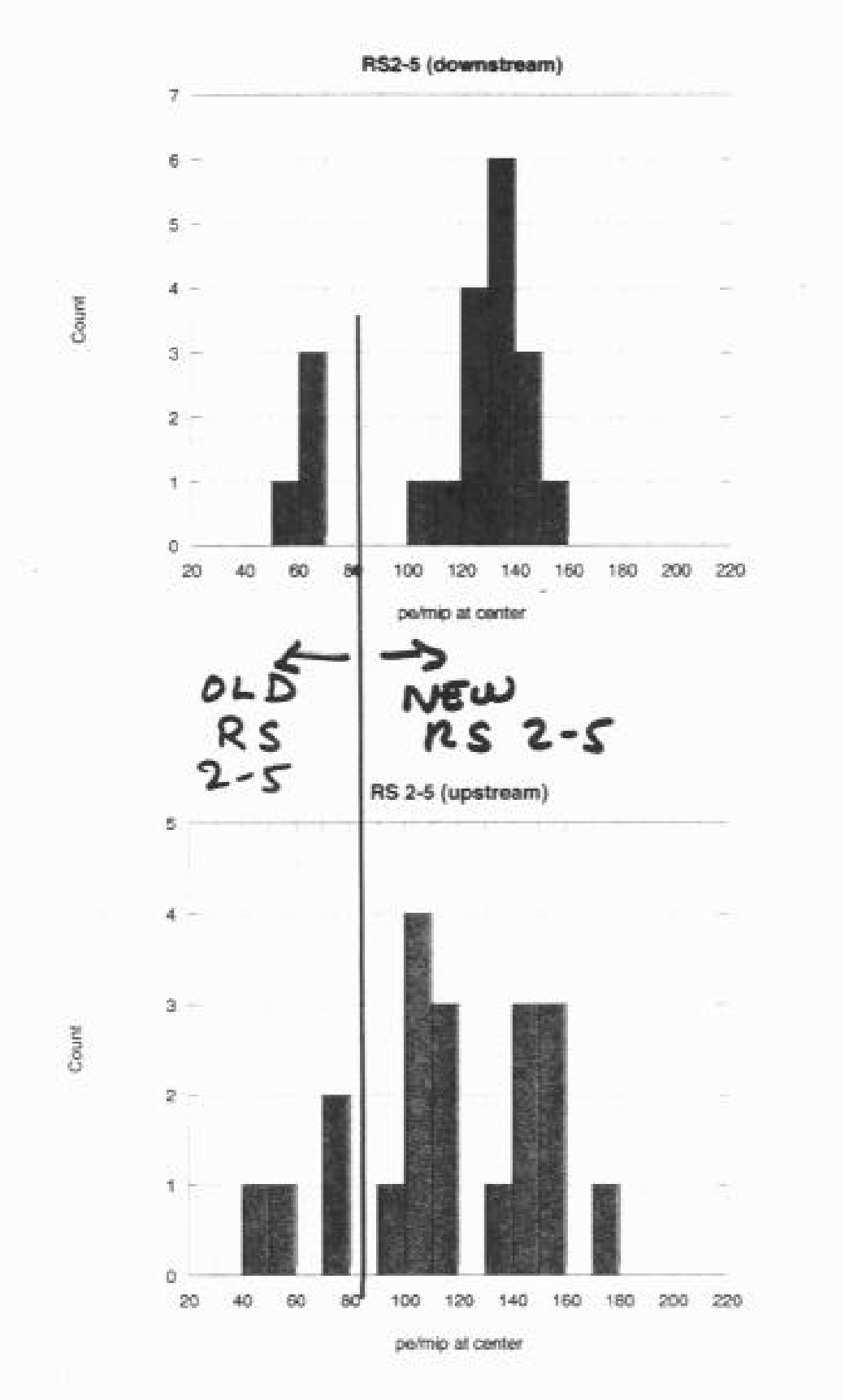
6/20/00 6 stacks of 4 ctrs received
2 " " " " broken
BICRON REVAMPS SHIPPING PROCEDURE
7/11/00 14 stacks of 4 ctrs received
So far; O.K.
10 ~~8~~ stacks wrapped; 4 stacks tested
EXPECT ALL MODULES HERE BY END of JULY
FIRST STACK INSTALLED ↘ 14 JULY


2d (pe)
3d (pe)
4d (pe)
5d (pe)
RS 2-5 new module #1
(downstream)
y = m1*exp(-(190.8-M0)/m2)
Value
m1 201.7
m2 311.84
y = m1*exp(-(190.8-M0)/m2)
Value
m1 171.73
m2 322.89
y = m1*exp(-(190.8-M0)/m2)
Value
m1 164.58
m2 311.91
y = m1*exp(-(190.8-M0)/m2)
Value
m1 182.97
m2 322.37
~photoelectrons/mip.
position (cm)
200
180
160
140
120
100
80
60
20
40
60
80
100
120
140
160



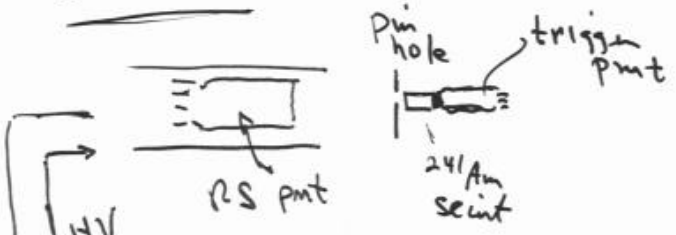
old RS counters are poorer because
a) worse Lata
b) (mostly) worse UVT
c) black shims epoxied to light guides, yellowing epoxy, etc.


Brt(0) up
Brt(0) down
L2-5
4 new modules
geometrical coverage
change
~photoelectrons/mip
(extrapolated to 0 scint)
240
220
200
180
160
140
120
1
2
3
4
5
6
layer

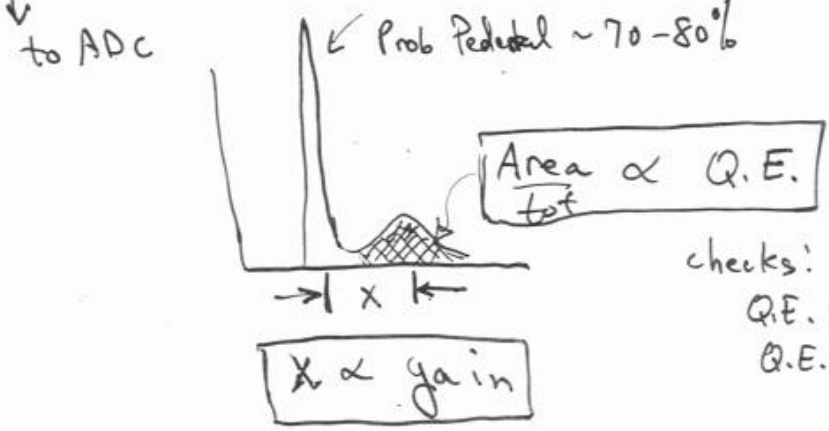

RS2-5 (downstream)
Count
pe/mip at center
OLD RS 2-5
NEW RS 2-5
RS 2-5 (upstream)
Count
pe/mip at center

RS phototube selection for E949 ..

Bench test:



Set RS pmt HV @ operating point:



checks:
Q.E. repeatable
Q.E. ∝ indep. of H.V.

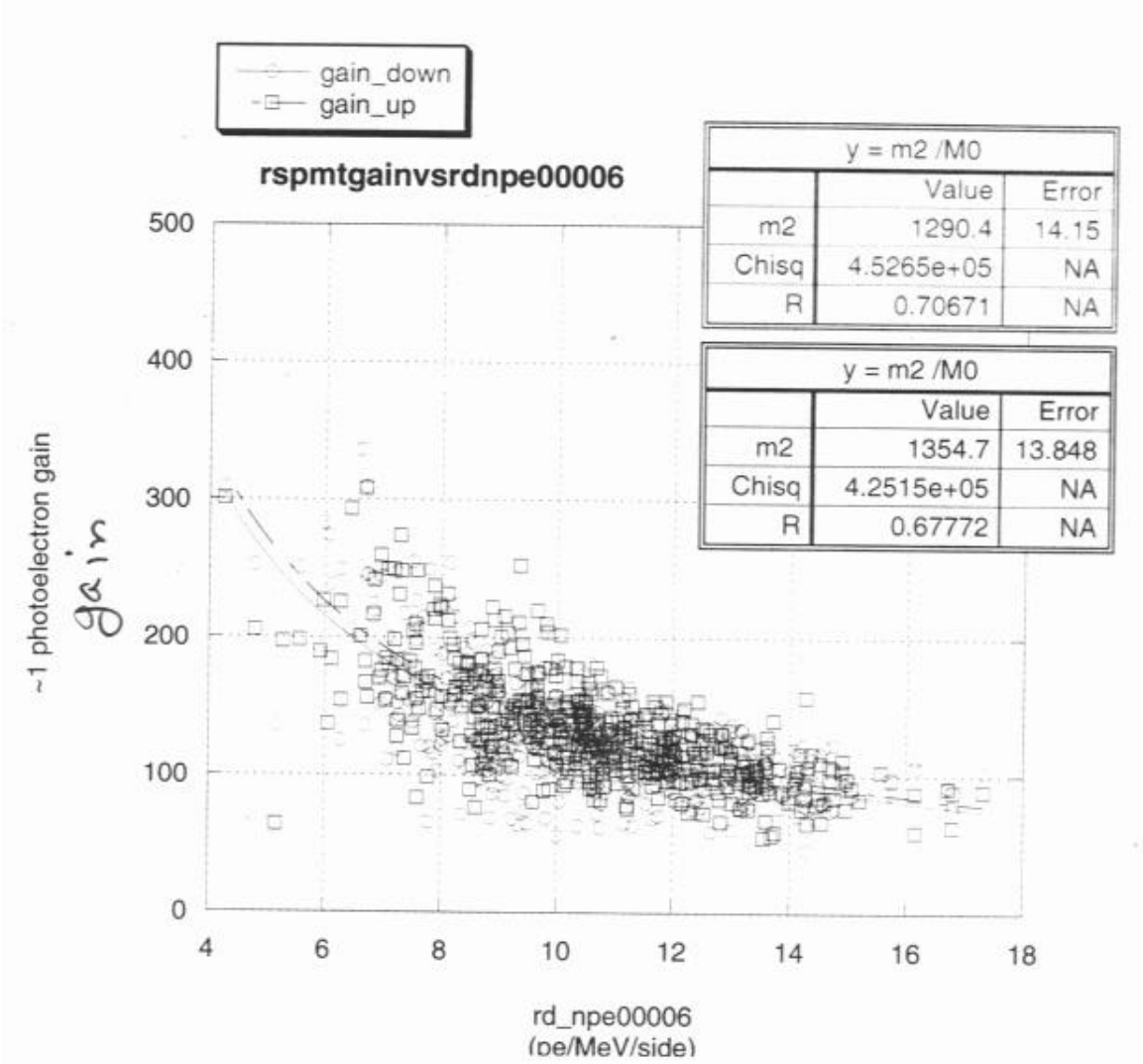
COMPARE TO E787 calibration data

rd-npe gives pe/MeV/end

from comparison of E_{UPSTRM} vs E_{DOWNST} at center (z) of each counter.

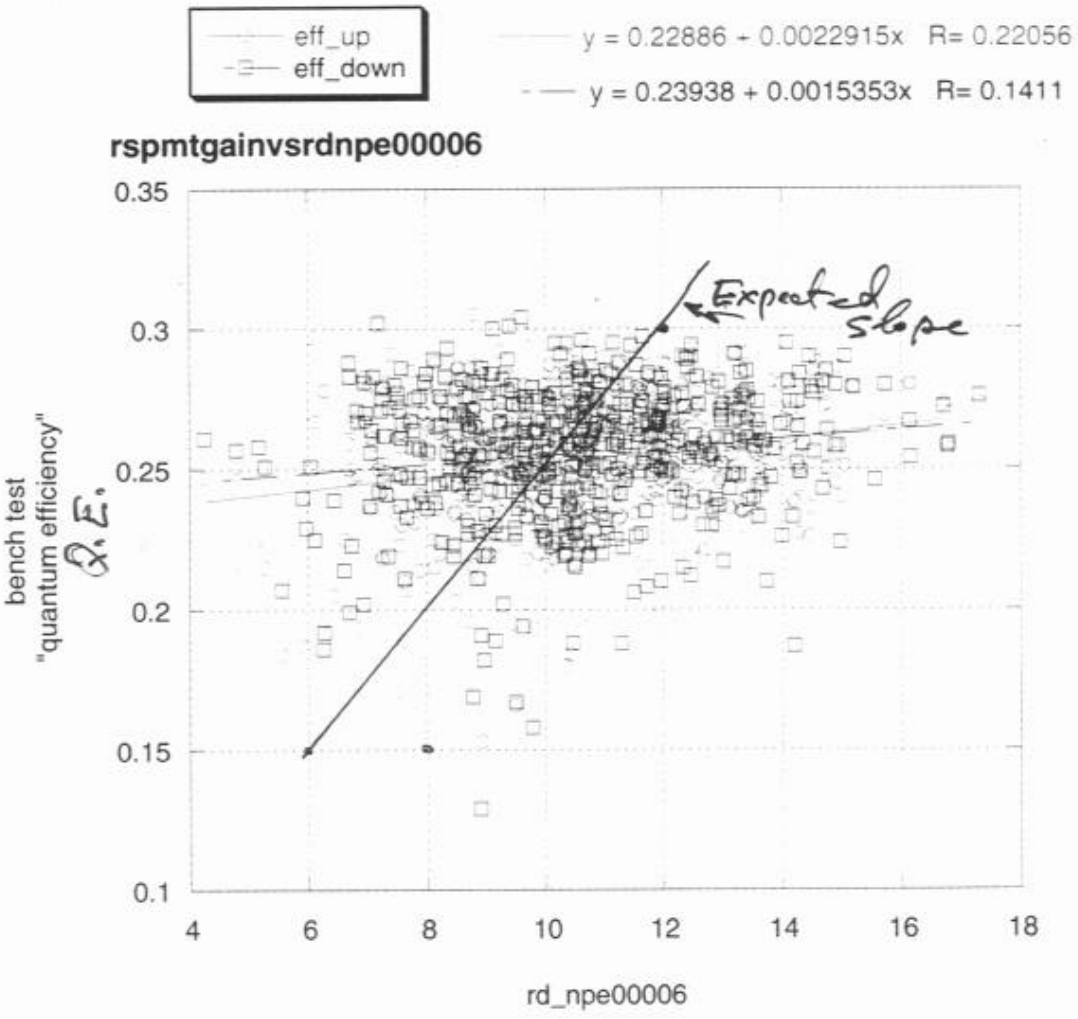
EXPECT gain ∝ 1/P.E.

Q.E. ∝ P.E.



correlation is reasonable.
for gain ↘

× lousy!!
why?



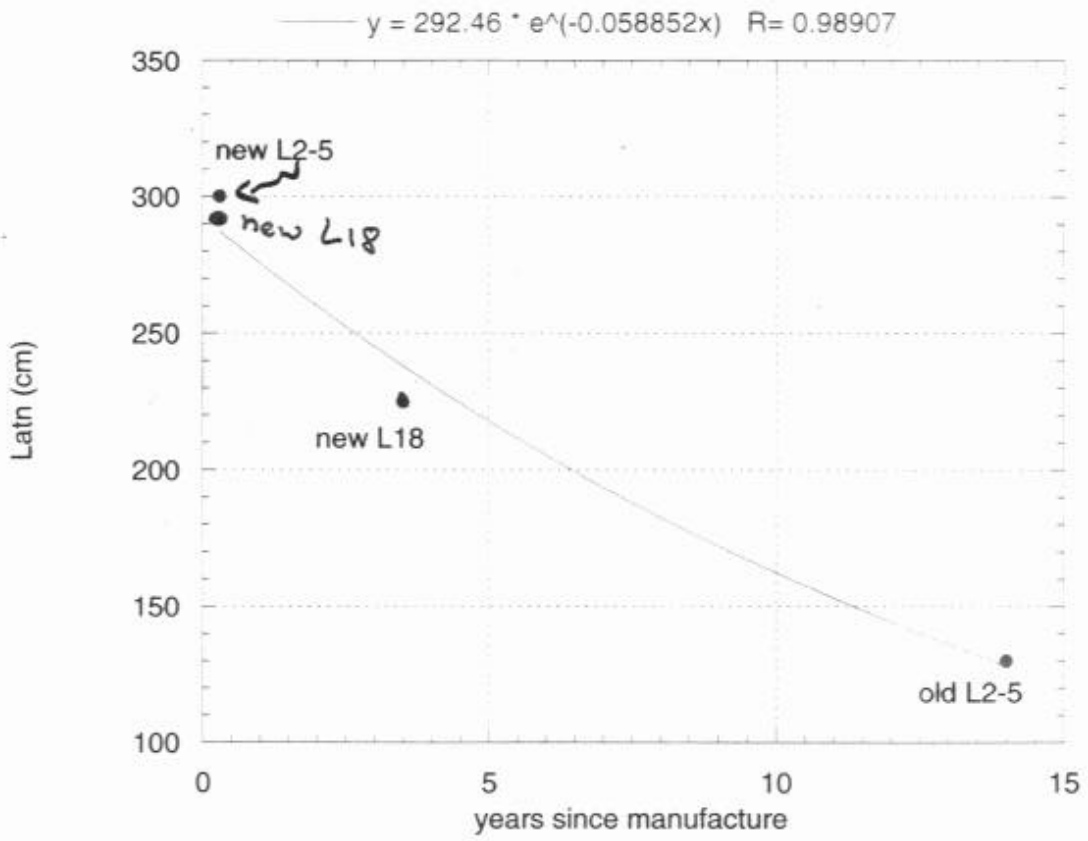
For E949

1. Eliminate pmts with Q.E. ≤ 0.2
2. Don't reposition other pmts

or

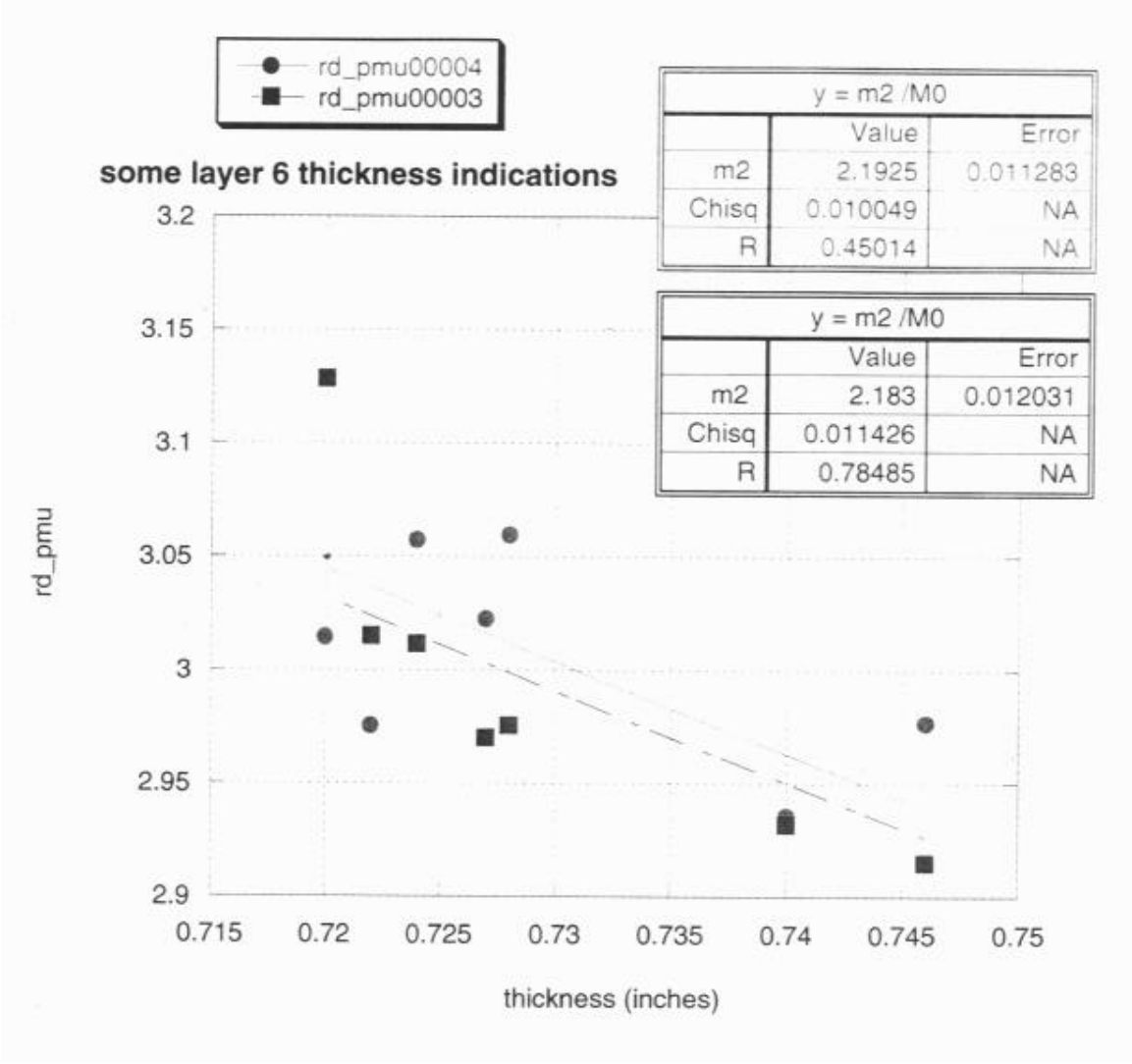
put best Q.E. in L 11-18 ? or ?

Is it TIME or BC408 COMPOSITION?



FROM SATO-SAN OCT 3-4, 99 E949 meeting

$\Delta L_{ATT} = \begin{cases} -4.6\,\%/\text{year} \\ -3\,\%/\text{year} \end{cases} \parallel 5\,\text{mm}_{BVL,INFR}$


rd_pmu00004
rd_pmu00003
some layer 6 thickness indications
y = m2 /M0
Value Error
m2 2.1925 0.011283
Chisq 0.010049 NA
R 0.45014 NA
y = m2 /M0
Value Error
m2 2.183 0.012031
Chisq 0.011426 NA
R 0.78485 NA
rd_pmu
3.2
3.15
3.1
3.05
3
2.95
2.9
0.715
0.72
0.725
0.73
0.735
0.74
0.745
0.75
thickness (inches)

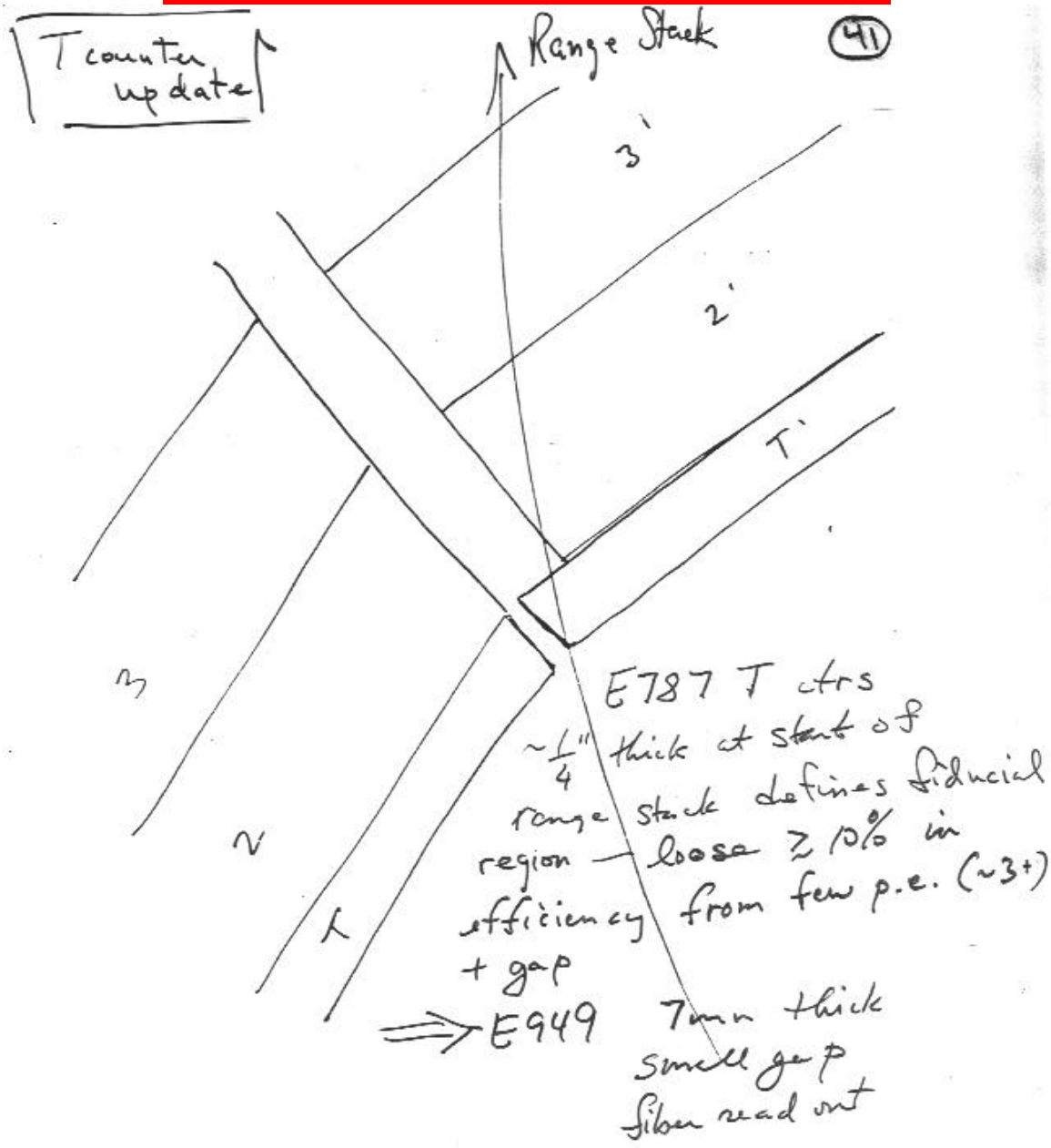
- L2-5 upgrade will improve light 2×2
- implications for experiment not clear

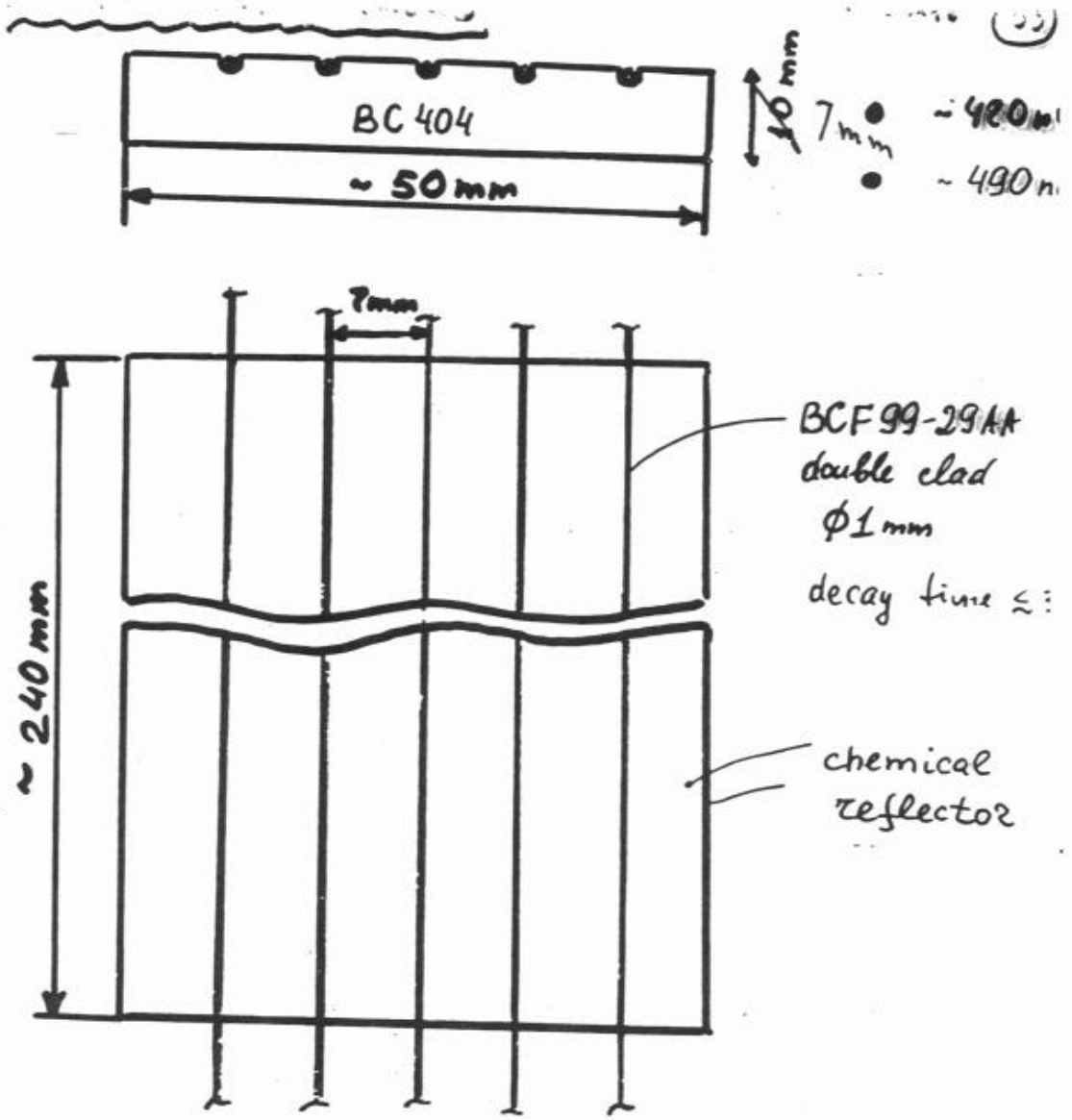
CAN (SHOULD) we do more?

— IF RSSC project requires removal of all chambers + delay in getting cables it's fair to ask about doing more.
- what about RHIC schedule ...

Asked BICRON ABOUT SCHEDULE FOR L6-10 (??)
AS of 2 weeks ago, pretty open (11-17 better ...)
BUT STILL DELAYS US BY ~3½ months +

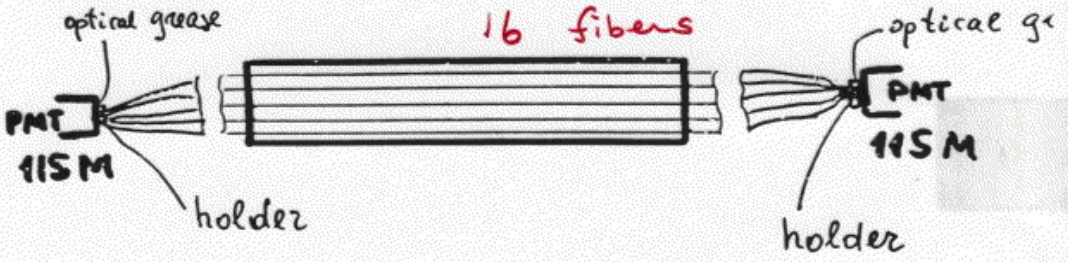
T-Counter Update (J. Frank)

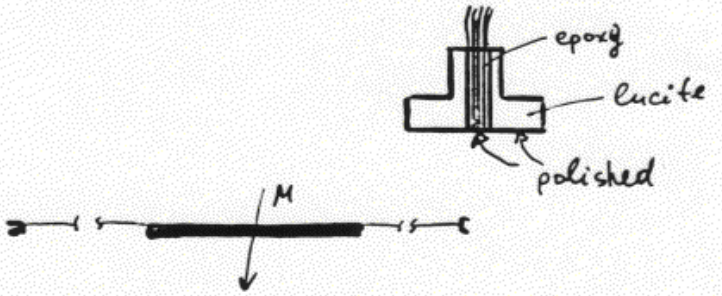




The fiber length = 4.3 meters

fiber/plastic contact: ~~optical grease~~
Epoxy

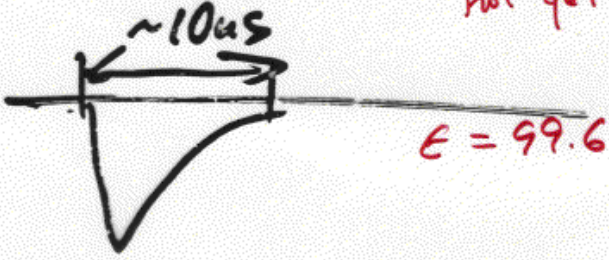




L.y. ~~Sum of~~ { ~~50 p.e./MIP (10mm)~~
two ends { 35 p.e./MIP (7 mm)
↳ 32-34 pe/mip (6 tested)

Timing σ_t = ~~440 ps~~ → 600-650 ps

L.y. nonuniformity < ±5% (for extruded plastics)
not yet ~~tested~~



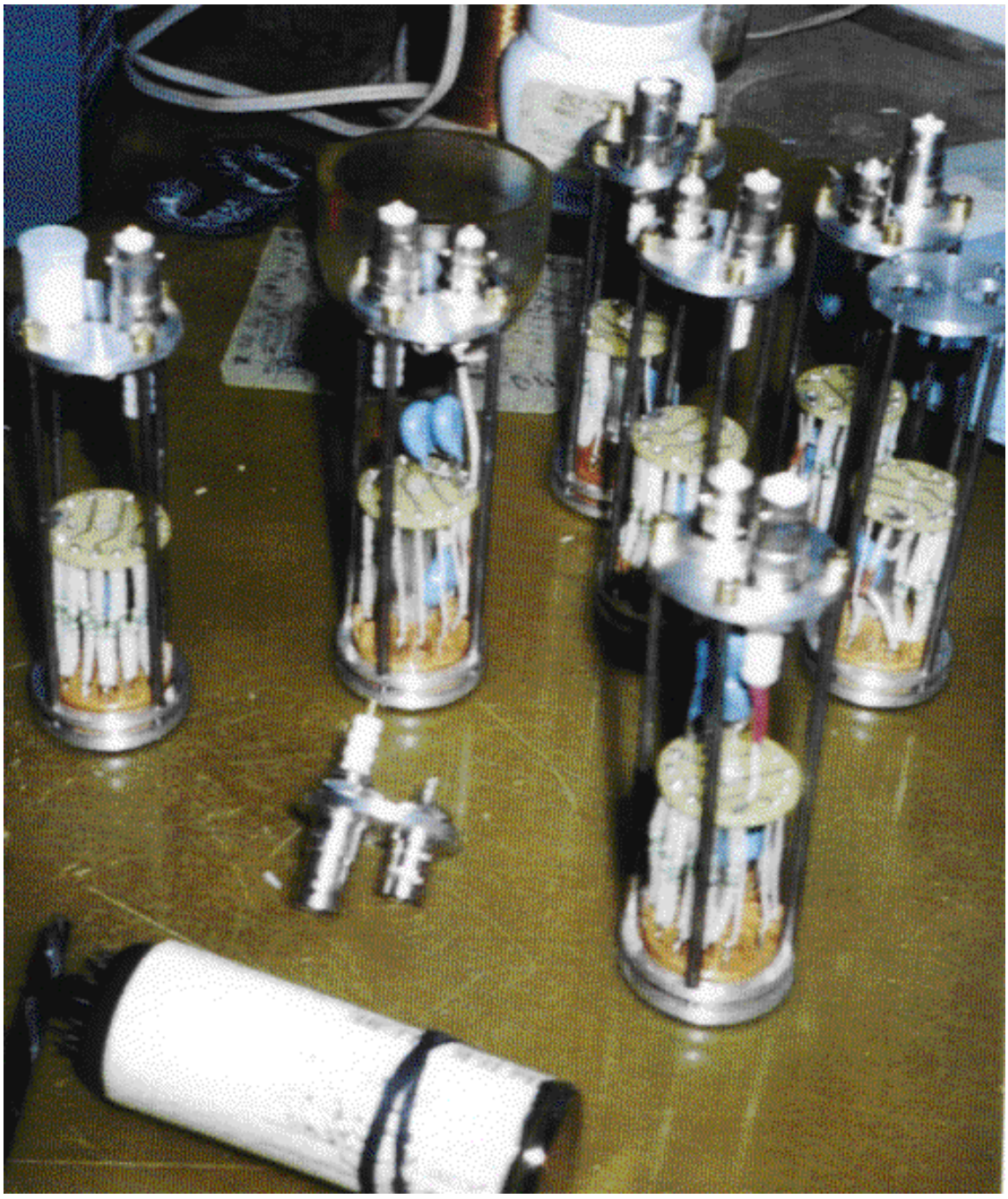
ϵ = 99.6 - 99.7 %

27 new t-counters construction complete

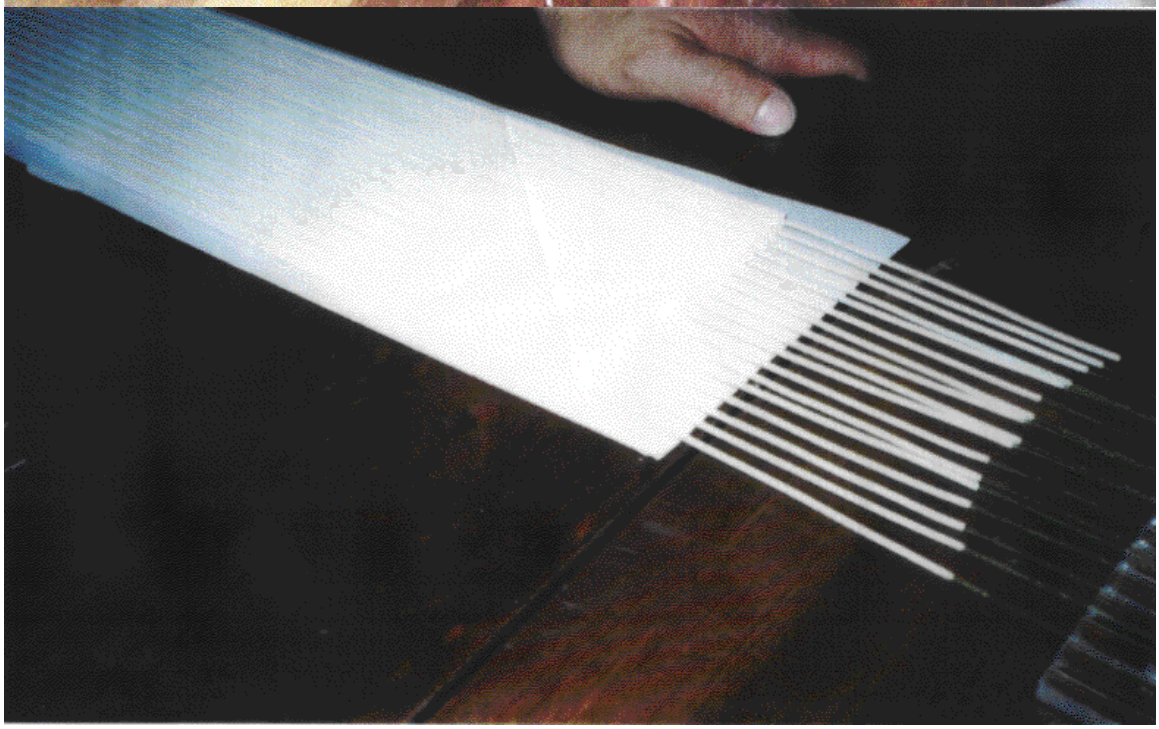
~60 PMT (115M) ready (+ bases)

Shipping to BNL next week

Yuri, Oleg, Marat at BNL
5 AUG for ~ 5-6 weeks for
testing + possible installation.
(or maybe in January, after detector
is closed)




РОЖОК



RS Monitor (T. Nomura/A. Kozhevnikov)

RS Monitor System

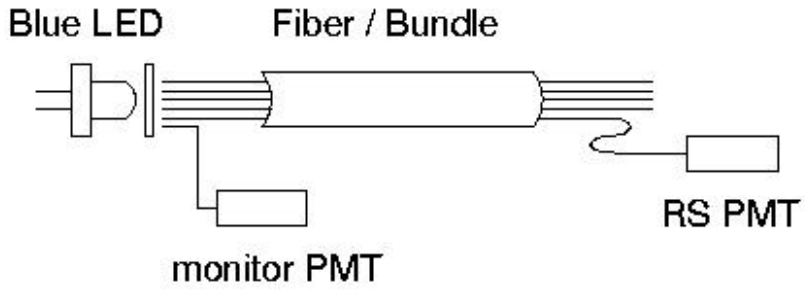
Tadashi Nomura
(Kyoto Univ.)

July 16, 2000

1. Overview
2. Description of each part
   (a) Light source part → T.N.
      – LED + driver
      – light intensity monitor
   (b) Light distributing part → Sasha
      – fiber network
      – mounting on RS PMT
3. How do we use it? → T.N.
   – run types
   – trigger

1. Overview

High quality LED / driver
(Japan)
+
Fiber network
(IHEP)

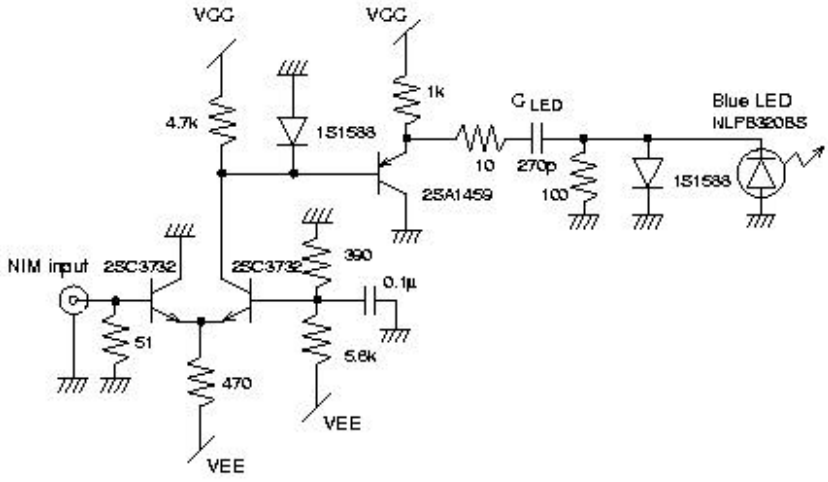


- 8 subsystems for RS
  4 sector groups in up- and downstream,
  to check TDs (1,5,..,21)(2,6,..,22)(3,..,23)(4,..,24)
- 2 for BV and 2 for BVL

2. (a) Light source part

Light source

- Blue LED ... NSPB320BS (Nichia)
  $\lambda = 460$ nm
- Driven by capacitor-discharge pulser



- Stability

LED	T	+0.1%/°C
Driver	T	−0.4%/°C
	V_{cc}	+0.08%/mV

Assuming ±1°C and ±10 mV,
expected stability is ≈ 1%.

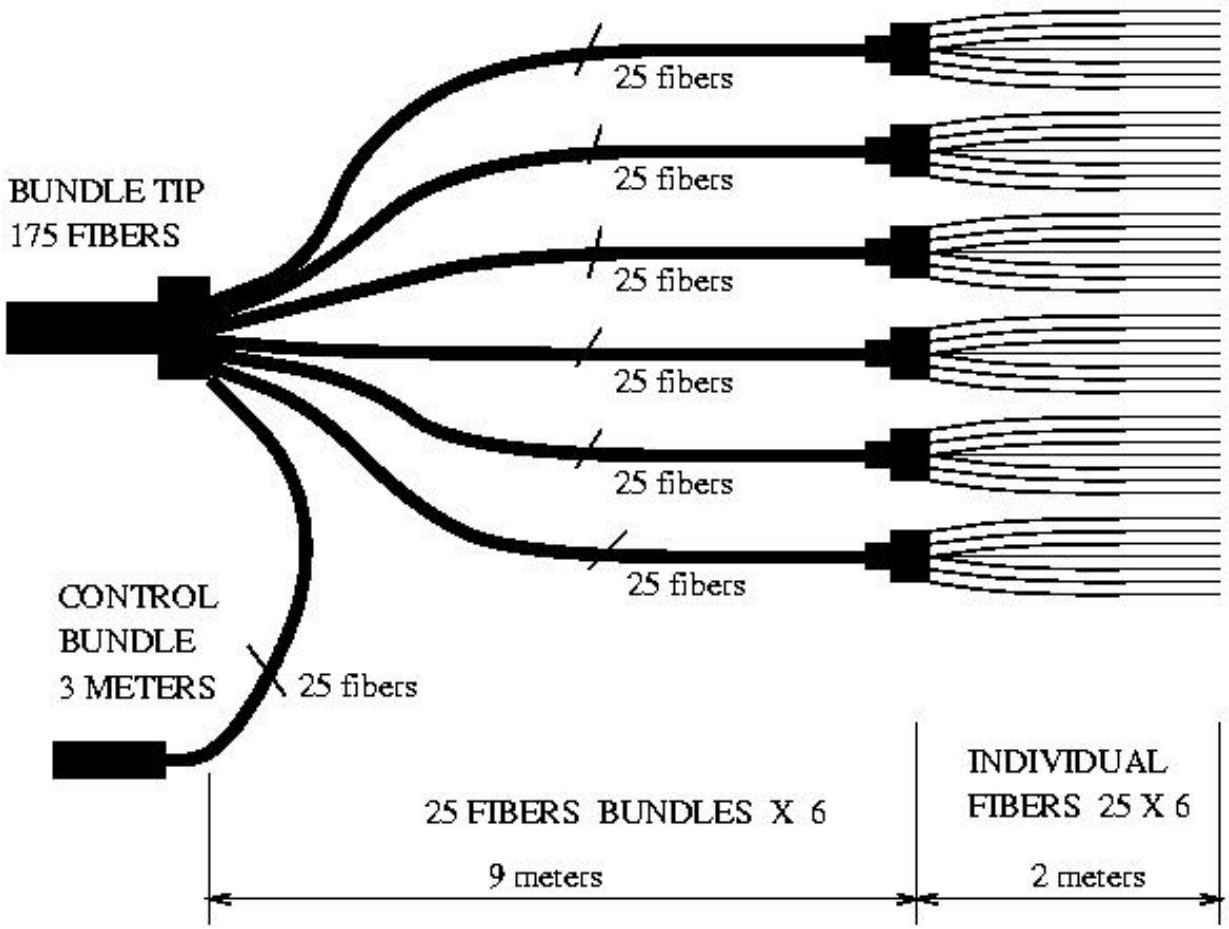
(*) LEDs and drivers are placed
in a temperature-controlled box.

Light intensity monitor

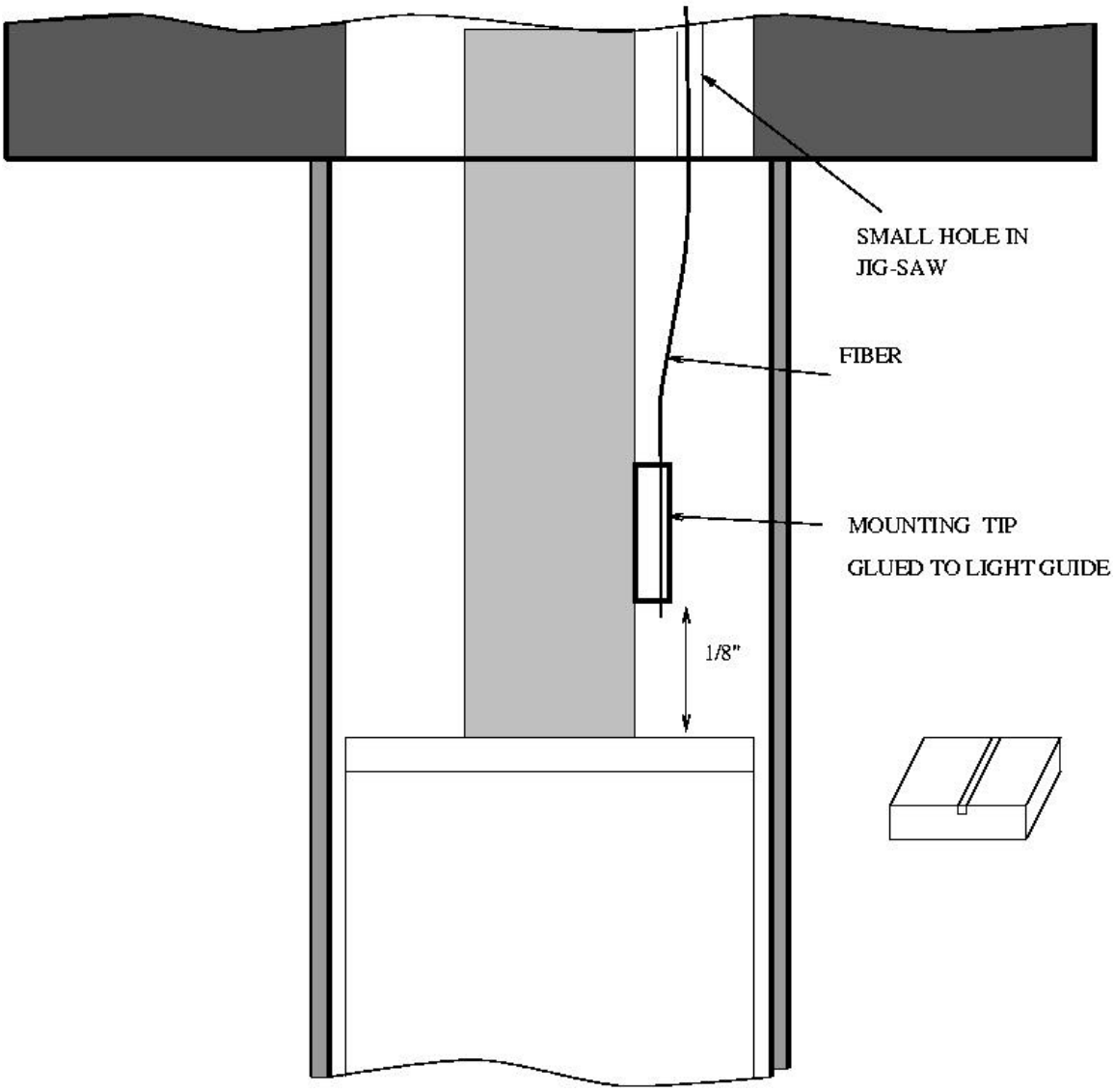
- 12 PMTs with RI source on their window.
  (Am+BC408, or ..)
- view 10000 p.e. from LED.
  fluctuation by p.e. statistics is 1%.
- put in (2nd) temperature-controlled box.

175 FIBERS BUNDLE LAYOUT

TOTAL BUNDLE LENGTH 11 METERS

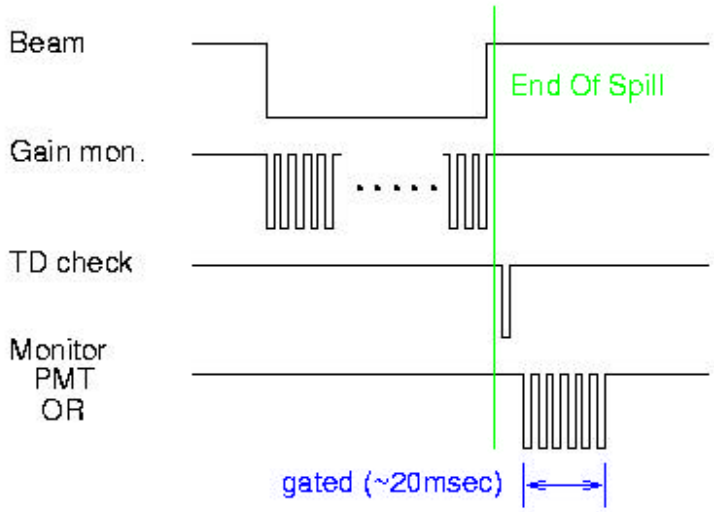


RS PMT MONITOR FIBER/LED OPTION C

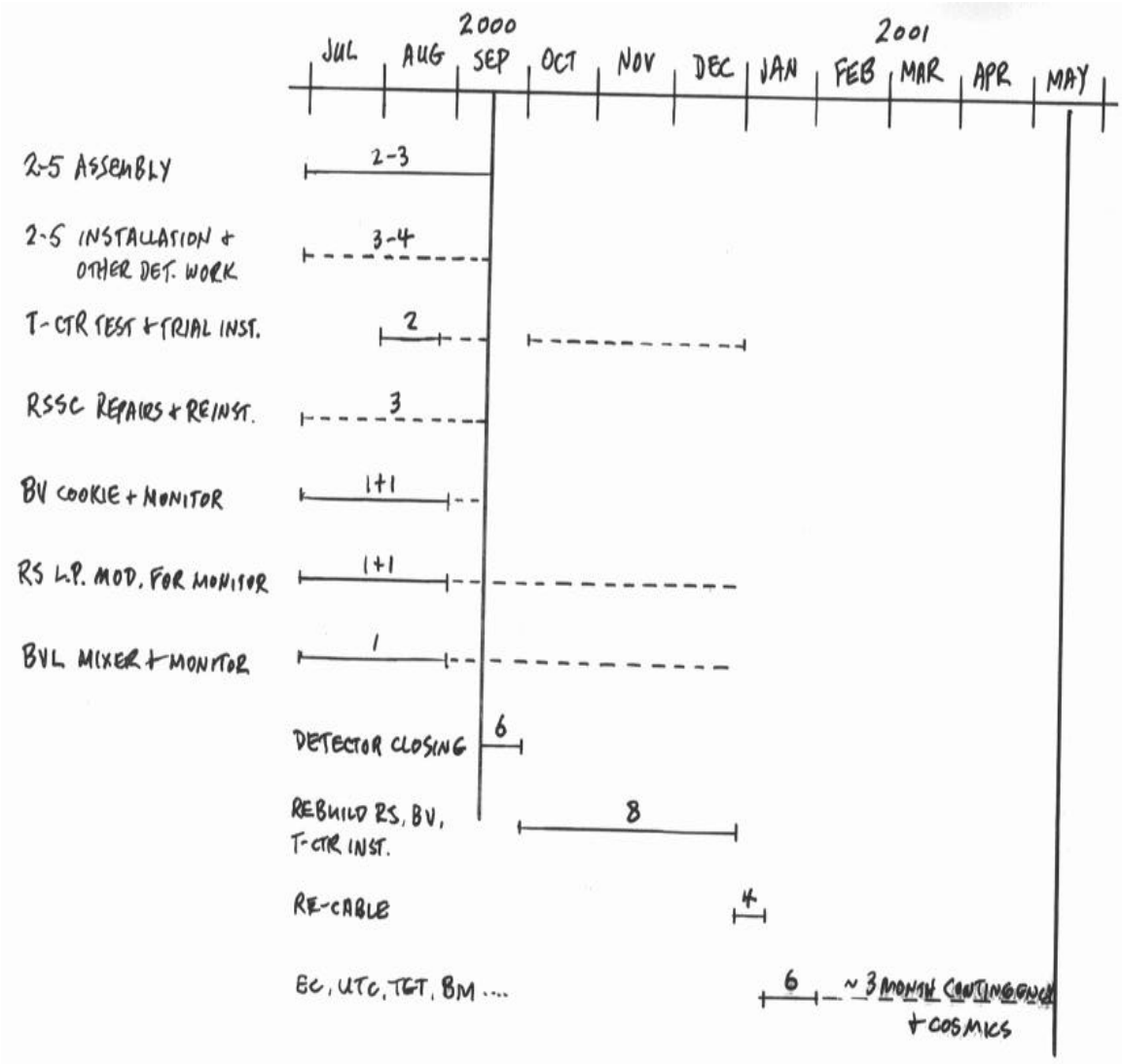


3. How do we use it?

Run/Trig type	clock	LED selection	TD
(special run)			
gain monitor	~100 Hz	all	no
dedicated run to study RS PMT gain			
(smx)			
gain monitor	~10 Hz	all	no
(depends on results from special run)			
TD check	1 per spill	1/4	yes
		1 sector group	
monitor PMT	OR (gated)	0	no



Detector Schedule (K. Li)



Beam Instrumentation (P. Kitching)

BEAM INSTRUMENTATION

P.Kitching Univ of Alberta/TRIUMF July 2000

- New B4
- Segmented live degrader
- Ring photon veto
- Upstream Photon Veto
- Results of beam tests carried out in April 2000
- Monte Carlo calculations - photon efficiency
- Monte Carlo calculations - stopping K's
- Mechanical design
- Costs and schedule
- Tests during 2001 run

Aims:

- To improve photon detection efficiency in beam direction
- To better determine X-Y location of K entering target

At the same time we want to maximise the number of stopping K's in the target.

B4 - Top View

- B4 is a 16 by 16 hodoscope with each element read out by 3 WLS fibres (Bicron BCF92A double-clad). Scintillator is BC404.

- The thickness of one plane is 3.175 mm (same as old B4).Total thickness of B4 is 6.35 mm.

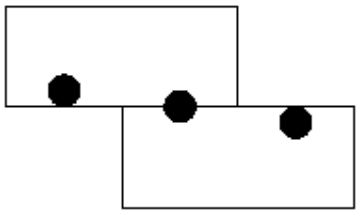


Figure 1: Rectangular B4 hodoscope element

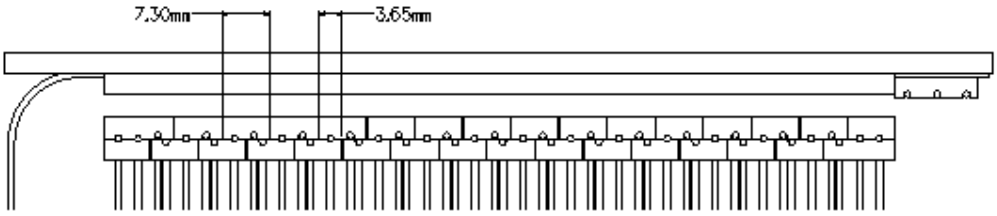


Figure 2: Rectangular B4 hodoscope -top view

B4 - Front View

- Spatial resolution in X-Y is 3.65 mm.
- WLS readout allows hodoscope elements to cover I-counters, which are also covered by a two-element ring veto counter.
- Tubes are 34 H3165-10 already purchased in Japan

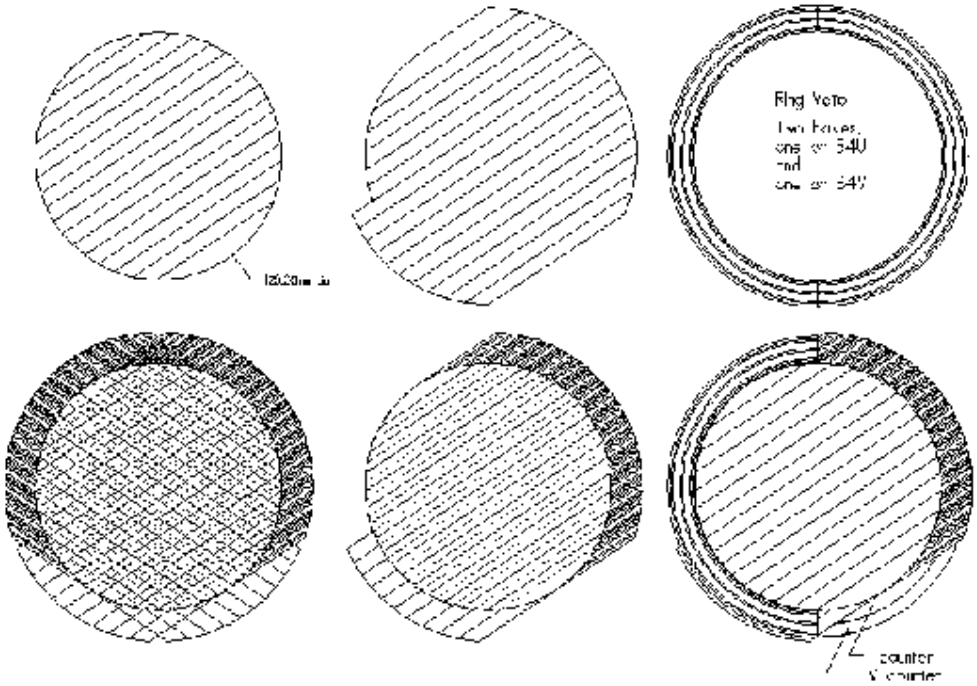


Figure 3: B4 design with rectangular elements, showing B4 hodoscopes and ring veto counters

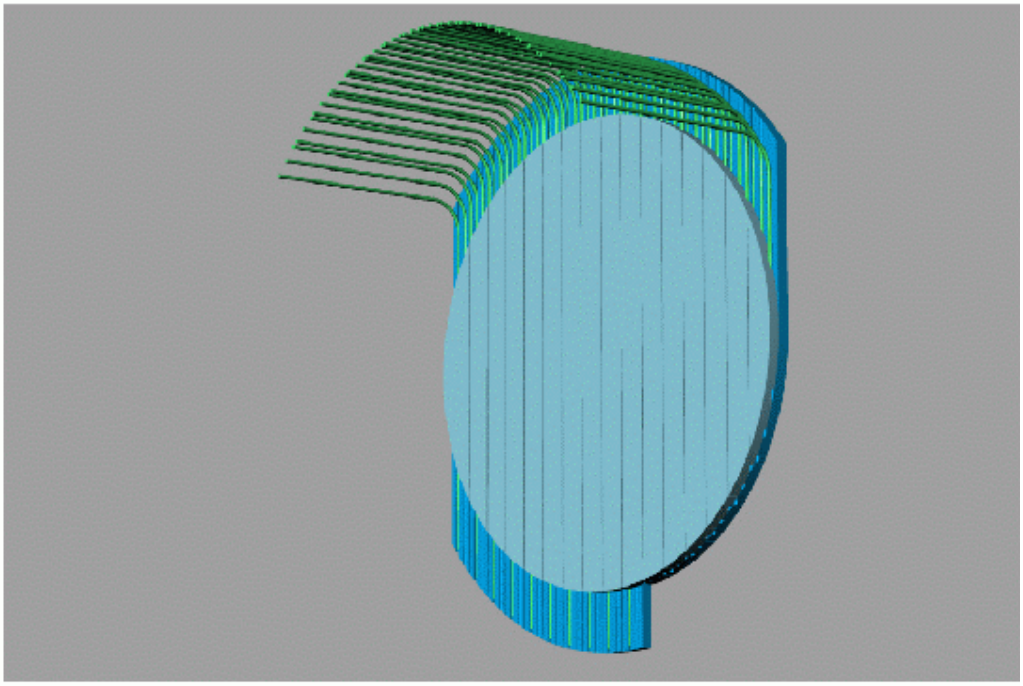


Figure 4: 3-D view of one B4 hodoscope

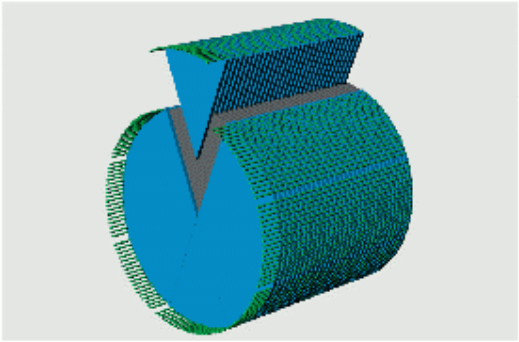


Figure 5: Segmented active degrader

Segmented Live Degrader

Layers of radiator and 2mm-scintillator with eight-fold segmentation in X-Y, read out by WLS fibres. We will use recycled tubes from old B4

UPSTREAM PHOTON VETO

- 20 x (1 mmPb + 2mm Scintillator)
- Total thickness = 6 cm
- 4 cm gap for beam to pass through
- Total mass 12-15 kg
- Propose to mount it on downstream end of Princeton Cerenkov

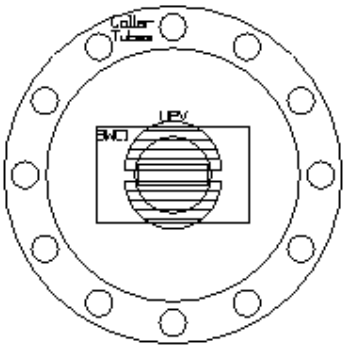


Figure 6: Upstream Photon Veto (UPV)- beams-eye view

Beam tests of prototypes

- Used pions and muons of 100 MeV/c, 200 MeV/c in M11 beamline at TRIUMF in May, 2000
- 5-element B4 prototype tested.
- Used timing and pulseheight for PID.
- Saw peaks corresponding to particles passing through 1.59 and 3.175 mm of scintillator.
- Identified Single p.e. peak.

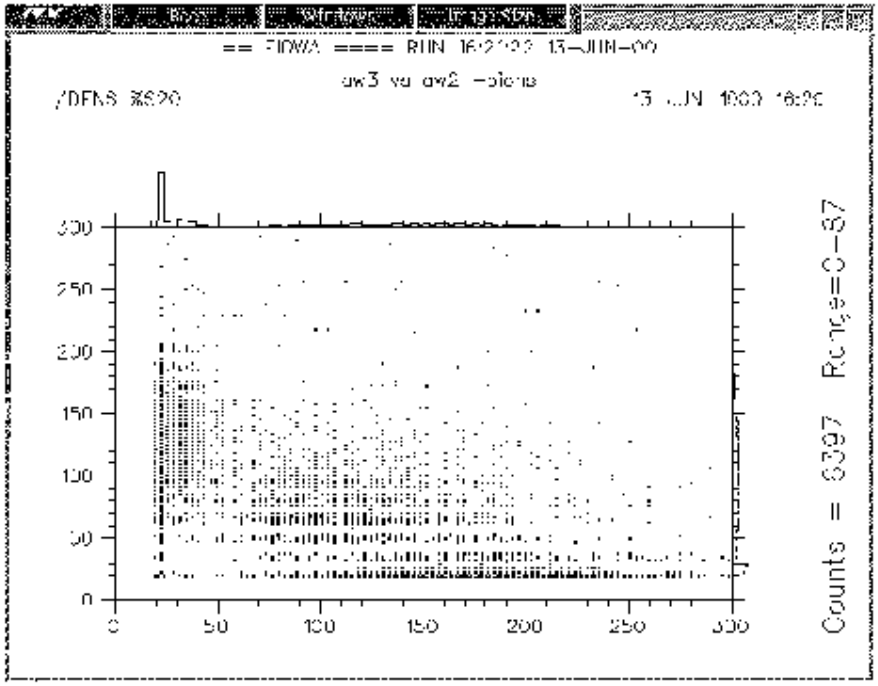


Figure 7: Pulse height in element 3 vs pulse height in element 2 for 200 MeV/c pions

Monte Carlo Estimates - KAON STOPS

- GEANT-based can be used with either Gheisha or Fluka hadronic packages.
- Input consists of 4000 incoming K's whose coordinates are derived from measured values.
- Kaon momentum = 710 MeV/c
- Lead-glass live degrader assumed present.
- For each segmented live degrader configuration, BeO length is adjusted so that Kaon stopping distribution in Z peaks at centre of target.
- A layer consists of radiator plus 2mm scintillator.

Table 2: MC calculations of Kstop - Pb radiator

Hadronic	Seg. Live degrader		Rad Len		K-stops	
package	Radiator	Layers	P-Veto	Total	Kstops	% loss
gheisha	none	none	3.8	5.7	1063	0
fluka	none	none	3.8	5.7	1206	0
gheisha	1mm Pb	5	4.7	6.2	1015	-4.2
fluka	1mm Pb	5	4.7	6.2	1173	-3.5
gheisha	1mm Pb	10	5.6	7.1	988	-6.7
fluka	1mm Pb	10	5.6	7.1	1136	-6.6
gheisha	1mm Pb	15	6.5	8.0	980	-7.5
fluka	1mm Pb	15	6.5	8.0	1112	-9.0
gheisha	1mm Pb	20	7.3	8.9	945	-11
fluka	1mm Pb	20	7.3	8.9	1084	-10

Effect of Changing Radiator

- Lead-glass live degrader assumed present.
- Radiator thickness adjusted to give constant photon detection efficiency.
- Loss in stopping K's is greater for high Z radiators - Loss seems to be minimum on Fe-Cu region.
- Total number of radiation (and interaction) lengths in beam path increases with Z of radiator.

Table 3: MC calculations of Kstop - Radiator dependence

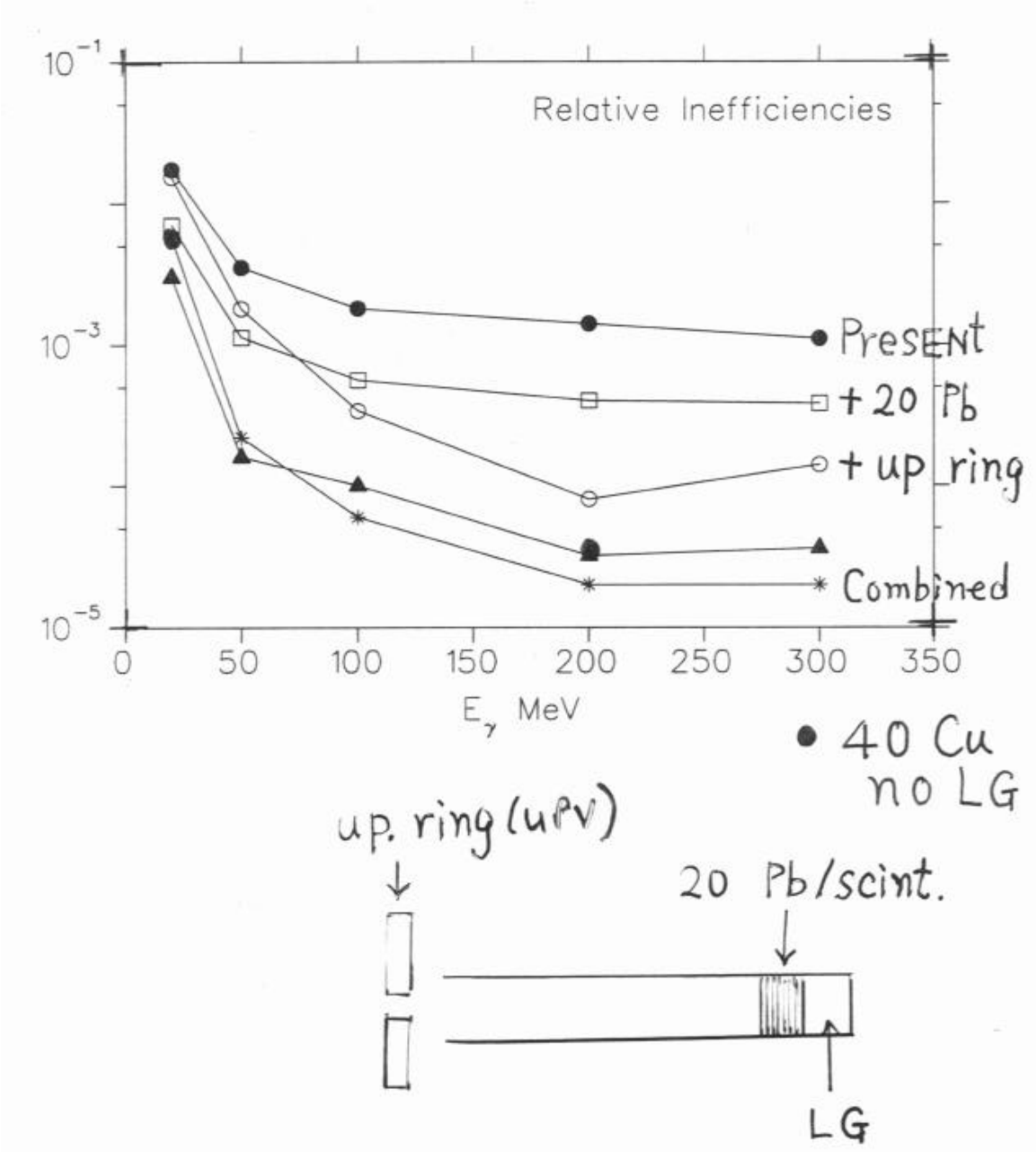
Hadronic	Seg. Live deg.		Rad Len		K-stops	
package	Radiator	Layers	P-Veto	Total	Kstops	% loss
gheisha	none	none	3.8	5.7	1063	0
fluka	none	none	3.8	5.7	1206	0
gheisha	1mm Pb	20	7.3	8.9	945	-11
fluka	1mm Pb	20	7.3	8.9	1084	-10
gheisha	.571mm U	20	7.3	8.9	934	-12
fluka	.571mm U	20	7.3	8.9	1051	-13
gheisha	.625mm W	20	7.3	8.8	956	-10
fluka	.625mm W	20	7.3	8.8	1089	-10
gheisha	2.16mm Sn	20	7.3	8.7	986	-7.2
fluka	2.16mm Sn	20	7.3	8.7	1065	-9.7
gheisha	2.55mm Cu	20	7.3	8.3	1034	-2.7
fluka	2.55mm Cu	20	7.3	8.3	1126	-6.6
gheisha	3.14mm Fe	20	7.3	8.2	1048	-1.4
fluka	3.14mm Fe	20	7.3	8.2	1169	-3.1
gheisha	4.62mm V	20	7.3	8.0	1009	-5.1
fluka	4.62mm V	20	7.3	8.0	1124	-6.8
gheisha	6.36mm Ti	20	7.3	8.0	1006	-5.4
fluka	6.36mm Ti	20	7.3	8.0	1123	-6.9

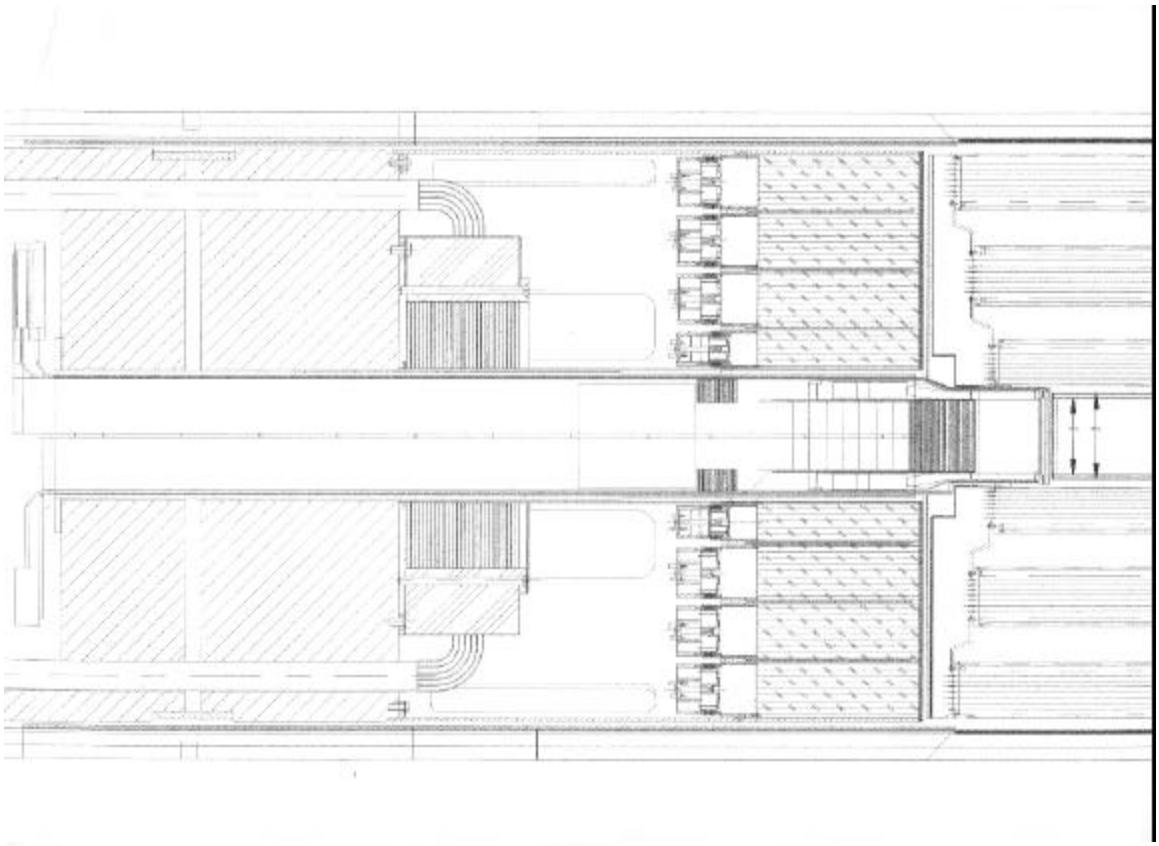
Table 4: MC calculations of Kstop - Cu radiator

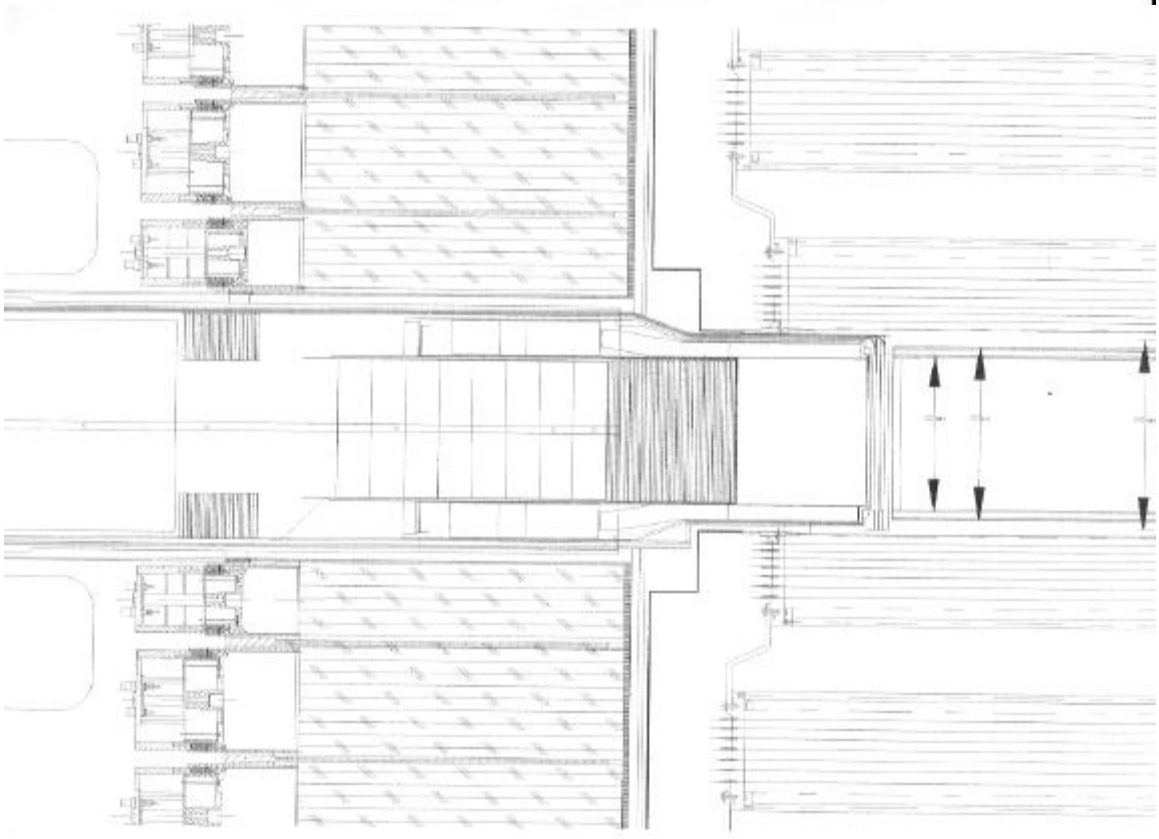
Hadronic	Seg. Live deg.		Rad Len		K-stops	
package	Radiator	Layers	P-Veto	Total	Kstops	% loss
gheisha	none	none	3.8	5.7	1063	0
fluka	none	none	3.8	5.7	1206	0
gheisha	2mm Cu	10	5.2	6.7	1035	-2.6
fluka	2mm cu	10	5.2	6.7	1186	-1.6
gheisha	2mm Cu	20	6.6	7.7	1026	-3.5
fluka	2mm Cu	20	6.6	7.7	1130	-6.3
gheisha	2mm Cu	40	5.6	6.7	1162	+9.0
fluka	2mm Cu	40	5.6	6.7	1275	+5.7

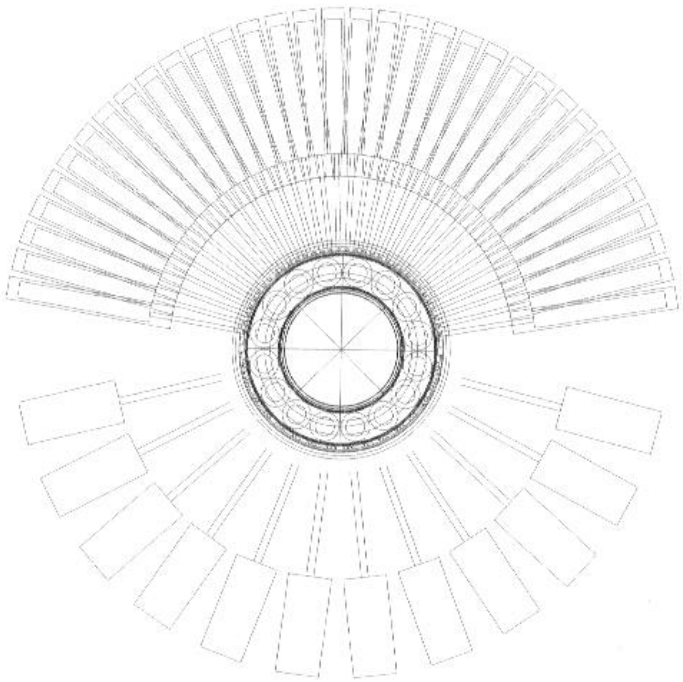
Copper radiator studies

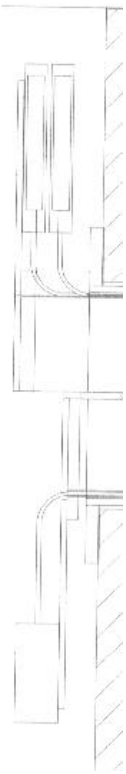
- Lead-glass live degrader assumed present except for 40-layer case.
- We could maximise K-stops if 40-layer segmented live degrader without lead-glass gives enough photon efficiency. This configuration would allow diameter of segmented live degrader to be increased (no high-field tubes), eliminating ring photon veto and simplifying machanical design.

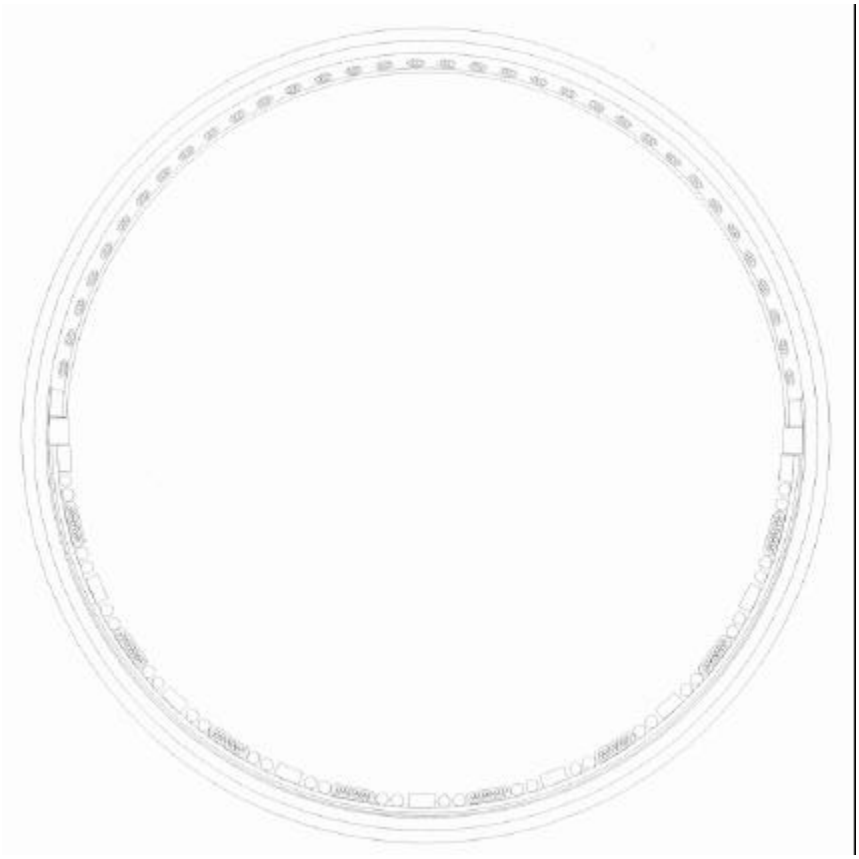

Relative Inefficiencies
10^{-1}
10^{-3}
10^{-5}
0
50
100
150
200
250
300
350
E_γ MeV
Present
+ 20 Pb
+ up ring
Combined
• 40 Cu
no LG
up. ring (uPv)
20 Pb/scint.
LG











Schedule

CONSTRUCTION

Construction of B4 has already begun and will take about 3 months to complete.
Construction of the segmented live degrader will start as soon as the design is complete. This depends on a decision on whether we keep the lead-glass live degrader (within 1 month).
Once design is complete construction should take about 4 months.Critical-path item is machining pieces of scintillator
Design of the mechanical support is almost complete but depends on the final configuration of the segmented photon veto etc.
Old s/s support tube with rail will be used. May be possible to modify old B4 support and re-use if we go with Cu/Scintillator only option. Construction of mechanical components can proceed in parallel with the other projects, since it must be done in an outside shop. We need the old mechanical structures to be sent back to TRIUMF - critical path item.
Construction of UPV can proceed later

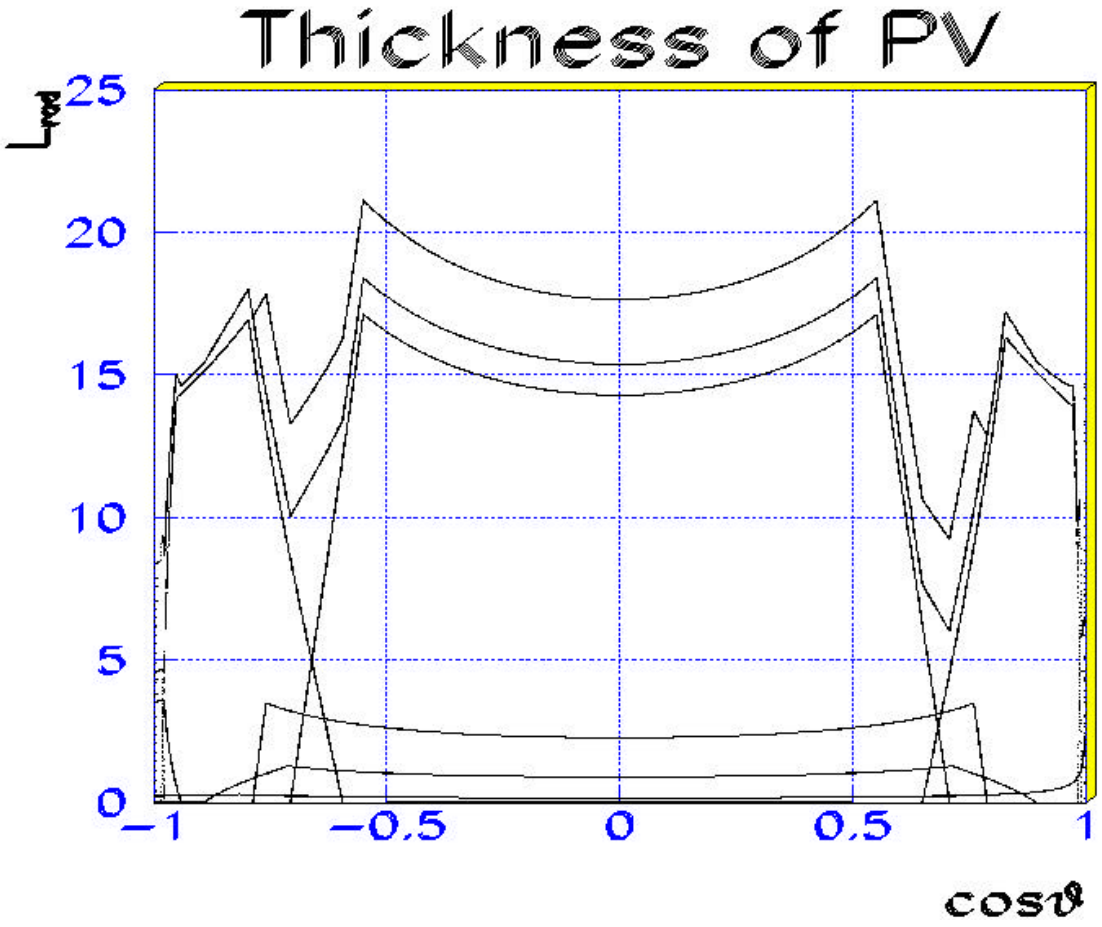
INSTALLATION

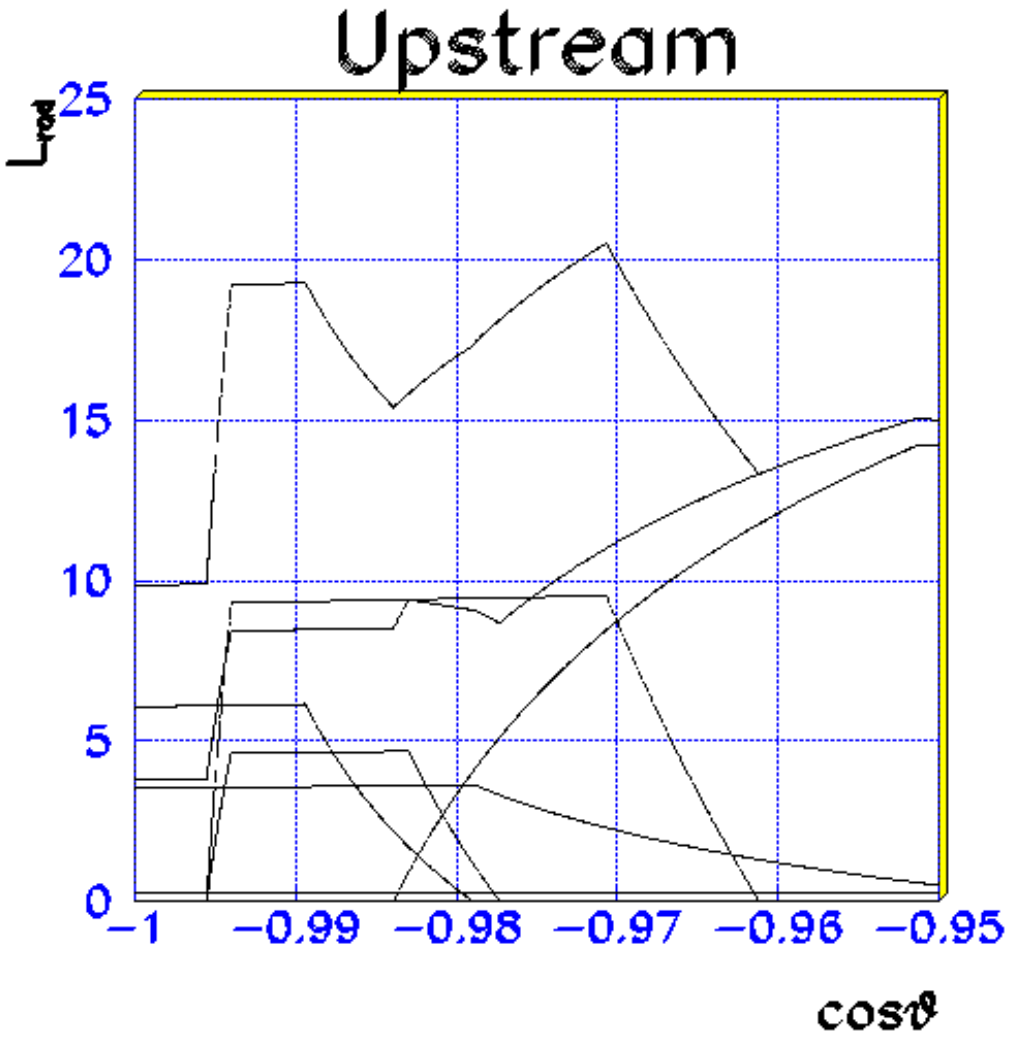
When everything is built and tested we will ship it back to BNL.Then insert support tube,slide in B4 assembly with target removed so that we can look from downstream end and shim support tube to ensure B4 enters UTC without touching anything. Then remove B4 assembly,leaving shimmed support tube in situ. After target installation, we put back B4 assembly, followed by lower double-walled tube holding remainder of beam instrumentation

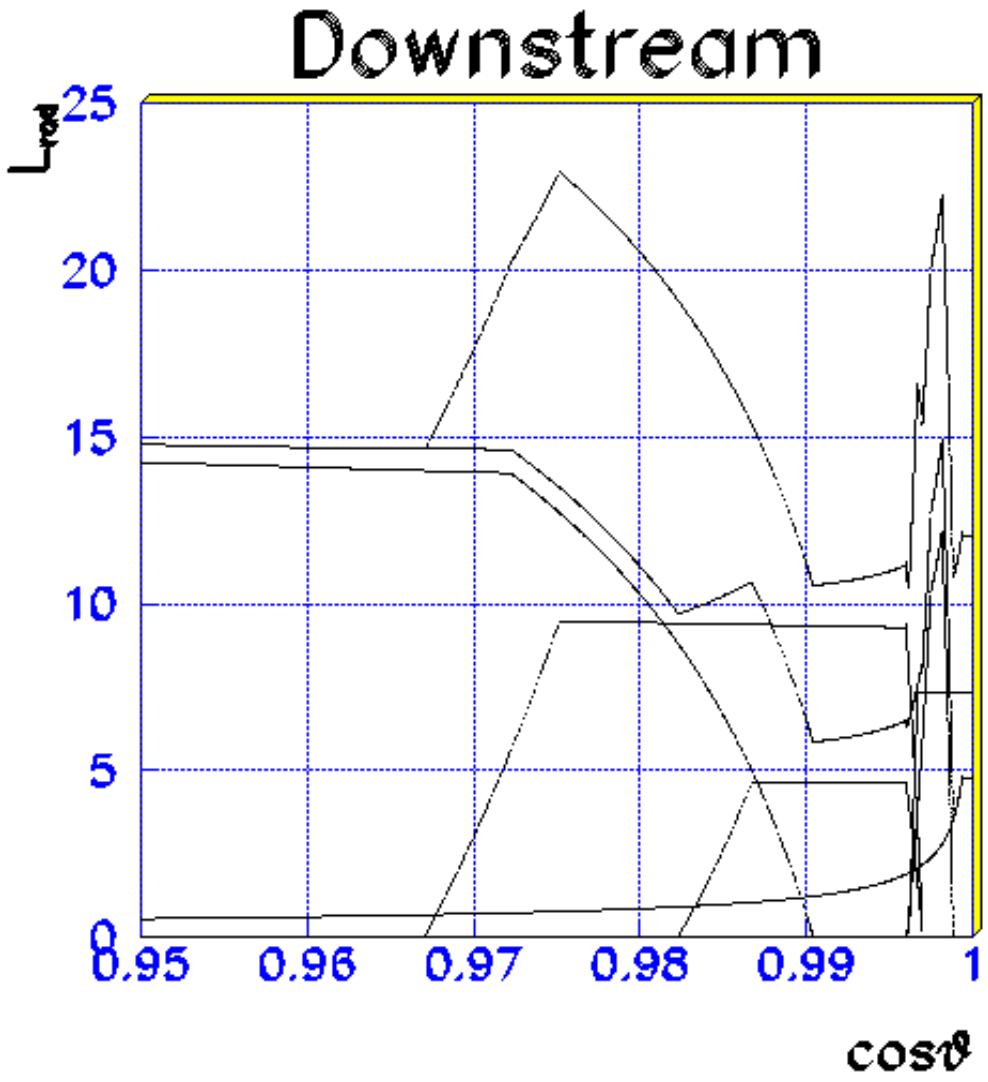
Other PV (S. Kettell)

PV Upgrades

- Upstream (see Peter Kitching's talk)
- BVL (discussed extensively in previous meetings)
- Downstream (dspv)
- Collar (CO)




Upstream
L_{rad}
25
20
15
10
5
0
−1
−0.99
−0.98
−0.97
−0.96
−0.95
cosϑ


Downstream
25
20
15
10
5
0
0.95
0.96
0.97
0.98
0.99
1
cosθ

CO design

- dsCO is a weak point in detector
- CO are only 4.8 L_{rad} (26x5mm CH + 25x1mm Pb = 15.5cm)
- design/testing (2mmPb-5mmCH, maybe fiber readout)
- current CO has ~30 pe/MeV, fiber readout tests (5-15 pe/MeV)
- Maybe same readout, but (22x2mmPb+23x5mmCH = 15.9cm) L_{rad}=8.1

CO Schedule

- Installation during closing (FY01 or FY02)
- needs more design work

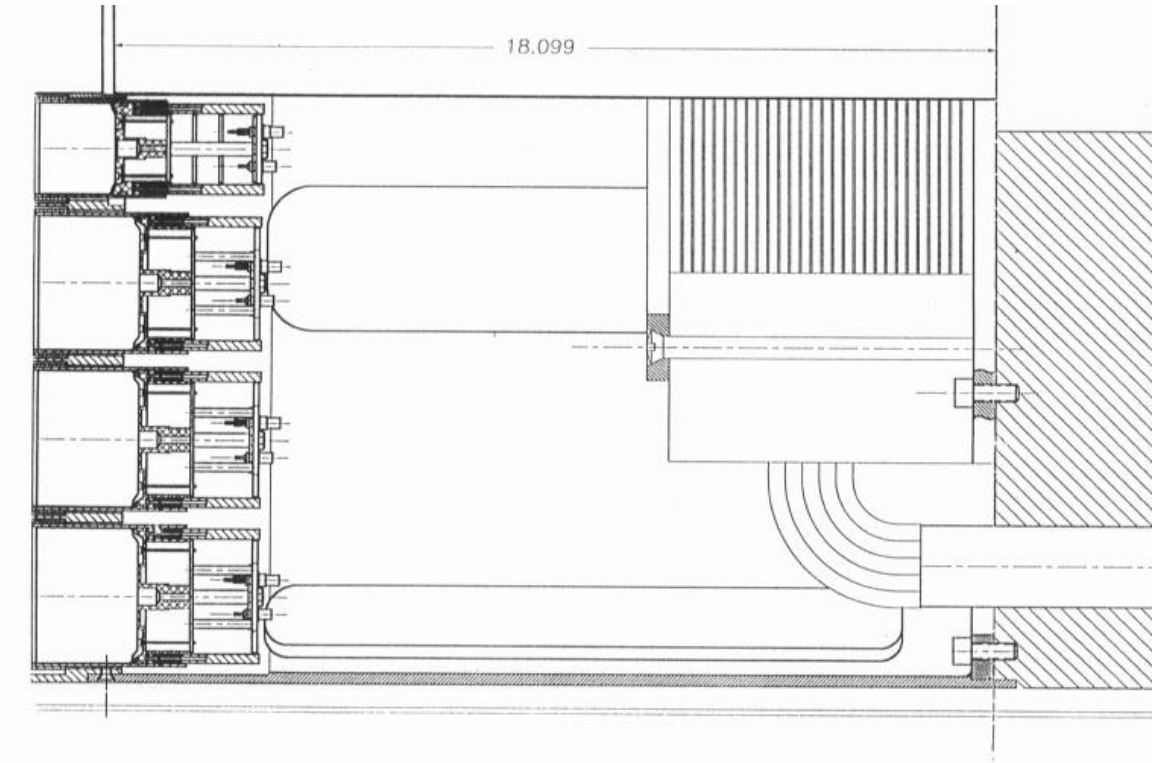
Possible light yield

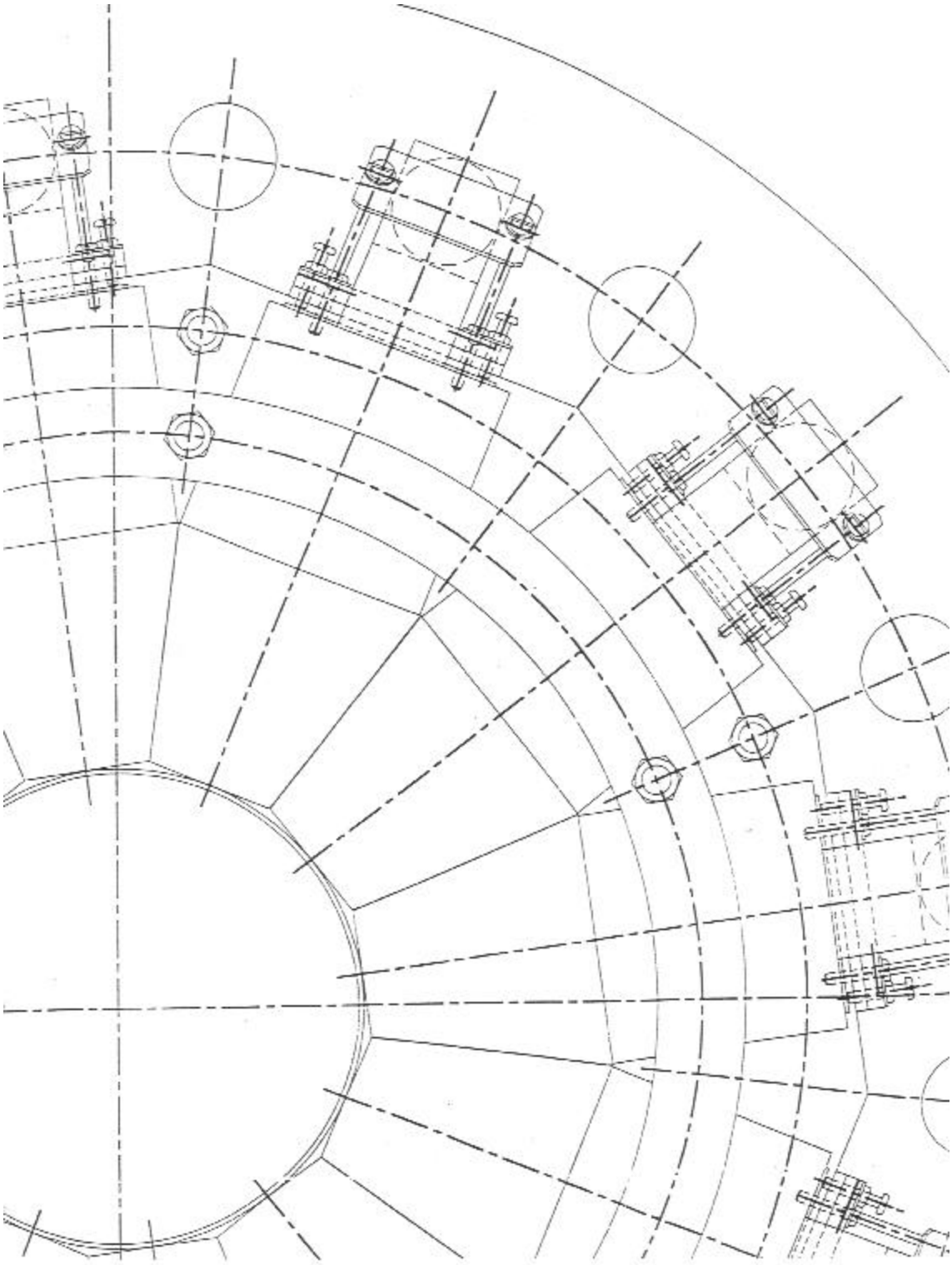
The light yield of a fiber readout scheme is not known.

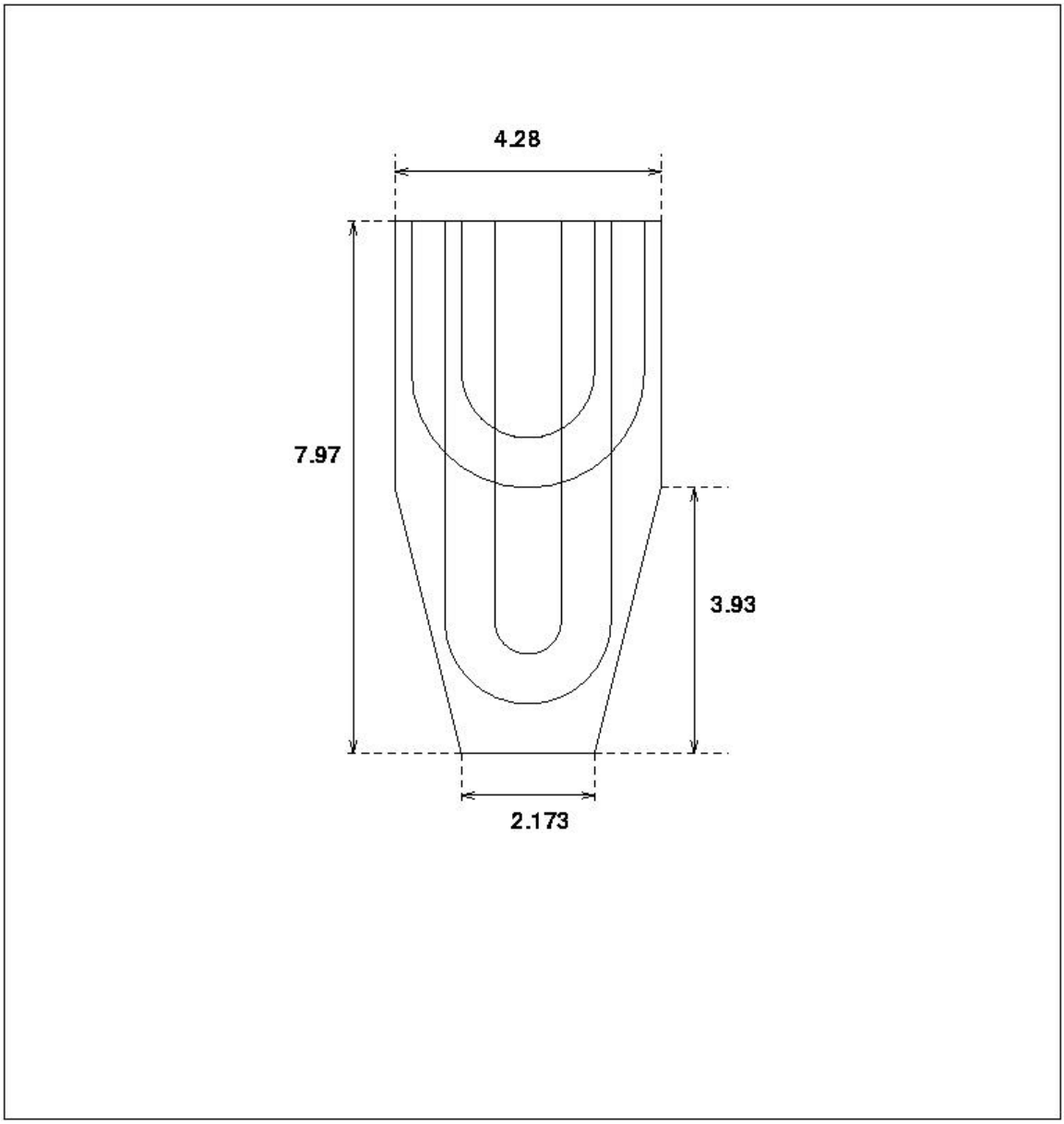
- Ilia obtained 12.5 pe/MeV (BC408, 5mm, good fiber, RS PMT, 8 fibers)
- ×1.2 (BC404)
- ×1.2 (green extended PMT)
- ×1.1 (chemical reflector)
- ×0.9 (full length fibers)
- Total of perhaps 18–20 pe/MeV

At a level of 20 pe/MeV we reach a region where it is interesting to compare to the existing scheme with direct readout through a mixer block and light guide. We currently get 30 pe/MeV, but perhaps we are willing to take a 33% hit in order to add photon veto coverage at larger radius.

- We need more data to verify the light yield.
- We need a design for extending the radial coverage.
- We need a design for the added L_{rad} along z.
- We need cost and schedule


18.099




4.28
7.97
3.93
2.173

Downstream Photon Veto (dspv) Descripti

- 26 layers of 1cm scintillator + 25 layers of 1.5mm Pb
- 70cm x 70cm x 7.3 L_{rad}, mount on tombstone at end of pit?
- four PMT-49 (6")
- monitoring with YAlO and blue LED
- 10 p.e./MeV, uniformity variations 25%

dspv Schedule

- Installation after closing ($\sim$ Dec)
- parts at BNL (7/5/00)
- assembly during July-August or later, depending on RS Monitor manpower needs
- testing during October (same caveat)

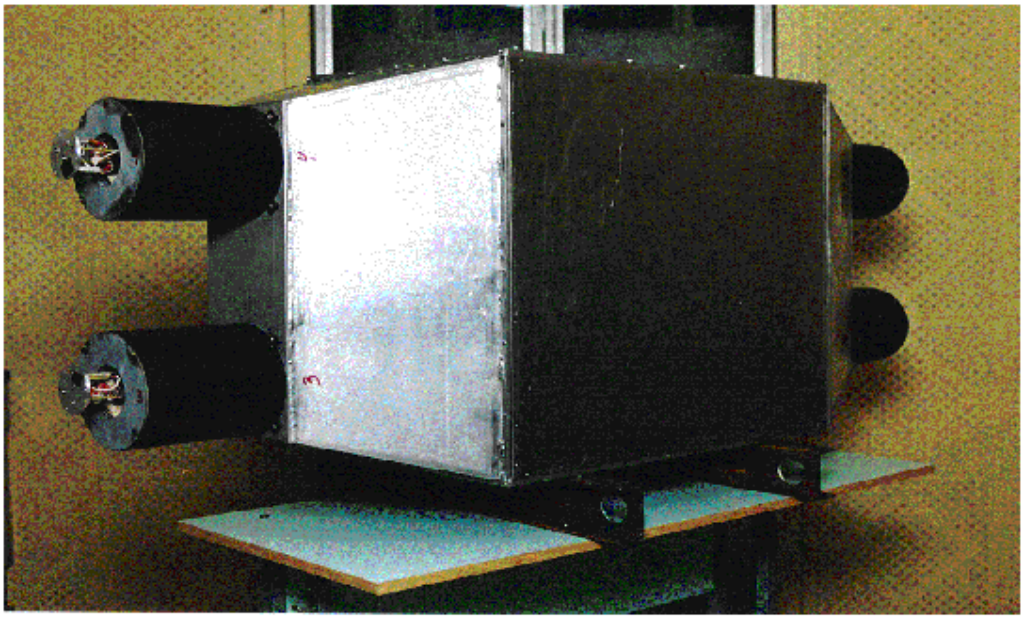
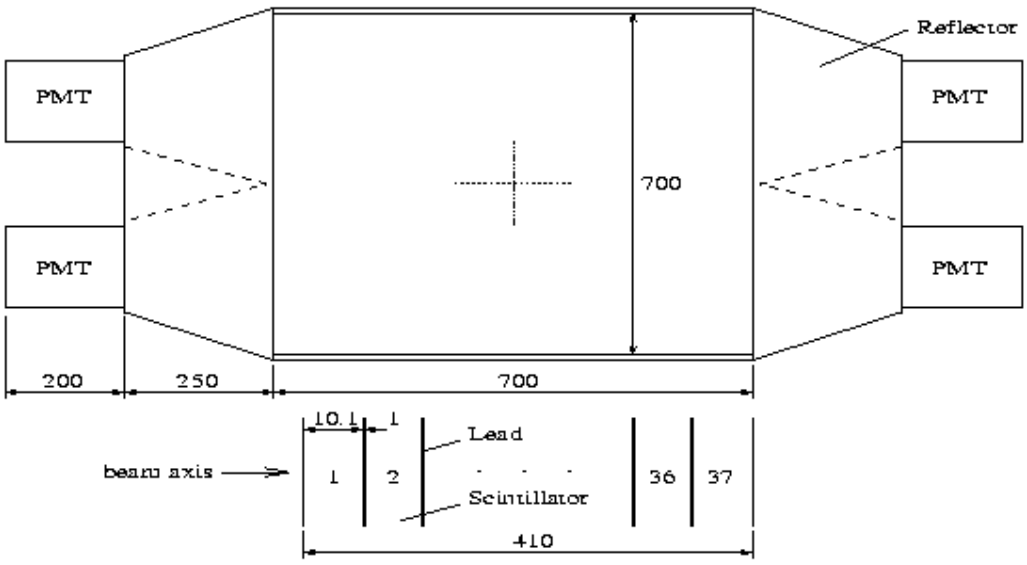


Fig. 1 . VETO COUNTER (downstream view) .



UTC (T. Numao)

UTC

Ar to He

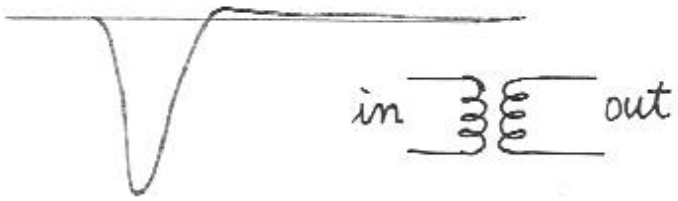
- more MC
- gas tests
- seal pins
- bag UTC

Electronics

- Cathode pre/post amps
  - no overshoot
  - DC offset
  - being tested

UTC electronics

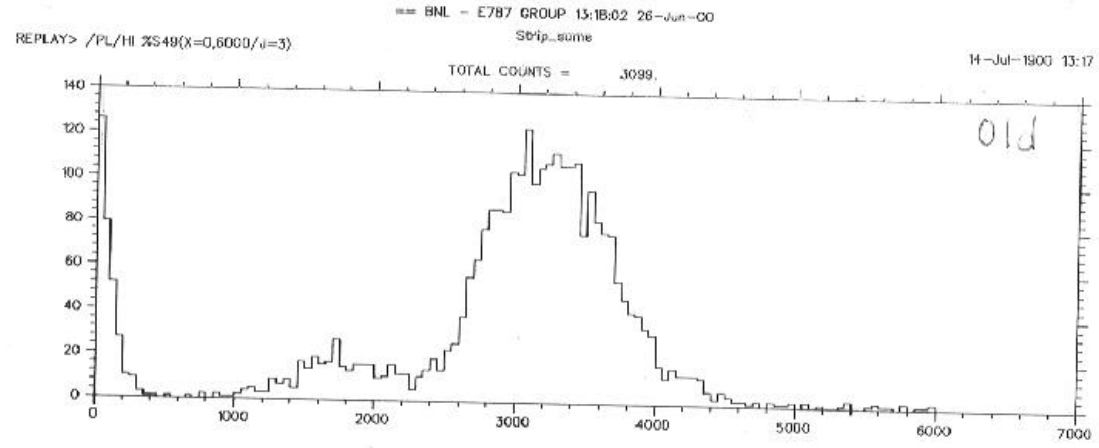
Problems:

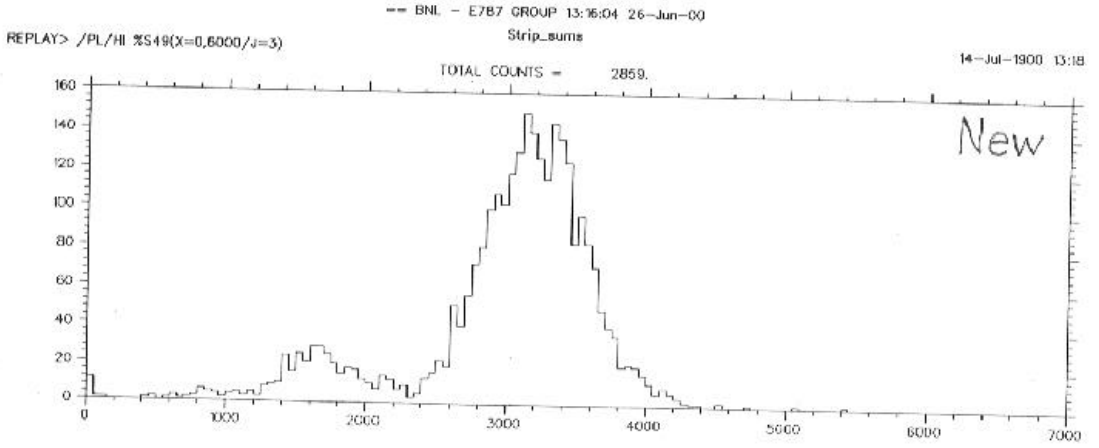


- Cathode inefficiency 10-15%, due to ADC malfunctioning.
- 5% of hits are fake, due to "overflow".
- Optimized for timing.

Byproducts:

- 30% less material at EP.
- Close EC by 1-2cm.


== BNL - E787 GROUP 13:18:02 26-Jun-00
Strip_sums
REPLAY> /PL/HI %S49(X=0,6000/J=3)
14-Jul-1900 13:17
TOTAL COUNTS = 3099.
Old
0
20
40
60
80
100
120
140
0
1000
2000
3000
4000
5000
6000
7000


== BNL - E787 GROUP 13:16:04 26-Jun-00
Strip_sums
REPLAY> /PL/HI %S49(X=0,6000/J=3)
14-Jul-1900 13:18
TOTAL COUNTS = 2859.
New
0
20
40
60
80
100
120
140
160
0
1000
2000
3000
4000
5000
6000
7000

UTC plan

- Cathodes

  new pre/post amps

- Anodes

  small mod. in preamps

- System tests in Oct.

Trigger (M. Nomachi)

Trigger Board

Requirements

Programmable logic for flexibility
Four TBs into one (if possible)
Result signals MUST come within 90 ns.

New trigger board prototype

2.5 V Altera FLEX chip
ECL/TTL before/after FLEX.

- Latency measurement (T. Yoshioka) at KEK

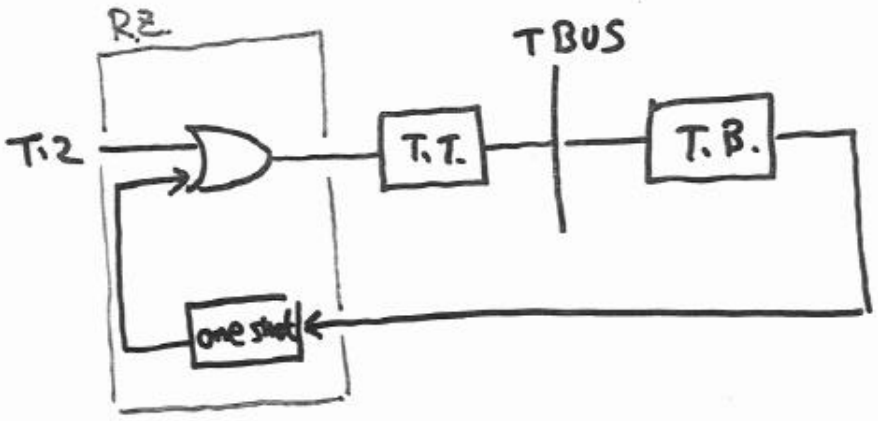
ECL/TTT + TTL/ECL	8 ns
Propagation on board	2 ns
FLEX	10 ns*
total	20 ns

*realistic logic may take 17 ns.

Existing trigger board

ECL logic
- Latency measurement (T. Yoshioka) at BNL

total 144 ns
*Jumper position is "4" (same as the others)



- Latency measurement
  - input of T.T. → output of T.B.
    = 26.2 ns
  - one shot + cable may take additional 6~7 ns

26.2 + 7 = 33.2 ns

- P16 of RZ Logbook says 33 ns

Another 5 ns is maximum.

→ TB must be faster than 19 msec.

ECL/TTL

1) Faster conversion

- another ECL/TTL
- use LVDS or PECL instead of TTL.

2) No conversion

- use ALTERA in negative voltage

Goal : 8 ns → 2~3 ns

FLEX

- realistic LOGIC 60~80 logic elements
  (T. Yoshioka)

- FLEX has 5000 logic elements.
  → for monitor, control

- use MAX from ALTERA
  - MAX has 256 logic elements
  - minimum 5 ns latency
  - Realistic Logic takes 11 ns.
- MAX ~~#~~ will be on the prototype board

Goal

· Receiver / Transmitter	3 ns
· MAX in negative Voltage	11 ns
· Propagation on board	2 ns
total	16 ns

Mean Timer

- Logic elements are used as delay line
- will use the same chip as the prototype trigger board

- Delay cell
  propagation delay through on cell is 1.1 ns. (T. Yoshioka)
  → Three times faster than the MT that was reported.

- M.T. performance
  It will be measured with the prototype trigger board (T. Yoshioka)

- Design shedule depends on the T.2 reduction scheme.

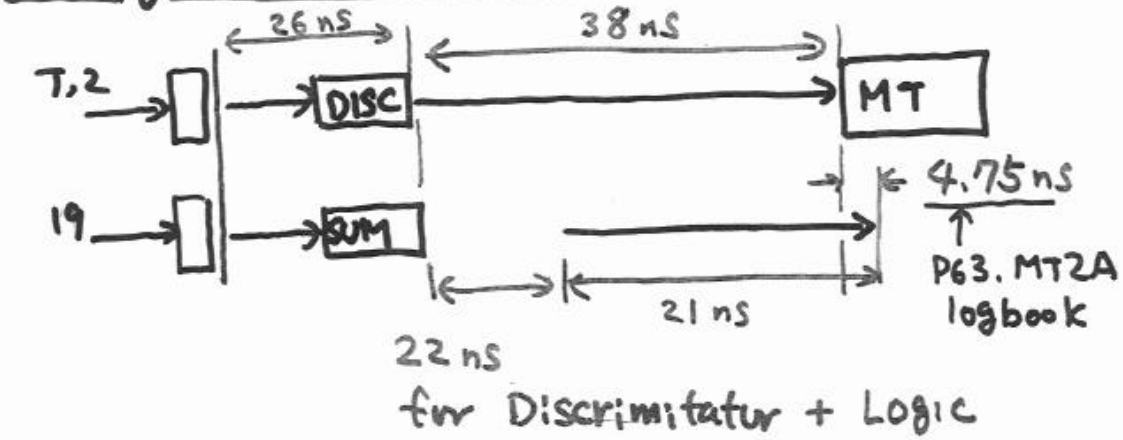
T.2 reduction

Avoid dead-time of ORed T.2

Individual T.2 signals should be vetoed by layer 19 signals.

The FLEX mean timer may be used.

Timing measurement



- Discriminator takes 13 ns
- only 9 ns left for the Logic

Possible implementation

1) Existing Disc. + Simple ECL logic
↑ new

2) Include discriminator in the MT.

Pros
- no TX/RX between Disc. and Logic
  save 3~5 ns.

Discriminator	6ns
FLEX	11ns
Transmitter	1ns
propagation	2ns
total	20ns

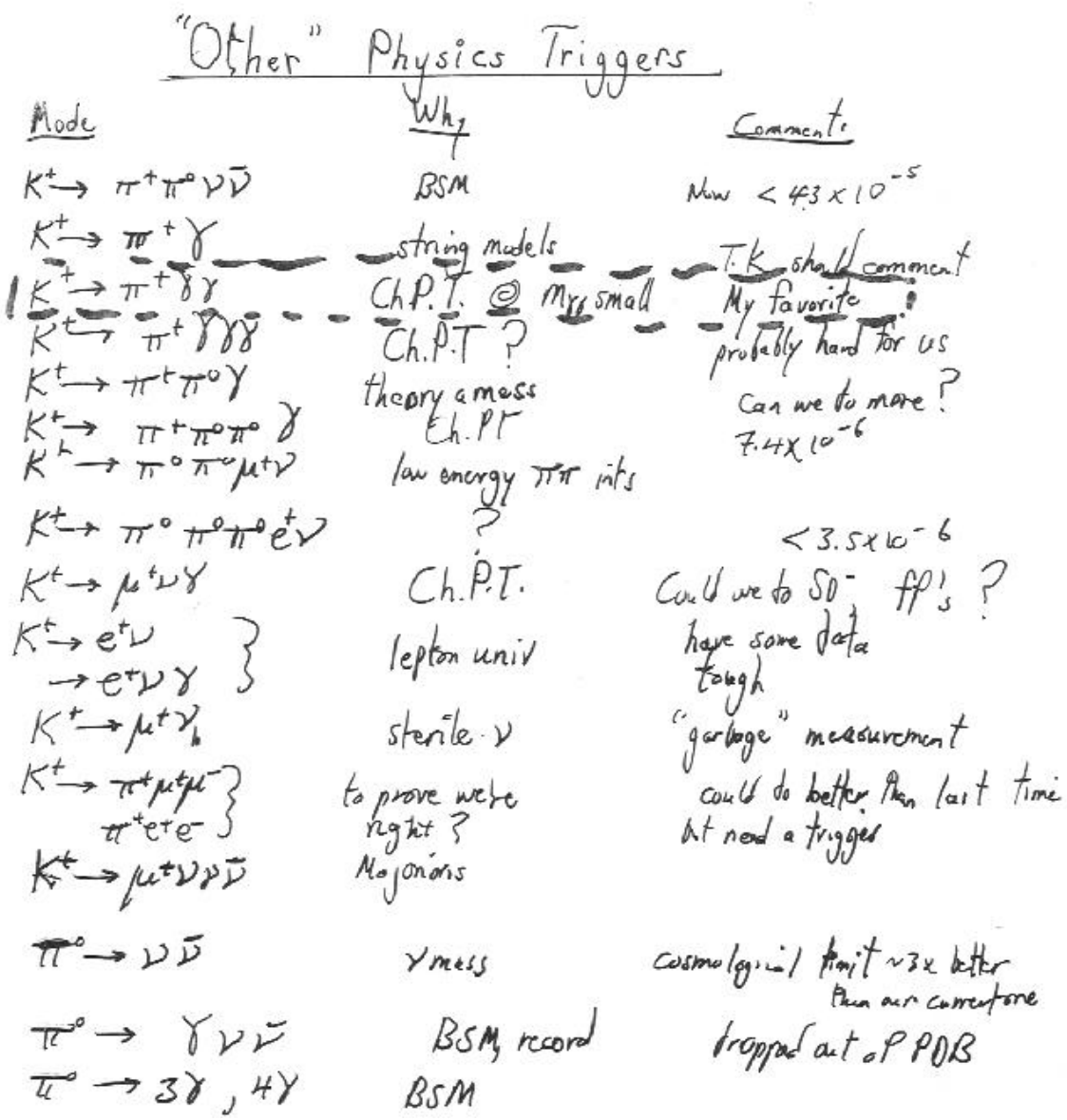
- Save the space.

Cons
- Takes time to develop.
  January ?

Layer 19 veto

- It kills $K\mu 2$ trigger
  - off the veto for short period regularly.
  - Tag the event with on/off.
- (Dead time
  Veto efficiency
  - we cannot count T2.
  - Can we use $K\pi 2$?
  - KB counting for on and off.

Other (L. Littenberg)



1 GAMMA TRIGGER (T. Komatsubara)

takeshi.komatsubara@kek.jp

E949 Collaboration meeting @BNL, July 16 2000

1gamma triggers for E949

what is it ?

- Kpi2(2) $\equiv$ KB · DC · IC-T•2 · $(6_{ct} + 7_{ct})$ · $\overline{(19_{ct} + 20_{ct} + 21_{ct})}$ · L1.n · HEX
- pnn(1) $\equiv$ Kpi2(2) · $\overline{ECL0}$ · $\overline{BV}$ · L0-z-mask
- 1gamma $\equiv$ Kpi2(2) · $\overline{ECL0}$ · BV · $\overline{NG2}$
  - In E787 the data were taken in 1996 and 97, with the prescaling factor 2450 ($\sim$ 1 event/spill).

purpose

- $K_{\pi 2}$ decays, tagging the high-energy photon by BV
  - $\Rightarrow$ Xray-ing the detector by the low-energy photon
  - $\Rightarrow$ photon inefficiency studies
- Search for the rare decay $K^+ \to \pi^+\gamma$
  - Sensitivity 1.5×10^{-7}: $\times 3 \sim 4$ better than KEK-E10 (1982)
  - Background levels are negligible. $\Rightarrow$ further search is promising.

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design of the running mode

- total KB_L of the E787 1gamma dataset:
  6.7E8 (85 days)
  $\Leftrightarrow$ KB_L/day in E949: 6.9E10 ($\times 100$!)

1. long-term, with the same prescaling factor
   - E787: 1event/spill ($\equiv$ 1M KB_L every 3.6sec)
     $\Leftrightarrow$ E949: 5event/spill ($\equiv$ 5M KB_L every 6.4sec)
     ($\times 2.8$)
   - 6000hr ($\times 3$) $\rightarrow \times 8$
   - 10event/spill and 3000hr $\rightarrow \times 8$
2. short-term, dedicated run (2001?)
   - assuming that the AGS beam intensity is 1/10
     and our DAQ is ready;
   - adjusting the prescaling factor
     and running with 150 event/spill
   - 5 days of running $\rightarrow \times 6$
     (1 day $\rightarrow$ reproduce the E787 dataset)

- the trigger can be more efficient
  if we would dedicate to the $K^+ \rightarrow \pi^+\gamma$ search

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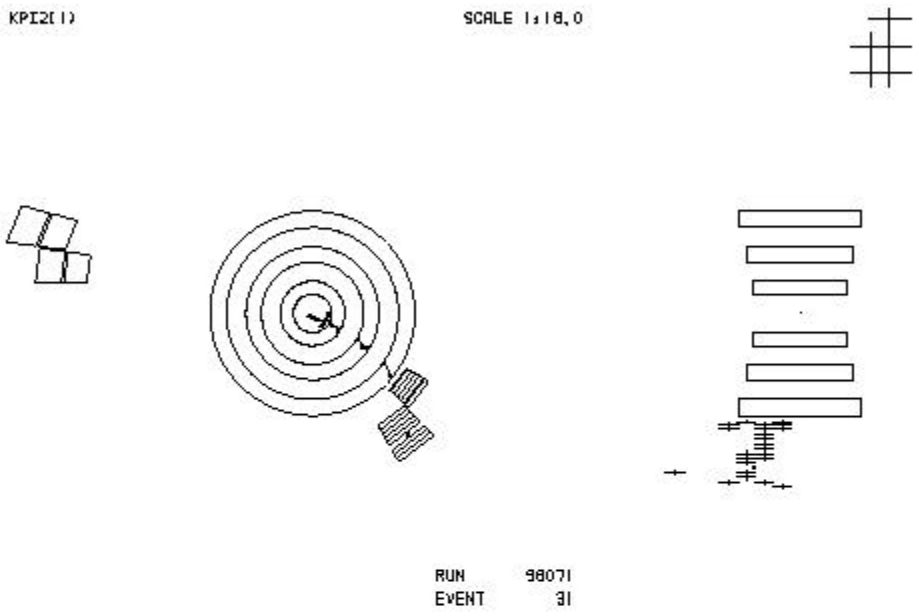
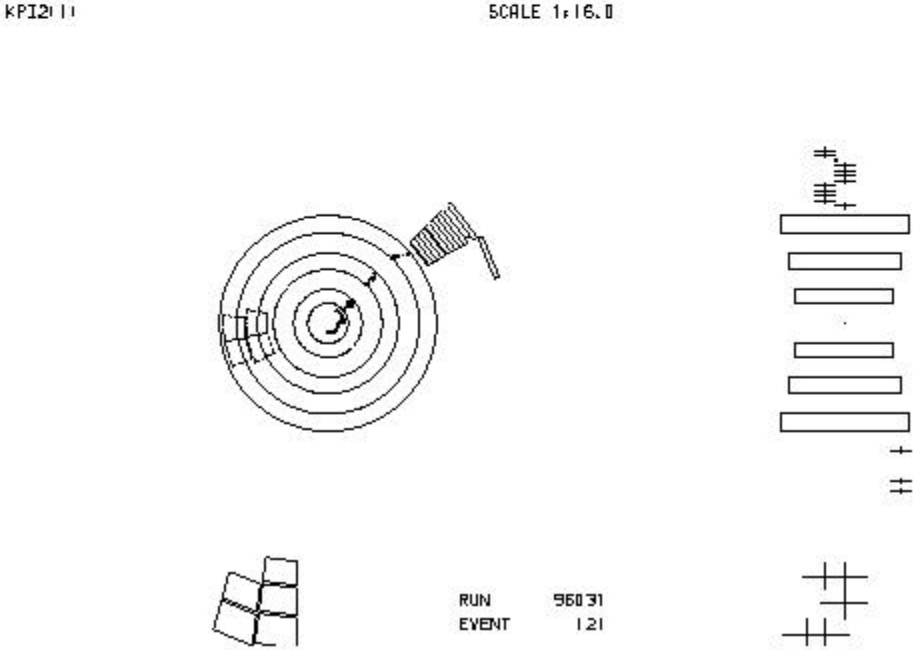
$K^+ \to \pi^+\gamma$ decay in Monte Carlo (of course...)





Cal. Trig (S. Kettell)

New Calibration Triggers

RS Calibration

- km22 trigger (we no longer have one and need to design an efficient one with the BVL installed; problems from BVL and L0-L19 veto)
- 3 new RS Monitor triggers (see T.Nomura's talk)
  - RS gain
  - TD check
  - Reference PMTs

E949 Normalization

- km21 trigger (used for normalization in e787; problems from BVL and L0-L19 veto)
  - maybe E949 will have to use B($K_{\pi 2}$) to normalize
  - can fix problem with sector gaps by using (18_{CT}+19_{CT})
  - Really need to understand difference in deadtime of T*2 and T*2*19_{veto}

Acceptance, performance, etc

- 2 trigger would be good to have a less biased trigger that would allow determination of T-counter and I counter inefficiencies. For UMC kaon stpping distribution we want to remove IC requirement. In E787 we know that the T-counter inefficiency was a problem and that KB triggers are not the most useful.
- CCD pedestal trigger. Take out of spill to correct pedestal levels on the fly. Will reduce CCD data load.
- Add MB to standard_mix?
- Other???

Necessary mods

- Repair/replace 2 A-type triggers (km21, km22)
- add 4 D-type triggers (RSmon, TDcheck, RSref, CCDped)
- Create new A-type trigger (2 [how do we do this?])
- Do we want to add flexibility to run 1γ and 3γ simultaneously?

DAQ (G. Redlinger)

DAQ

(G.R. Jul. 16, 2000)

- Activity at the Counting House
  - Slowly turning things on and trying to take data. So far we have the 2 Master crates, trigger and TD crates going. All TD's pass TDDAC. No SSP problems so far. I completely rebuilt the DAQ directory tree from CVS so this is also a test that this was done properly.
  - Have not yet succeeded in taking data with pulser triggers.
  - Artie and Bill are setting up new CAMAC discriminator crates for trigger and BVL. The main activity has now shifted to the alarm system. Arnie is making new temp sense boards (no more spares) and Artie/Bill are working on understanding/documenting the alarm system.
  - Need to start organizing various tasks:
    * RSTDC cabling, crates
    * New cables laid from detector to Counting House
    * New BVL splitters?
    * New beam stuff?
    * RS monitor system?
    * If there is some infrastructure you need, please let me know.

- Online software
  - Code management: entire online software tree is in CVS, including the VxWorks stuff on bnlku9x.
  - SSP software
    * CCD pedestal correction. Renee says she hopes to have it done by September.
  - PPC software
    * Fastbus interface routines (so-called BSI software) has been implemented on the SFI's so that the BBFC interface to Fastbus is no longer needed. sspar, sspcheck, CFI-MENU, TDDAC, snoopy all work ok. sspcheck may need to be ported to run completely on the SFI for speed, but it's not too bad as it is.
    * Started looking at PPC task to read data from disk and then push it through the rest of the DAQ system (useful for throughput tests, for example, or for testing the code downstream of the PPC).

– Online database/logbook.

* Current DAQLOG is probably reaching its limit in terms of the complexity of the data it can store and the complexity of the queries it can handle. It is also unwieldy for fixing incorrect data entries.
* New idea is to go with a more robust "industrial strength" database, in particular PostgreSQL with PHP for the graphical user interface.
  - Free.
  - Well-supported, widely used, very flexible.
  - Pretty straightforward to set up. Toy example http://bnlku28.phy.bnl.gov/daqlog/daqlog.php3 replicates current DAQLOG for a couple of runs.
* Database will incorporate logbook entries; should help for character string searches, for example. (Paper logbook will remain as an option.)
* Could serve as the central area to collect error messages which are currently scattered in multiple files.
* Actually we may want 2 kinds of "databases".
  - PAW ntuples can be useful as a kind of database.
  - User-interface is familiar.
  - Excellent for numerical analysis.
  - PAW ntuples could be a good choice for read-only storage of numerical data. Interactively modifying them is a pain. Character string handling is poor.

RSTDC (E. Ramberg)

A TDC System for the Range Stack

Erik Ramberg-Fermilab

16 July, 2000

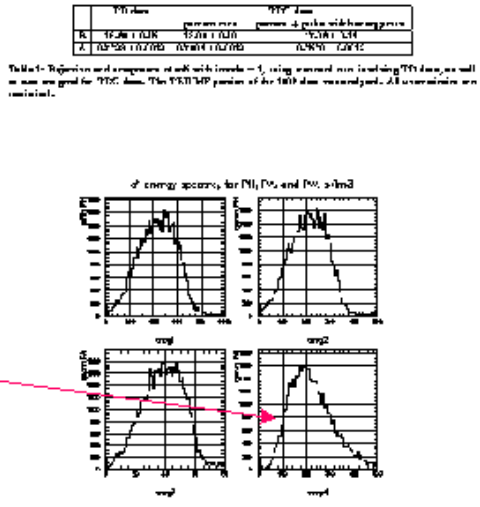
- TDC vs TD for electron identification
- Overview of system at Fermilab
- Data transfer rates
- Work to do

Electron Identification in RS

- (See P. Bergbusch's technical note: tn349)
- Need to see μ^+ decay into e^+, and therefore must go out to 3 or more lifetimes (7 μs)
- Hit rate in range stack averages 200 kHz, thus giving large data volumes and deadtime with the time digitizers.
- TDC's can reduce the data volume considerably and still retain some pulse height information.

Energy Measurement using TDC's

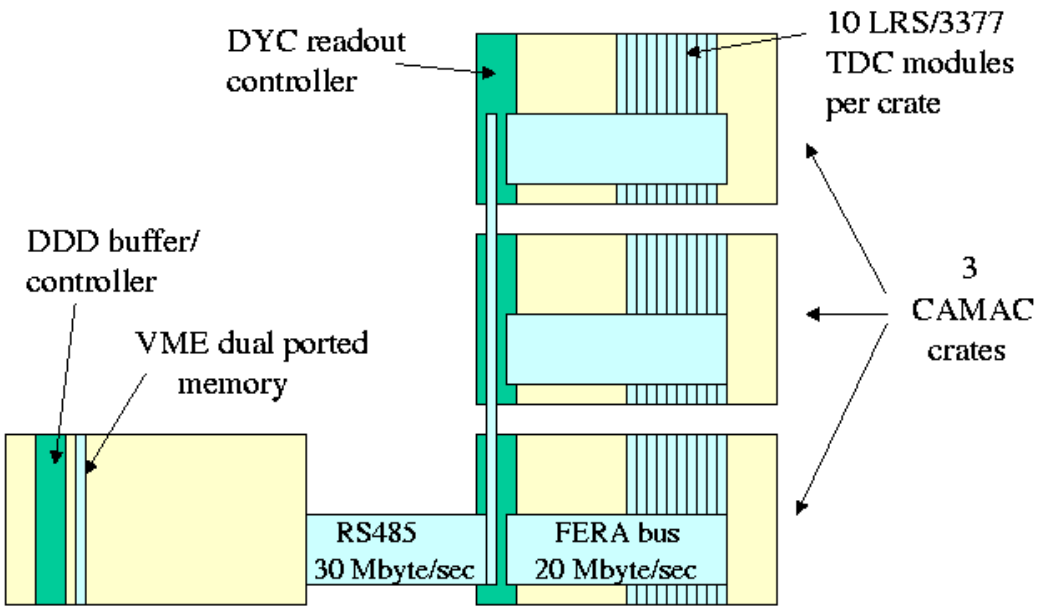
- We need both leading and trailing edge measurements. The width of the pulse gives an approximate energy measurement.
- Pion rejection and electron acceptance are similar to TD's



Rates in the Range Stack counters

- Paul's study shows an average of 200 kHz in the range stack counters.
- This rate will drive aspects of our system, namely the maximum time we can go out to: ~12 μsec
- Will rates double in E949? If so, we probably need to double our readout controllers.

Outline of RS TDC system



TDC Module Properties

- Lecroy 3377 TDC
  - .5 nsec resolution
  - 32 μsec full scale (double word readout)
  - Leading/trailing edge capability per hit
  - Can store up to 16 edge measurements per channel
  - 10 nsec double pulse resolution
  - 1.8 μsec + 100 nsec/word conversion time

DYC Readout Controller

- Accepts FERA bus input from TDC's
- Stores event in buffer and feeds it into RS485 chain when crate readout is finished. (Internal buffer is 16 kBytes but asserts ½ full busy signal)
- MPI (measure pause interval) will have to be extended to 120 μsec to match the E949 trigger system.

System readout rates

- Assume 200 kHz average rate in counters and 12 μsec gate after prompt
- Conversion time in each TDC will average (1.8+.1(4)(2.4)(32)) = 32 μsec
- Total readout time into DYC controllers will be (120 + 8(2.4)(32)(10)/20) = 430 μsec
- Event size in each DYC is about 6.1 kBytes
- Total readout time into VME buffer will be (430 + 3(6100)/30) = 1040 μsec

Readout rates (cont.)

- If rates in counters are double what we expect (i.e. 400 kHz), then we would need to double the number of DYC controllers to handle the event size and readout time.

- Total readout time in that case would be 1650 μsec

Summary

- Fermilab is building a TDC system for the range stack which will be used to measure the electron signal instead of the TD's.
- Leading and trailing edge measurements should provide an adequate energy measurement.
- Readout time per event for a 12 μsec gate, and with a 200 kHz background, is about 1 msec.
- Work to do:
  - Complete acquisition of all hardware
  - Modify DYC's to accept longer MPI
  - Test system at realistic rates
  - Transport to BNL

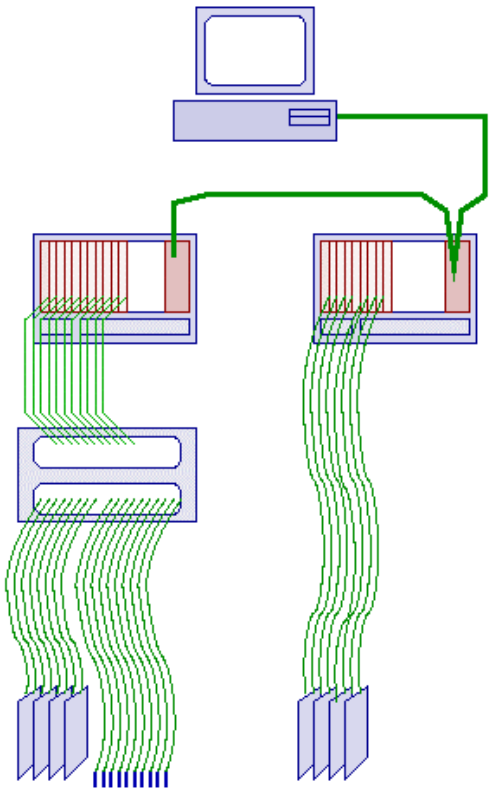
- Voltage monitor system
  - Aid in diagnosing data-taking problems
    - NIM/CAMAC/Fastbus crate voltages
    - FB Cable Segment quiescent voltages
  - Other monitoring?
    - Replace paper tape from Kelvin's blue box?
    - Temperatures? Air pressure?
  - Standalone DAQ system, operating asynchronously with the main DAQ
  - Various pieces exist but we need someone to think about putting together the overall system $\Rightarrow$ Sergey Petrenko.
    - Linux PC with Hytec CAMAC interface to scanning ADC's
    - Software: MIDAS system from PSI/TRIUMF
      - Well-supported
      - Has good support for slow-control-type tasks
      - Arnie has set it up and has started hardware tests
    - Hardware
      - Miles has built a card to give access to the Cable Segment voltages. Currently in test at TRIUMF.
      - Different ideas being discussed for CAMAC/NIM/Fastbus crate voltages
      - Many details still need to be worked out

VOLTAGE MONITOR.

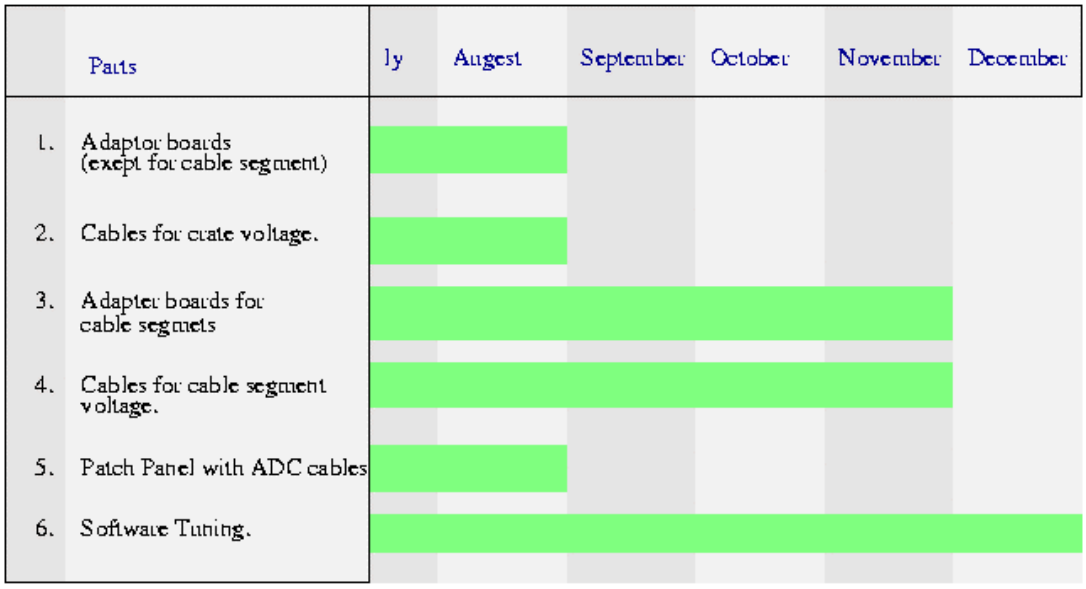
What to measure	Why	Source	Channels
Crates power supply voltage.	To keep high running efficiency.	Backplane voltage.	510
Cable segment line driver levels.	To detect DAQ problems on early stage.	Adapter board	240
Possible expansion for: high voltage, gas syatems, magnetic field, temperature, etc. measurements.	*To ensure permanet monitoring.*	*?*	*?*

Voltage Monitor Structure.

1. PC, running LINUX, equipped with IBM Personality Card.
2. Private Bus (CAMAC Branch) Cable.
3. CAMAC crates, equipped with 1331 CAMAC Interface module and set of Joerger ADC32A boards.
4. Patch Panel with cables to ADC.
5. Cables to crates under control, equipped with voltage dividers and crate specific tips.
6. Crate specific adaptor boards (if any)



Draft Schedule.



UMC (T. Komatsubara)

takeshi.komatsubara@kek.jp
E949 Collaboration meeting @BNL, July 16 2000

E949 Monte Carlo: Status Report

from E949 UMC meeting (Fri, July 14)

- Takeshi K, Seiji K [KEK]
- Marize P-M [Yeshiva]
- Steve K, Jim F, Dick S [BNL]
- Renee P [TRIUMF, on the phone]

- "e949.umc" in the E949 HyperNews (http://bnlku28.phy.bnl.gov/hn/).

UMC on Linux vs. SGI

machines in Japan:

- Heyday: SGI Challenge
  10 250 MHZ IP19 Processors
  CPU: MIPS R4400 Processor Chip Revision: 6.0
  FPU: MIPS R4010 Floating Point Chip Revision: 0.0
  Main memory size: 512 Mbytes, 2-way interleaved

- Hestia: SGI O2 (sgi2100)
  4 250 MHZ IP27 Processors
  CPU: MIPS R10000 Processor Chip Revision: 3.4
  FPU: MIPS R10010 Floating Point Chip Revision: 0.0
  Main memory size: 512 Mbytes

- Kgrare03: Linux machine
  model name   : Pentium III (Katmai)
  cpu MHz   : 501.143455
  cache size   : 512 KB
  MemTotal: 387476 kB
  SwapTotal: 530104 kB

* UMC Performance summary:
  All run used an identical parameter file.

host	binary(*1)	time hour:min:sec	result(NSKM)**2
Heyday	o32(heyday)	10:25:24	37
Heyday	o32(hesita)	not available	-
Hestia	o32(heyday)	3:38:30	37
Hesita	o32(hestia)	3:47:21	58
Hestia	n32(hestia)	2:43:23	52
Kgrare03	ELF(kgrare01)	2:21:41	34

*1: Each binary was compiled on the host in the parenthesis.
SGI machines have two compiler-modes : o32 and n32.
*2: Number of the events which pass the '98-3trigger conditions
from generating the 100000 radiative kmu3 event.

===

His test shows that:
- The Linux performance is better than SGI's,
- There exists a discrepancy on the UMC results
  among the jobs in different computers.

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UMC projects since Feb-00

1. UMC-Primer [Takeshi]
   http://www.phy.bnl.gov/e949/detector/mc/
   a package (commands, ..) so that a beginner can:
   - run a simulation job,
   - produce Monte-Carlo events, and
   - analyze them with XPHOTO in KOFIA.

2. UMC on Linux [Marize]
   $\Leftrightarrow$ KOFIA on Linux [Morgan, Renee]
   - working version in e949@physics.mid.yu.edu
   - start testing with Linux-KOFIA

   $\Rightarrow$ The UMC will be OS-independent:
   both the SGI-UMC events and Linux-UMC events
   can be analyzed by either of
   the SGI-KOFIA and Linux-KOFIA.

3. "Barrel Veto Liner" routines [Seiji]
   - debugged code on the new RS+BVL+BV system
   - backward compatible with the E787 system
   - (based on UMC-v5)
     $\rightarrow$ will be moved to UMC-v6 [Takeshi]

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Plan to the E949-UMC

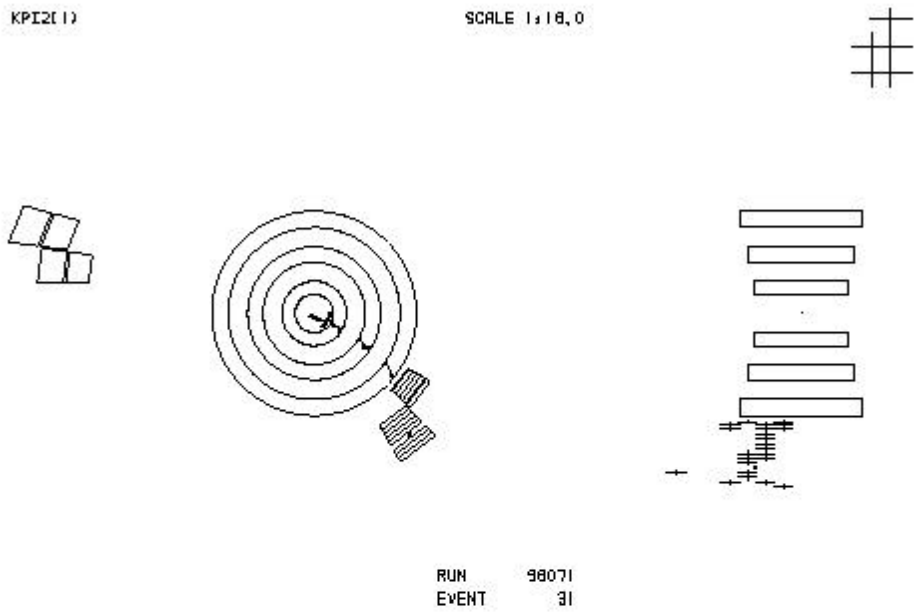
- UMC version 6 (next version) in a few months:
  end of October, or the next collaboration meeting
  - BVL routines
  - debugging

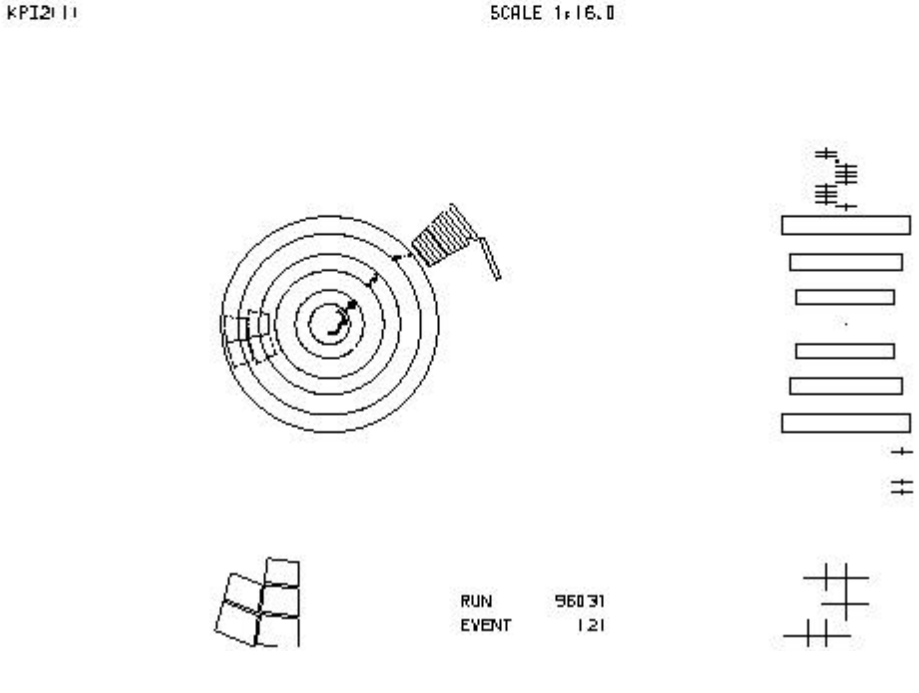
  purpose: start trigger-studies including BVL
- UMC version 7, oriented to E949
  - other new subsystems
    (PVs, B4, degrader, new RS layers, ..)
  - known issues, for example:
    * RS thickness in each counter
    * Target (individual fiber, shift, rotation)

* UMC updates are managed by CVS [Marize, Renee].

takeshi.komatsubara@kek.jp
E949 Collaboration meeting @BNL, July 16 2000

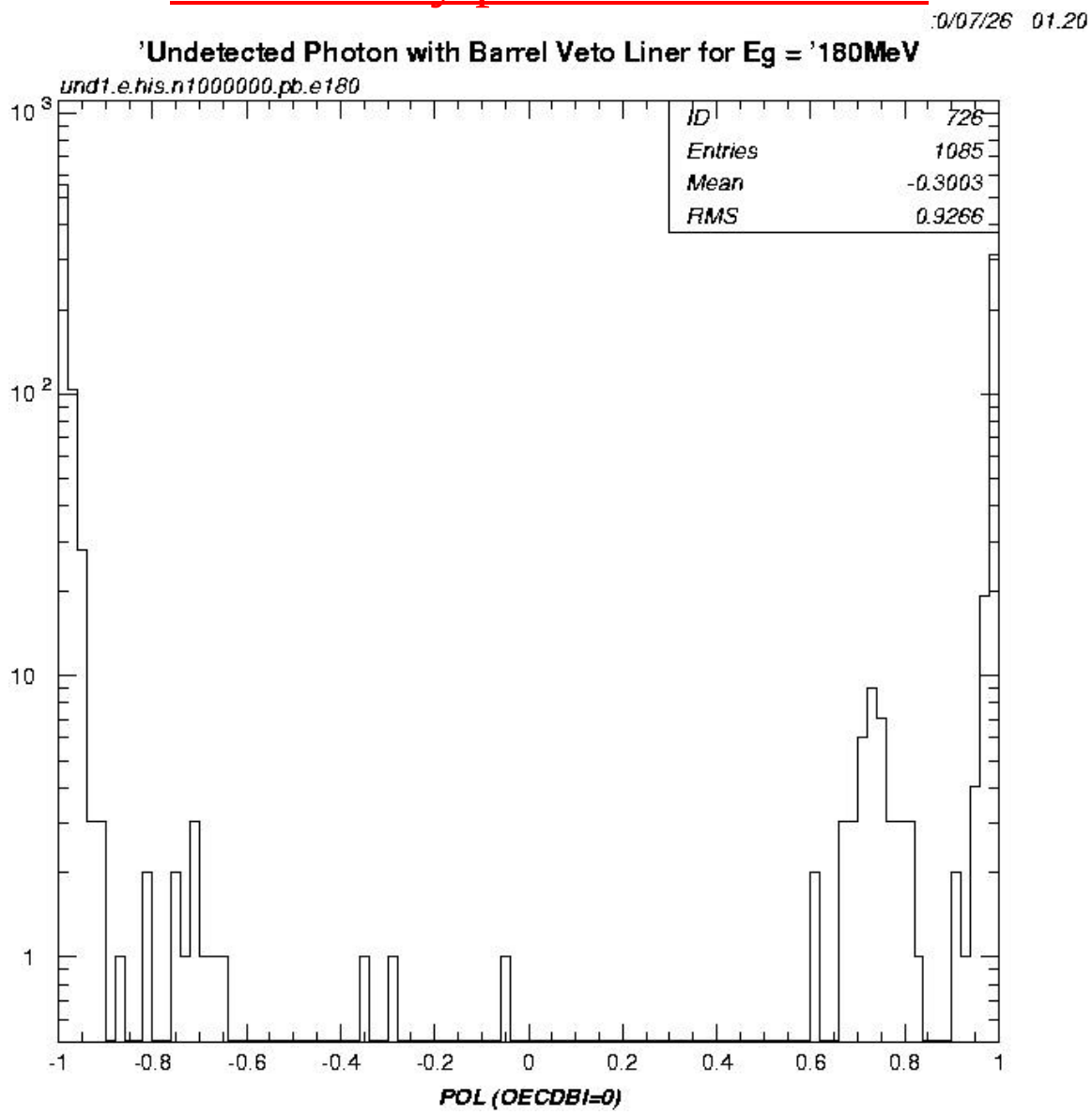
$K^+ \to \pi^+\gamma$ decay in Monte Carlo (of course...)

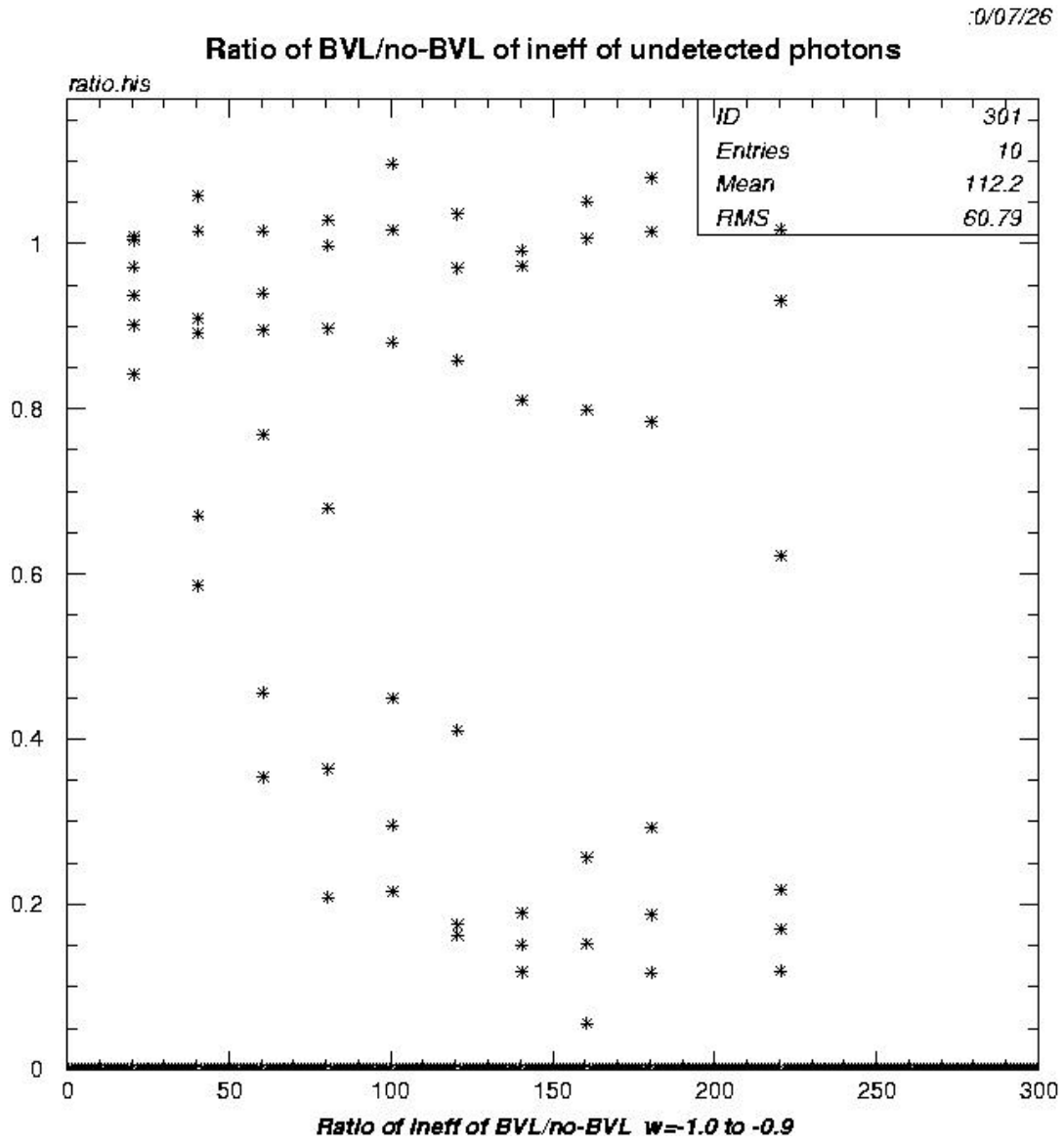




UMC PV

Inefficiency plots from S. Kabe




:0/07/26 03.57
Ratio of BVL/no-BVL of ineff of undetected photons
ratio.his
ID 301
Entries 10
Mean 112.2
RMS 60.79
0
0.2
0.4
0.6
0.8
1
0
50
100
150
200
250
300
Ratio of ineff of BVL/no-BVL w=-1.0 to -0.9

Collaboration Meeting Minutes

E949 Collaboration Meeting 7/16/00
BNL Physics 2-160

09:00-09:10 Welcome/Overview (S. Kettell)
FY01 president's budget looks good for E949 capital, and has been interpreted by BNL to allow 10 weeks of running. Most LESB3 work should be OK. Upgraded separator should be tested in September. If we want to run at higher instantaneous rates we need some new target cooling design effort. Our nominal running condition of 65 Tp, with a 4.1 second spill at 730 MeV/c would give about 1.5 MHz of stopped kaons.

09:15-10:00 RSSC (T. Numao)
Three chambers from the experiment and one from PU that were dead have been repaired at TRIUMF. There are 3-6 more "suspect" chambers in the experiment. Four of these have been removed to ship to TRIUMF (estimate 4 weeks + 2-3 weeks shipping to repair); this could be the critical path item for detector closing. They believe that they have reproduced the RSSC z-problems as seen in the data and have found a "fix". This fix requires new amplifiers and discriminators (perhaps dual level) after the current RSSC cables and before the PU electronics. This fix is not critical path (until we want RSSC data) and should cost ~$50k. Some more details about chamber cross-talk will be investigated.

10:05-10:20 RS 2-5 Update (J. Frank)
20 modules of 4 counters received (as of 7/11/00). Ten wrapped, 4 tested, 1 installed so far. About x2 more light than old counters. Ahead of revised schedule for closing on ~9/7/00.
Studies of PMT's: good anti-correlation with npe/counter, bad correlation of QE with npe. Jim would like suggestions on understanding this! Measured light loss over time is 6%/year. Measured L6 thicknesses agree with Milind's piscat measurements.

10:35-10:50 T-counter update (J. Frank)
New counters 7mm instead of 6mm and wider to fill gaps between sectors. BC404 (24cm) with BCF99-29AA double-clad 1mm fibers 4.8m long. New 115M PMT's (similar to current ones) Sixteen fibers per counter, 32-34 pe/mip, 600ps timing resolution, with 99.6-7% efficiency based on 6 counters tested. 60 PMT's and 27 counters ready; shipping in July.

10:55-11:15 RS Monitor System (T. Nomura, A. Kozhevnikov)
Sasha reported on the first "pre"production 175 fiber bundle and the RS mounting scheme.

11:20-11:40 Detector Schedule (K. Li)
Kelvin was almost able to show his transparency from the last meeting. Closing slipped from 9/1/00 to 9/15/00. Cabling is lengthened from 2 to 3 months due to RS monitor. Cosmics have therefore slipped from 1/1/01 to 2/15/01.

11:45-12:10 Beam Instrumentation (P. Kitching)

12:15-12:30 Other PV (S. Kettell)

Nothing new to report on BVL. Collar studies are progressing slowly - hope to design/build a new collar with x2 Pb and install before FY02 run (maybe fiber read out??) Downstream PV is at BNL, will mount on tombstone and add 7.3 Lrad along downstream beam line. Not on critical path - install after Dec.

13:30-13:45 UTC (T. Numao)
All preamps and cathode postamps shipped to TRIUMF. Anode preamps will get new resistors. Cathode preamps and postamps will be changed to remove positive overshoot. Ready for systems tests on UTC at BNL in October. Final installation/tests in magnet.

14:05-14:40 Trigger (M. Nomachi)
Prototype of new trigger board timing tests at BNL show 8ns too long: save ~6ns on ECL/TTL shift and another ~5-6ns by moving from Altera FLEX chip to MAX chip.
Meantimer has 1.1ns (down from 3.4ns) resolution. Too much delay for L19 veto. Need to either build L19 logic out of ECL (fast logic, like 10E) or develop a discriminator into the Altera board (may have long development time). This could become a critical path item if we want to use it in FY00.

new triggers (1g,3g,pgg,ke4,km22...) (L.Littenberg)
Laurie argued in favor of pgg at m_gg~0. This could come from 1gamma trigger if we can get x20-40 more trigger rejection.

calibration triggers (S. Kettell)
We do not have a km22 trigger: we need one. It is critical for RS energy calibration. We need to design one with BVL in place (perhaps high BVL threshold and a L0-zfrf). Will be further complicated with L19 L0 veto. We must modify our km21 trigger. It will now require L19 and since L19 is only 1cm, will be susceptible to cracks between counters. Perhaps go to (18_CT + 19_CT). We will also have the complication from the L19 veto at L0. We will add 3 new RS monitor triggers to the BD board (RS gain, TD check, and reference PMT). We do not yet know the rate or timing of RS gain monitoring triggers.
We will add one CCD pedestal correction trigger (out of spill) to BD board. We should consider adding minimum-bias to smx.
We should try to invent a L2 trigger: want to be able to measure T-counter (and IC) inefficiency and to get unbiased UMC stopping distribution.

14:45-15:30 DAQ (G. Redlinger)
DAQ software is in CVS. TD's and SSP's have come up OK. Pulser trigger is not currently working (discussion with Peter). Adding new crates for trigger and voltage monitor, which requires new additions to alarm system. Also need new RS TDC cables, beam cables from cave, splitters, RS monitor control/trigger. If you need any infrastructure in counting house contact George soon.
CCD-pedestal from Renee in Sep. Porting of TDDAC, sspcheck, sspar to SFI completed by George. He is working on reading data from disk into DAQ. Investigating PostgreSQL to replace DAQLOG
(see http://bnlku28.phy.bnl.gov/daqlog/daqlog.php3). Maybe PAW is also useful.

RS TDC (E. Ramberg)
Paul measured 200kHz in RS at KB=0.75 MHz. Expect double this in E949?

Want leading and trailing edge for electron "energy". Propose 3 CAMAC crates of LRS3377's (10/crate) with DYC controller in CAMAC crate and DDD controller in VME crate. Data is read into VME memory and then PowerPC. Need mod to MPI to 120 usec; may have problem with half-full at 8kbyte/crate. At 200kHz and 12 usec readout is 1msec, so at double the rate this could be a problem; may need 3 VME memories. Tests at FNAL now and BNL in Oct.

Monitoring systems (G. Redlinger)

Voltage monitor system has a critical role in maintaining our running efficiency. Currently work is focusing on crate voltages and Cable Segment voltages. Should have hardware in place by the end of August and software developed over the next several months.

15:45-15:50 Monte Carlo (T. Komatsubara)

A summary of the discussions in the E949 UMC meeting (July 14, BNL) is reported. UMC-Primer package is prepared for beginners. The project on UMC on Linux is in progress; we start testing a working version by Marize with KOFIA on Linux.
Barrel Veto Liner routines are developed and tested by Seiji, and they will be move to UMC-v6.
The next version of UMC will be released in a few months, for the trigger studies including BNL. And the E949 UMC updates will be managed by CVS.

16:00 next meeting/other business

probably next January-February as we get ready for cosmic ray running. No firm decision as to date.

Cast of characters