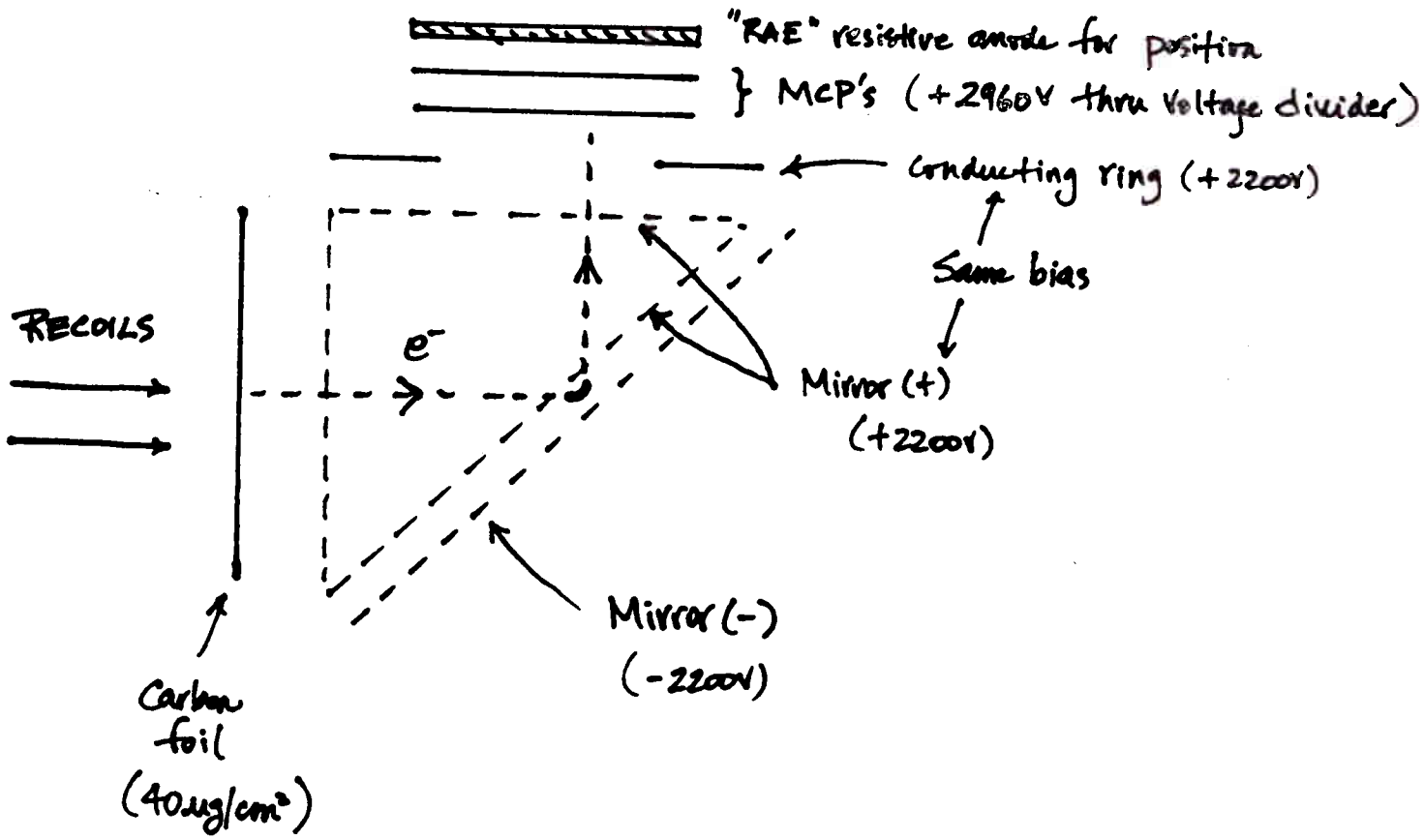
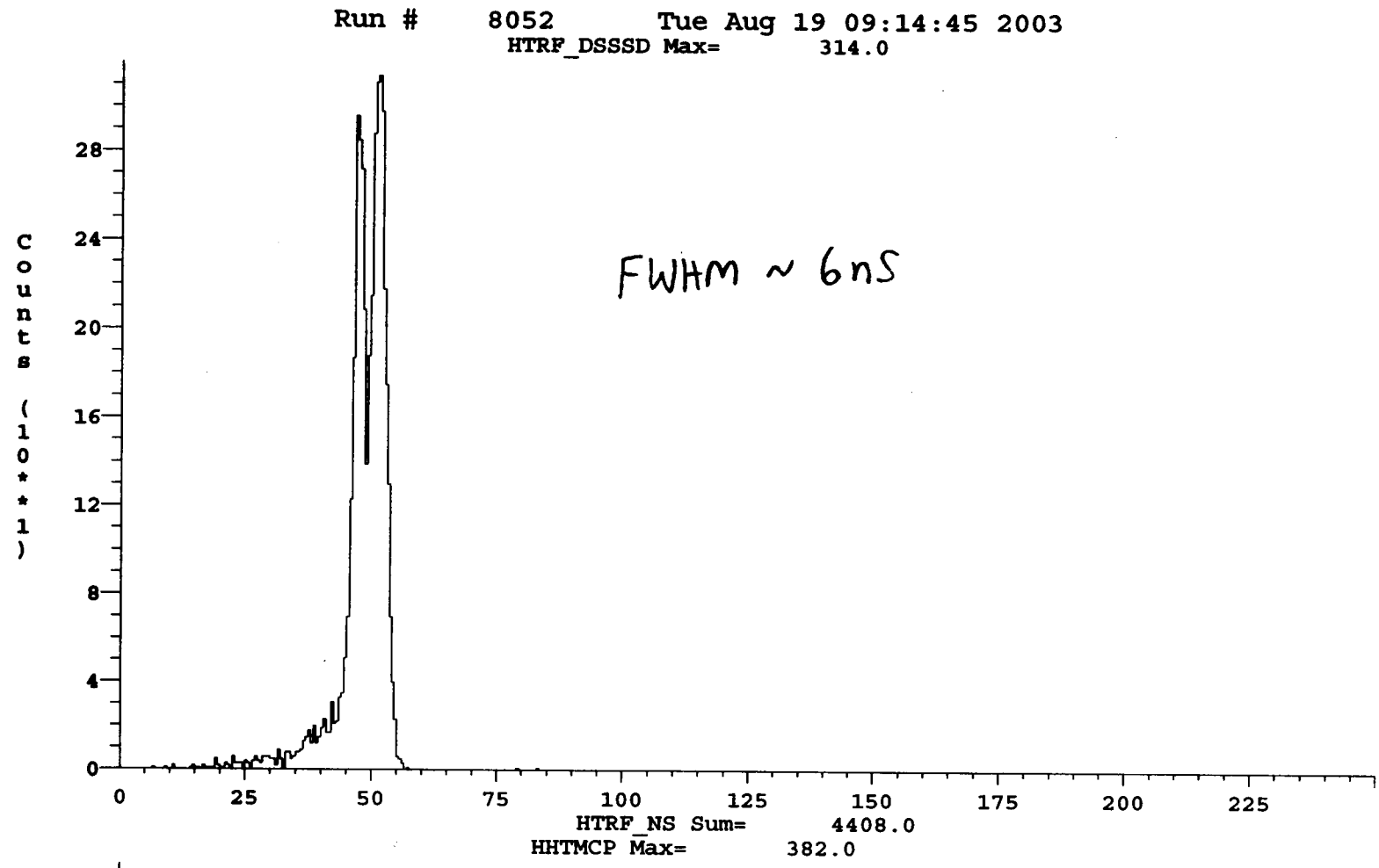
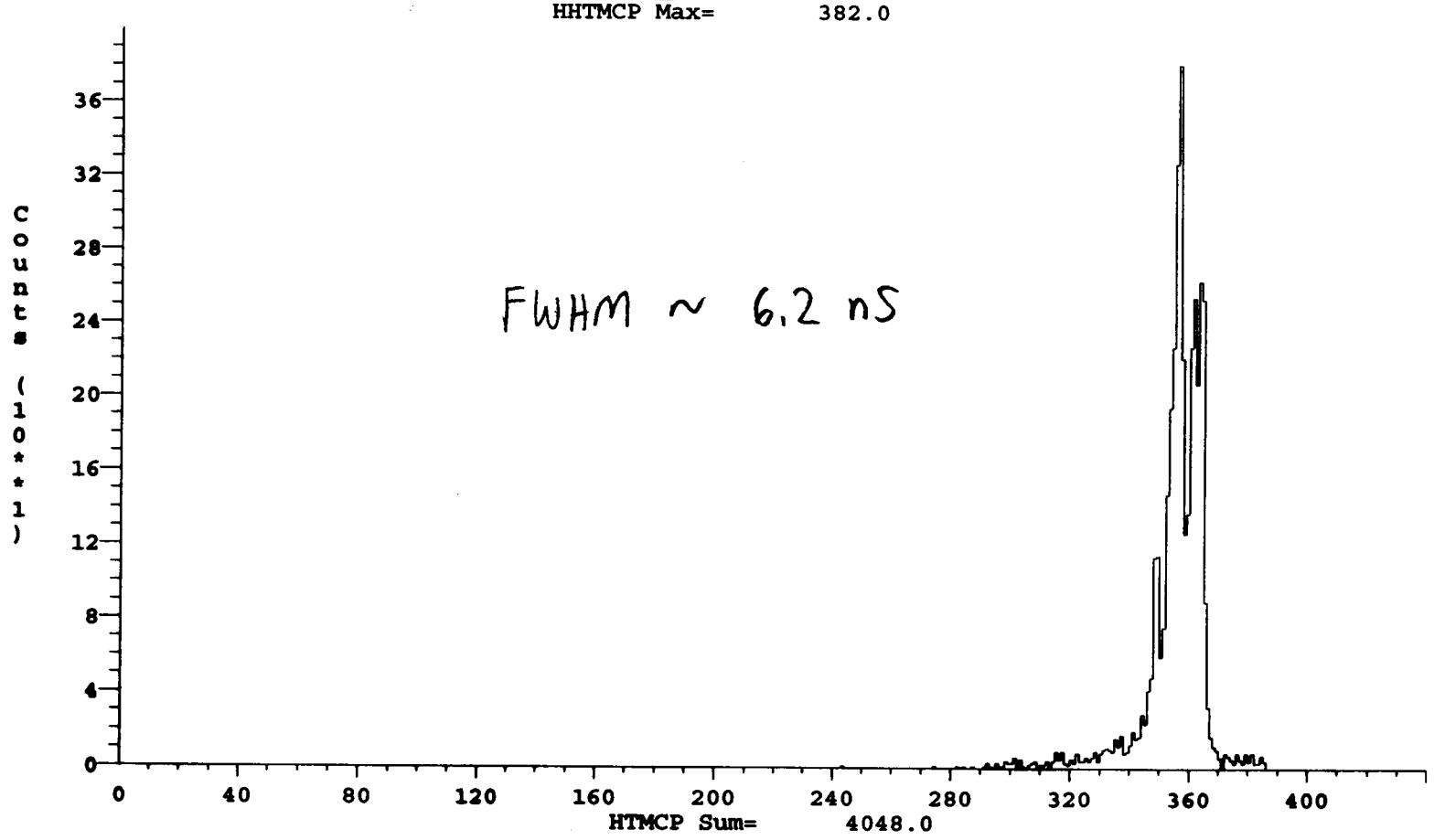
The Microchannel Plate Detector

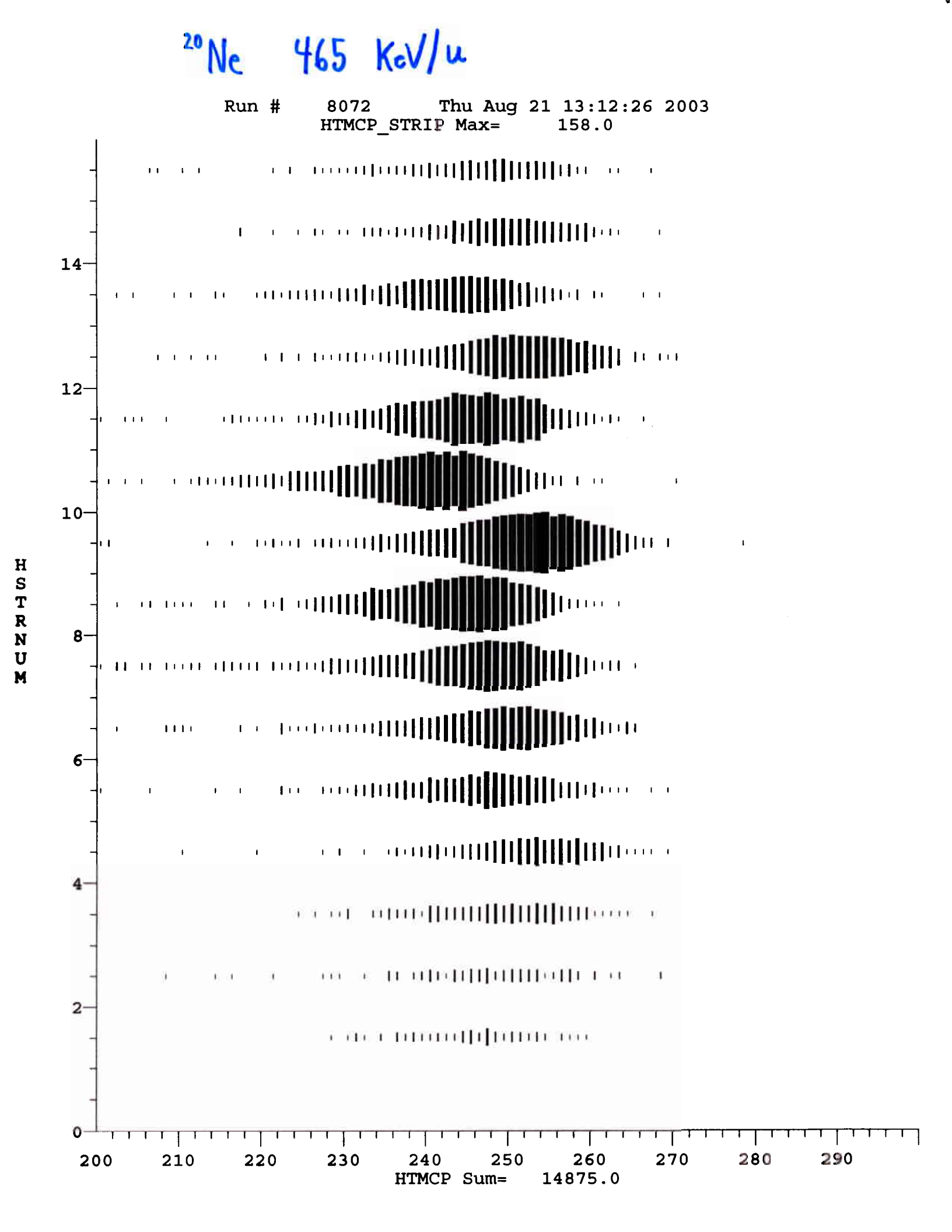
Detector Schematic:

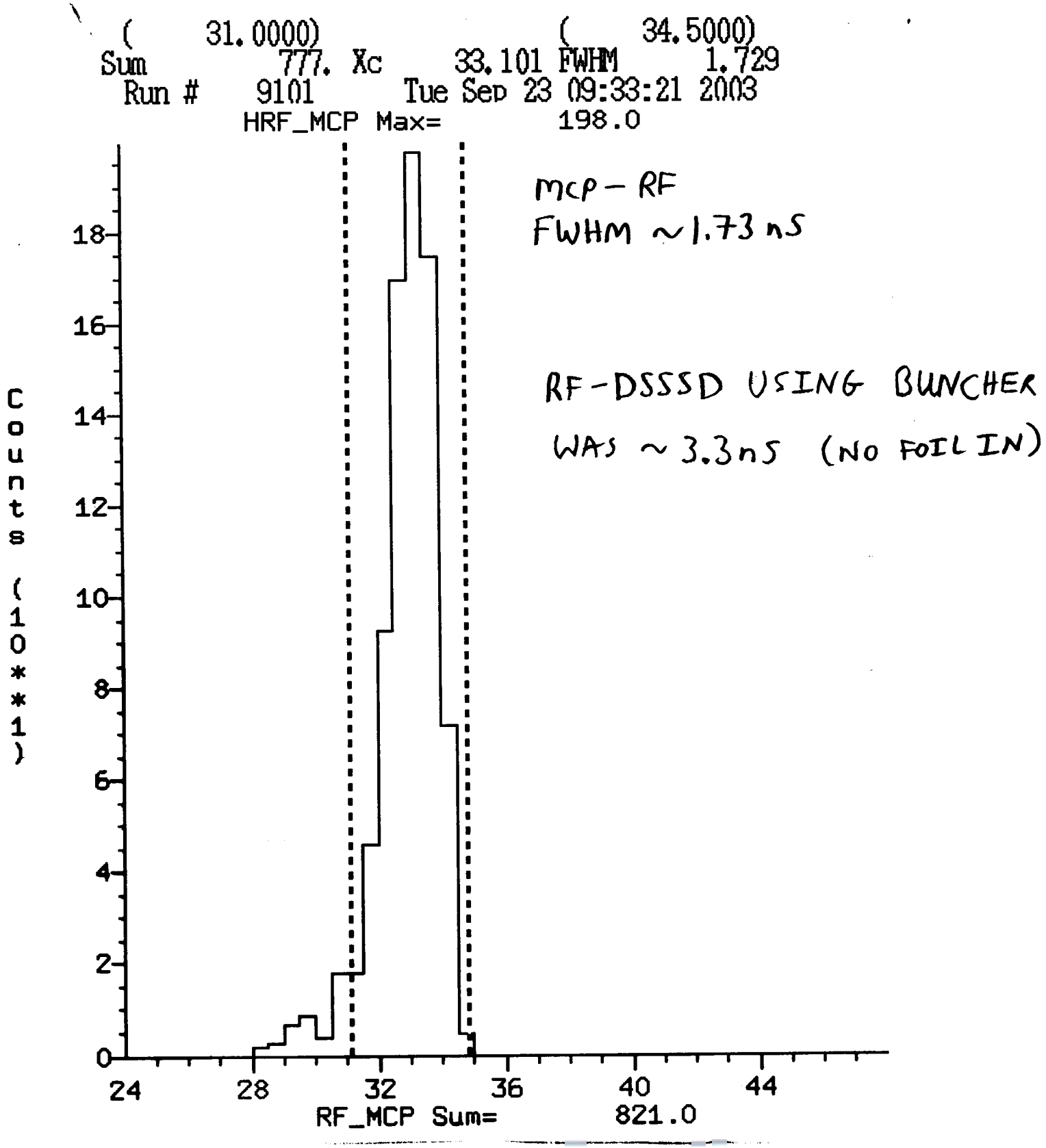



Run # 8052 Tue Aug 19 09:14:45 2003
HTRF_DSSSD Max= 314.0
Counts (10**1)
0
4
8
12
16
20
24
28
0
25
50
75
100
125
150
175
200
225
HTRF_NS Sum= 4408.0
HHTMCP Max= 382.0
FWHM ~ 6nS


Counts (10**1)
0
4
8
12
16
20
24
28
32
36
0
40
80
120
160
200
240
280
320
360
400
HTMCP Sum= 4048.0
FWHM ~ 6.2 nS

^{20}Ne 465 KeV/u




(31.0000) (34.5000)
Sum 777. Xc 33.101 FWHM 1.729
Run # 9101 Tue Sep 23 09:33:21 2003
HRF_MCP Max= 198.0
mcp – RF
FWHM ~1.73 nS
RF-DSSSD USING BUNCHER
WAS ~3.3nS (NO FOIL IN)
Counts (10**1)
0
2
4
6
8
10
12
14
16
18
24
28
32
36
40
44
RF_MCP Sum= 821.0

MCP Efficiency

Geometrical

→ Done using ^{148}Gd α's

→ MCP was moved around slightly

$$\frac{\text{Counts with mcp in}}{\text{Counts with mcp out}} \approx 93.0 \pm 0.6\ \% \quad \left(\frac{\text{counts}}{\text{in DSSSD}}\right)$$

→ Geometry of mcp

- ie wire thickness plus angle of mirror

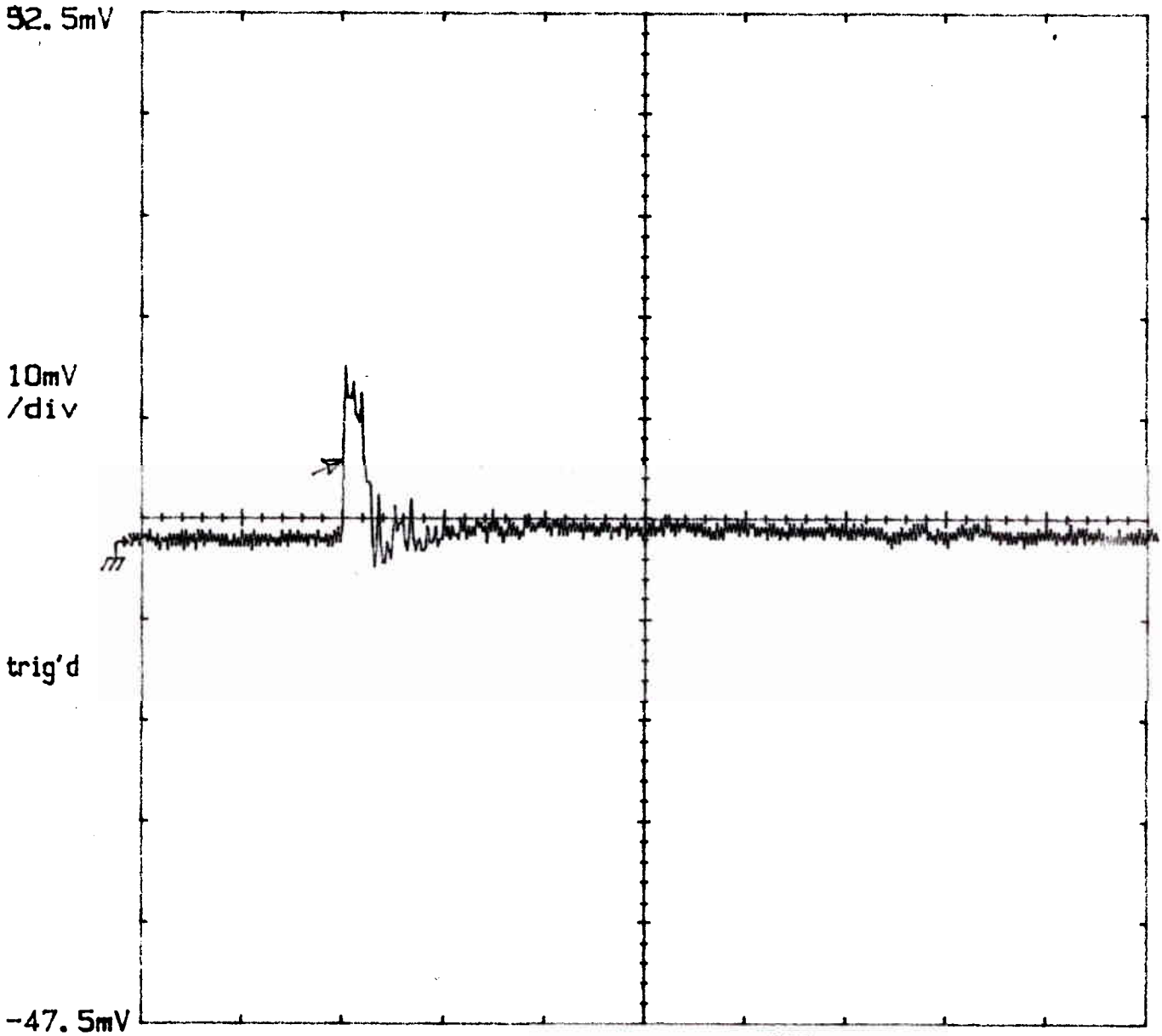
⇒ eff 92.6%

→ Meaning?

There is a ~~7%~~ chance that a beam or recoil particle will hit the Voltage mirror wires and not make it to the DSSSD.

NOTE: Not total efficiency only geometrical.

DSA 602 DIGITIZING SIGNAL ANALYZER
date: 19-SEP-03 time: 15:07:44



Peak-Peak	Rise	Width	Measurements	Statistics	Rem
20.00 mV	816.8 ps	4.983 ns		Comp & Def continuous	Wfm 2 L1 Main
			Horizontal Magnify 1 x	Pan/ Zoom On	Horizontal Pos Gr 0 pts

Mass resolving power of mcp/DSSSD

Can show that:

$$m = \frac{2Et^2}{d^2}$$

Using non relativistic eqn's

$E = \frac{1}{2}mv^2$, $t = \frac{d}{v}$

$$(\delta m)^2 = \left(\frac{\partial m}{\partial E}\right)^2(\delta E)^2 + \left(\frac{\partial m}{\partial t}\right)^2(\delta t)^2 + \left(\frac{\partial m}{\partial d}\right)^2(\delta d)^2$$

neglect this term for now

- $\Delta t \sim 2$ ns
- $d \sim 0.75$ m
- t found using SRIM. ie E loss in 220 mg/cm² Al foil

$$t = \frac{d}{c}\sqrt{\frac{m}{2E}}$$

- δE from DSSSD measurement

$$\delta m = \sqrt{8.02 \times 10^{-28} + 7.17 \times 10^{-29}} \cdot c^2$$

$$= 2660 \text{ MeV}$$

- But ΔE poor due to : foil, fried DSSSD

- if δm only due to δt term then

$$\delta m \sim 760 \text{ MeV}$$

also note $\delta m \propto \Delta t$