

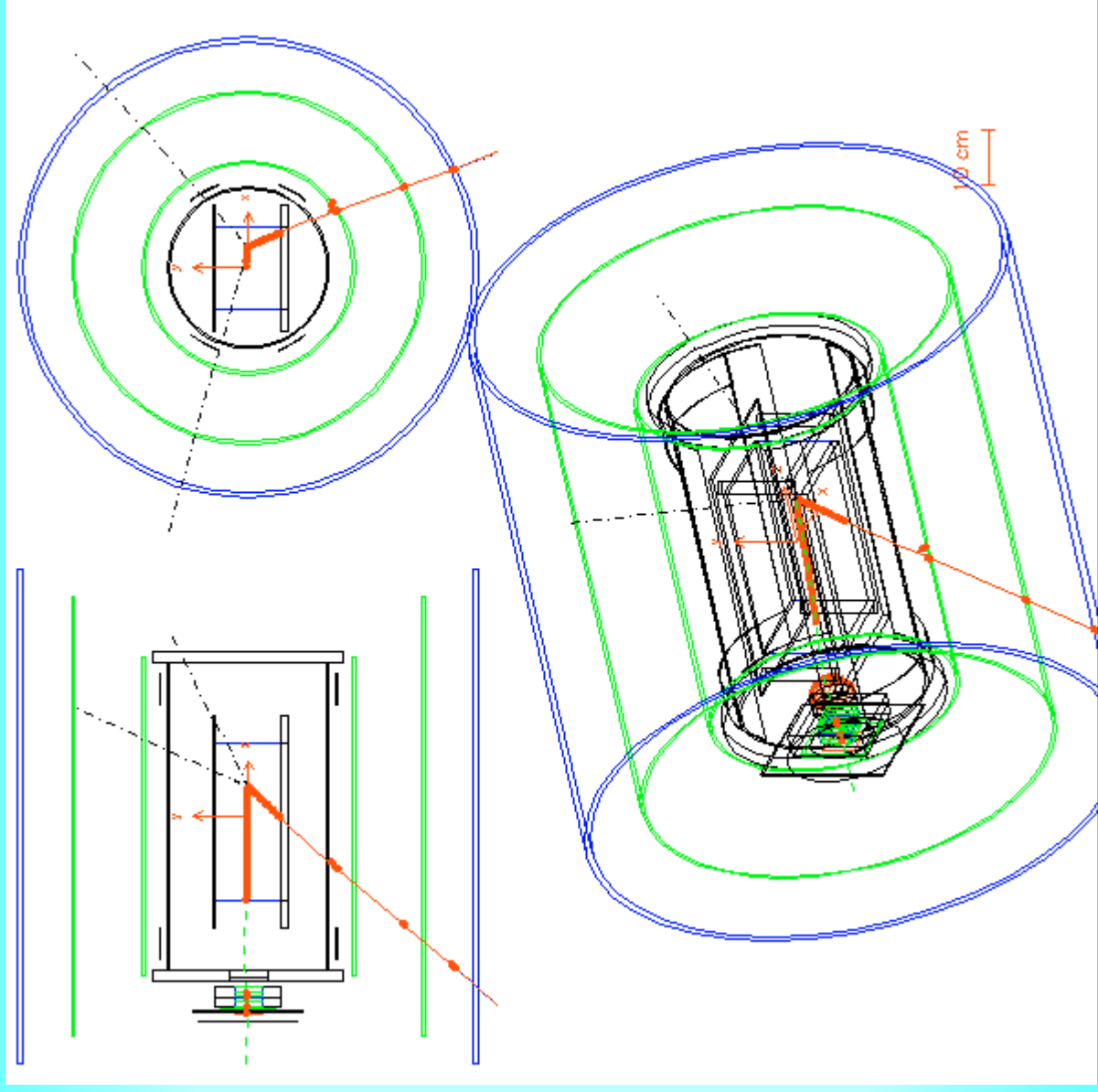
GMU-GMUD-GMID

A GEANT based

Monte Carlo

for MuCAP

View of Detectors in GEANT with tracked particles



GMU

GEANT 3 Version with full
detector geometry and tracking

GMUD

Will create MuCAP specific detector
properties

GMID

Generates absolute times, time
mixing and creates a MIDAS data file

present version available in CVS repository at
<http://kaon.physics.berkeley.edu/cgi-bin/viewcvs.cgi/mc>
uses run8 wiring map and odb

Repository - directory - mucap: mc - Mozilla

File

Edit

View

Go

Bookmarks

Tools

Window

Help

Back

Forward

Home

Bookmarks

Google

Standard

UC Berkeley

muLan

muCap Berkeley

muCap

Library Journals

Weak0

http://haon.physics.berkeley.edu/cgi-bin/viewcvs.cgi/muc/

mucap/

mc

mucap: mc

Current directory: [\[mucap\]/mc](#)

Files shown: 0

File

check0/

check1/

gmid/

gmu/

gmud/

Rev.

Age

Author

Last log entry

Show files using tag:

Select Branch

[Download tarball](#)

[CVS Admin](#)

Powered by [ViewCVS 1.0-dev](#)

[ViewCVS and CVS Help](#)

check0: analysis program / check for data.xxx file - gmu output

check1: analysis program / check for data_out.xxx file - gmud output

start

muLan-mucap_May_2...

Microsoft PowerPoint ...

pon.physics.berkeley...

Repository - director...

12:19 PM

in order to run

gmu:

change the ~/gmu/ini or init file to the personal directory settings

gmud:

change the directory settings in parameters.h

gmid:

needs a MIDAS installation and access to the run8 ODB as defined in the MIDAS path

Explore2fs

File Edit View Help

gmu

All Folders

ssh

thumbnails

wine

xice4

xine

analysis

Desktop

eigene.sache

etc

g2

GNUstep

magnet

mail

mc

check0

check1

CVS

gmid

gmu

raw

CVS

sc

gmid

mezo

midas

midas-cvs

mu

mucap

mulan

musun

mulin

npdg

office

revtex4

simulation

temp

text

tmp

www

initrd

lib

lost-found

nan

mnt

none

opt

proc

root

sbin

share

sys

tmp

usr

var

Contents of gmu

Name

400_geant.root

caen.viring

comp_anode_to_viring_map

comp_strip_to_viring_map

esc_par_to_viring_1.1.~

esc_par_to_viring1

esc_par_to_viring_map

esc_par_to_viring_old

gmu

gmu.in

gmu.in_1.6.~

h

init

init_1.1.~

last.kunac

last.kunacold

pav.metafile

runbook_mc.txt

runbook_mc.txt~

t.kunac

t.kunac_1.1.~

tdc400_mc_to_viring_map

test.1

Contents of gmu

Name

400_geant.root

caen.viring

comp_anode_to_viring_map

comp_strip_to_viring_map

esc_par_to_viring_1.1.~

esc_par_to_viring1

esc_par_to_viring_map

esc_par_to_viring_old

gmu

gmu.in

gmu.in_1.6.~

h

init

init_1.1.~

last.kunac

last.kunacold

pav.metafile

runbook_mc.txt

runbook_mc.txt~

t.kunac

t.kunac_1.1.~

tdc400_mc_to_viring_map

test.1

25 objects

10627379 bytes

gmu.in

```
LIST      1000
TRIG      1 2      10000
DEBU      1 2      10000
CUTS      0.000100 0.000100 0.0001 0.0001 0.000100 0.000100
          0.000100 0.000100 0.01 10000. 0.
HADR      1
LOSS      1
DRAY      1
MUNU      1
COMP      1
PAIR      1
BREM      1
ANNI      1
AUTO      0
PHOT      1
C--> run 1=formatted iswit (3)=(b1=1:nowall,b2=1:noframe,b3=1:nomag)
SWIT      400 1 0 0 0 0 0 0 0
C-->      ipart=ipart+100 p,x,y random
C KINE:    ipart  p      dp/p      r      z      sigmax      sigmay      divX      divY
KINE      106 0.0325 0.02 0.02 0.74 -45. 0.25 0.35 5. 15.
C MATE     21
BINS      20 IN Z 20 IN R
TIME      2=10.
END
STOP
```

switches for various GEANT processes

run-number

particle ID 105 = mu+ 106 = mu-

beam parameters p=momentum/dp=spread
z beam origin
sigmax/y = spread of origin
div x/y divergence mrad

how to run gmu:

```
source ini(t)
gmu
> trig 100 (creates 100 events)
> exit
```

saves those events in histograms test.1
and in the data.run# file

histograms are in hbook format
therefore

```
h2root test.1 run.root
```

in gmu

```
>t#ev displays the geometry and shows events
>dtree display all modules inside the GEANT geometry
```

how to run gmud

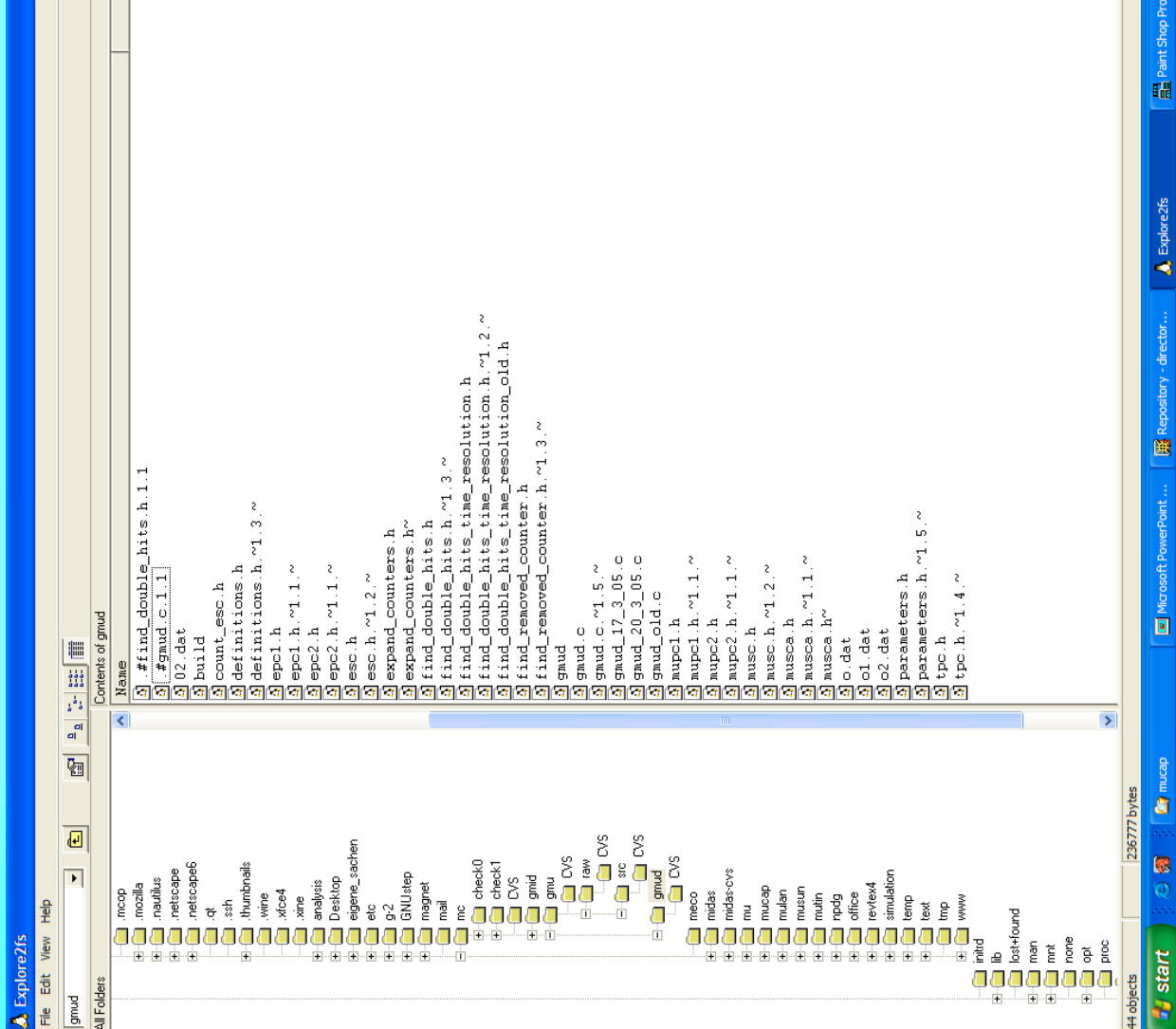
cd gmud:

gmud run#

reads ~/mc/gmu/raw/data.#
and writes ~/mc/gmu/raw/data_out.#

gmud

```
build
count_esc.h
definitions.h
definitions.h ~1.3.~
epc1.h
epc1.h ~1.1.~
epc2.h
epc2.h ~1.1.~
esc.h
esc.h ~1.2.~
expand_counters.h
expand_counters.h~
find_double_hits.h
find_double_hits.h ~1.3.~
find_double_hits_time_resolution.h
find_double_hits_time_resolution.h ~1.2.~
find_double_hits_time_resolution_old.h
find_removed_counter.h
find_removed_counter.h ~1.3.~
gaud
gaud.c
gaud.c ~1.5.~
gaud_17_3_05.c
gaud_20_3_05.c
gaud_old.c
aupc1.h
aupc1.h ~1.1.~
aupc2.h
aupc2.h ~1.1.~
ausc.h
ausc.h ~1.2.~
ausca.h
ausca.h ~1.1.~
ausca.h~
o.dat
ol.dat
o2.dat
parameters.h
parameters.h ~1.5.~
tpc.h
tpc.h ~1.4.~
```



how to run gmid
needs midas installation and Run8 ODB

cd gmid:

gmid ~/path/data_out.run# ~/path/filename.mid

reads ~/path/data_out.#
and writes ~/path/filename.mid

Timing: (on my Laptop / Pentrium4 1.2 GHz / 256 RAM)

300 k start mu -> 150 k stopped mu

gmu ~ 4 hours

gmud ~ 30 min

gmid ~ 10 min

present status:

runs ok with Tom's analysis program

gmud does not have much detector specifics yet.

comparing histograms shows still a slight problem in the absolute location/rotation? of the e-detectors displayed in the coinc_impact parameters?

(move along Z then rotate)

A result of this meeting should be:

What do we want to add ?

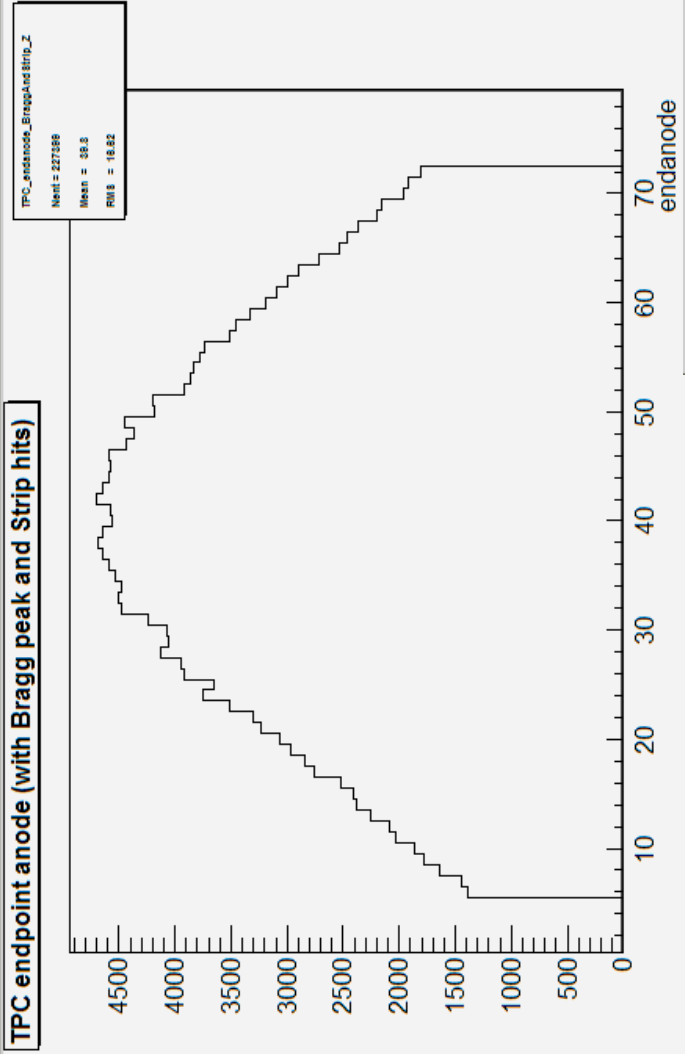
- muon capture with neutron emission
presently $\mu^+ = \mu^-$ lifetime

- μ^- diffusion
- afterpulsing
- detector dead-times

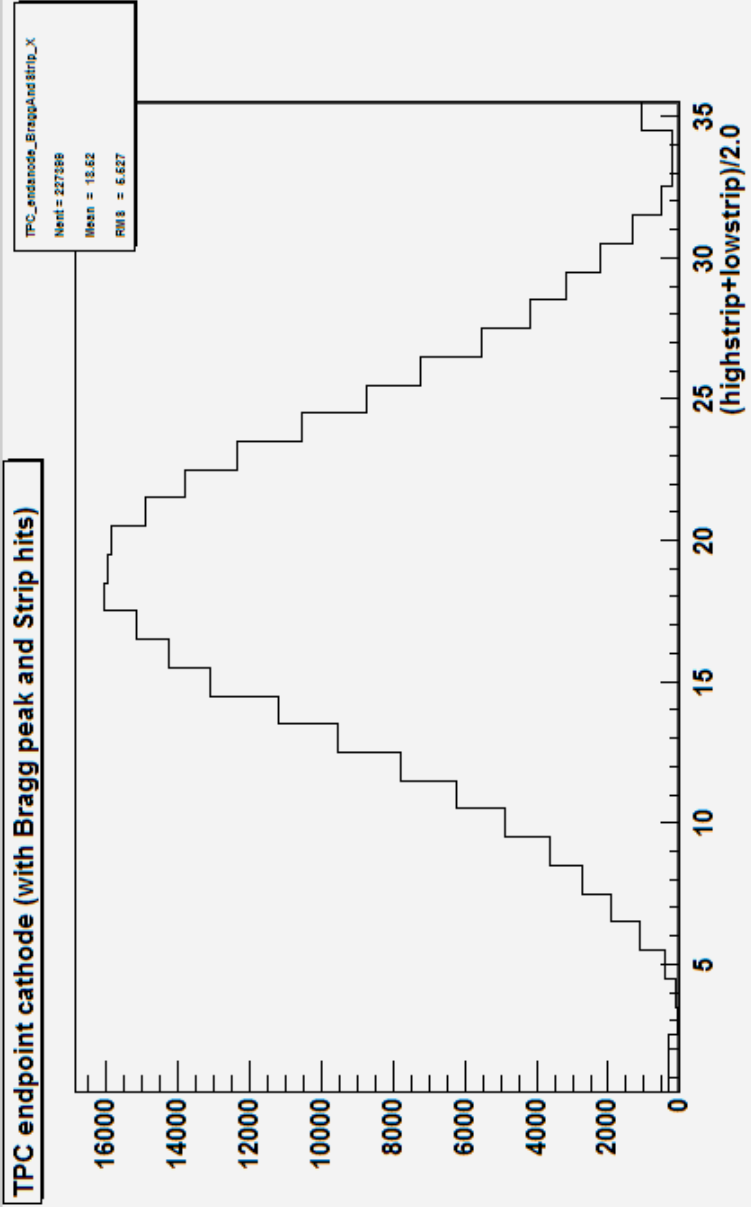
- pile-up

Suggestion for specific studies: ?
Production of 10^7 events.

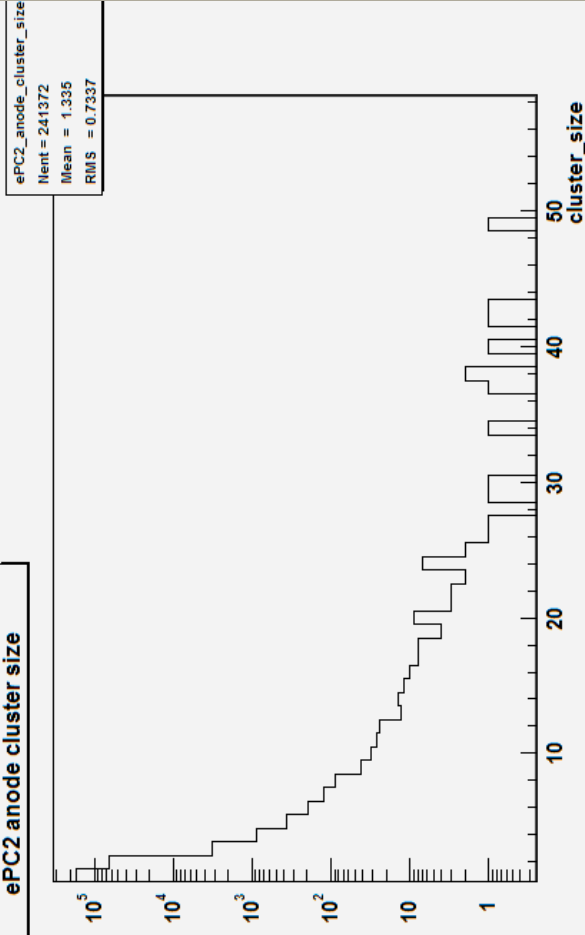
TPC endpoint anode (with Bragg peak and Strip hits)



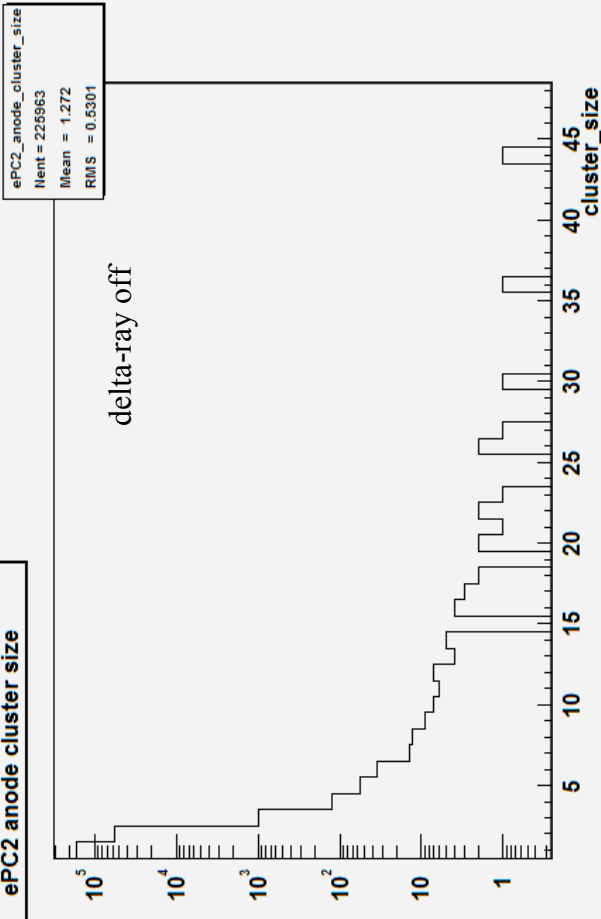
TPC endpoint cathode (with Bragg peak and Strip hits)



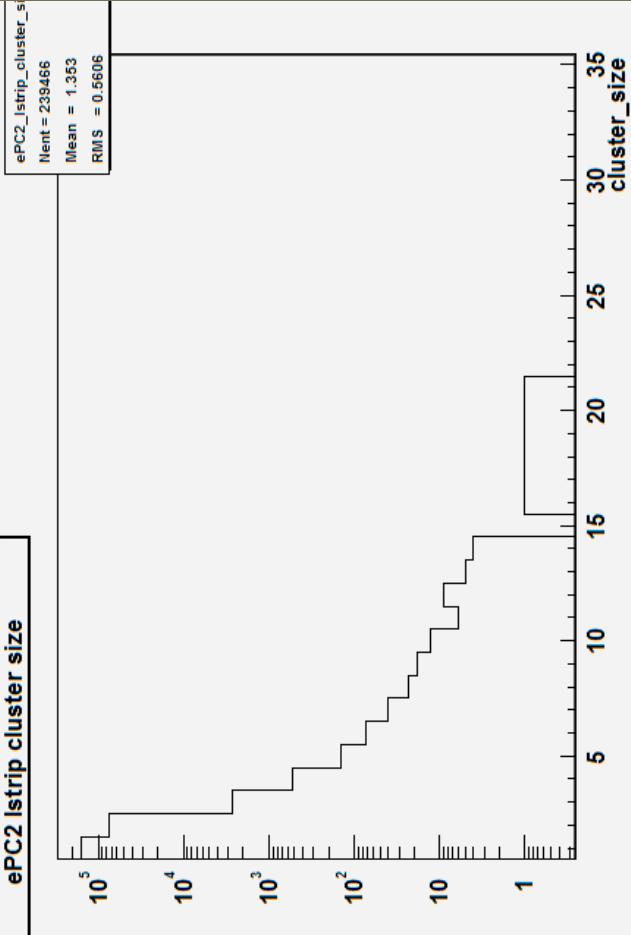
ePC2 anode cluster size



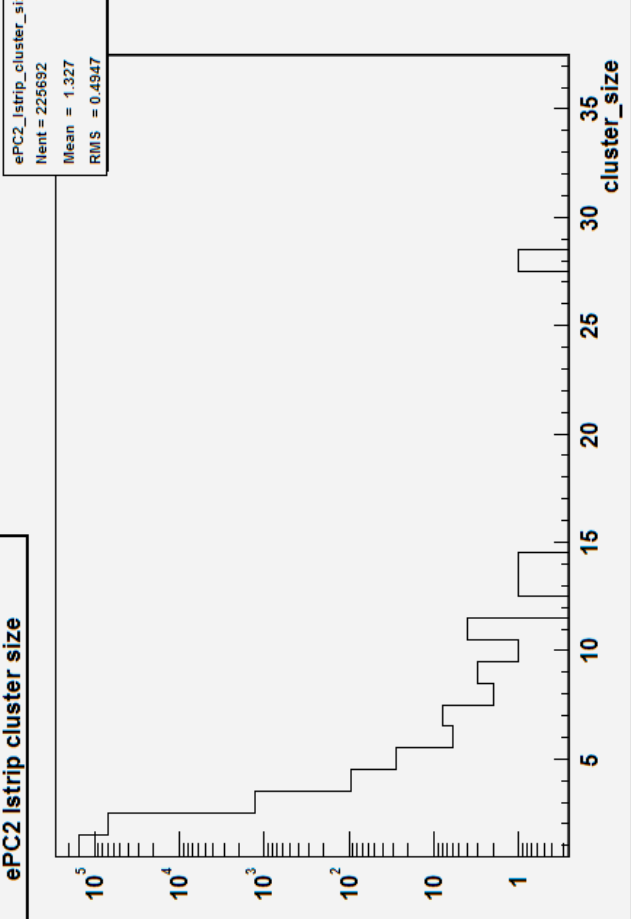
ePC2 anode cluster size



ePC2 lstrip cluster size



ePC2 lstrip cluster size



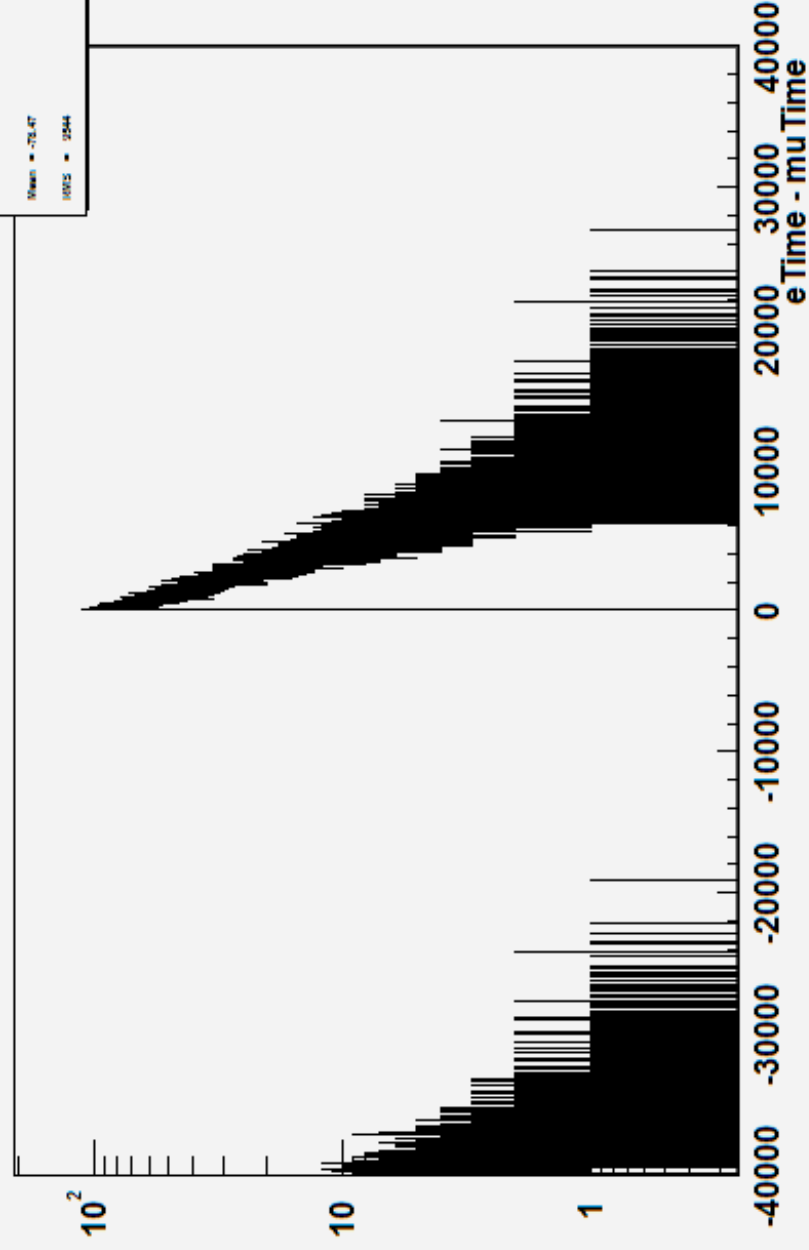
Lifetime: $\mu\text{SC}/\mu\text{PC1}/\text{TPC}/\text{ePC1}/\text{ePC2}/\text{eSC}$, 25 μsPP

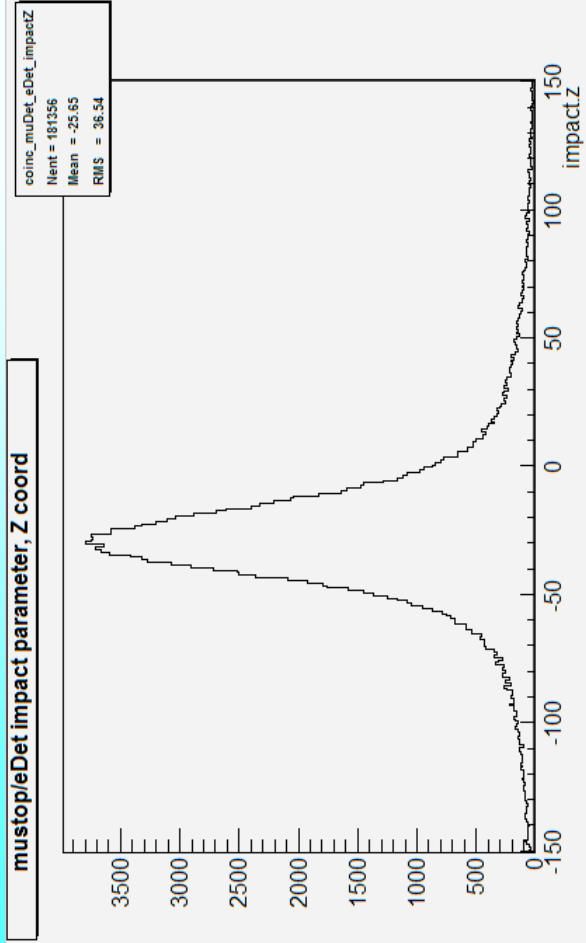
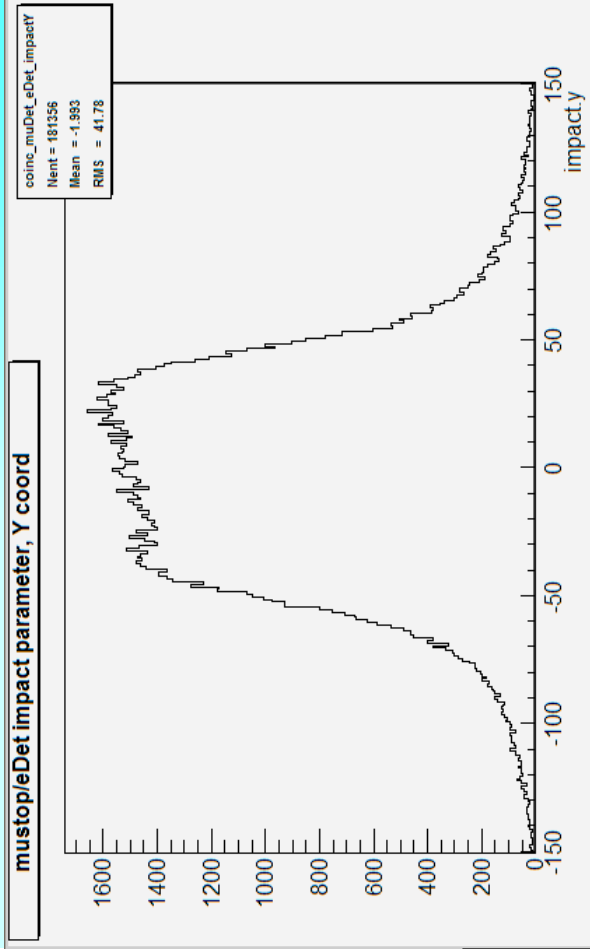
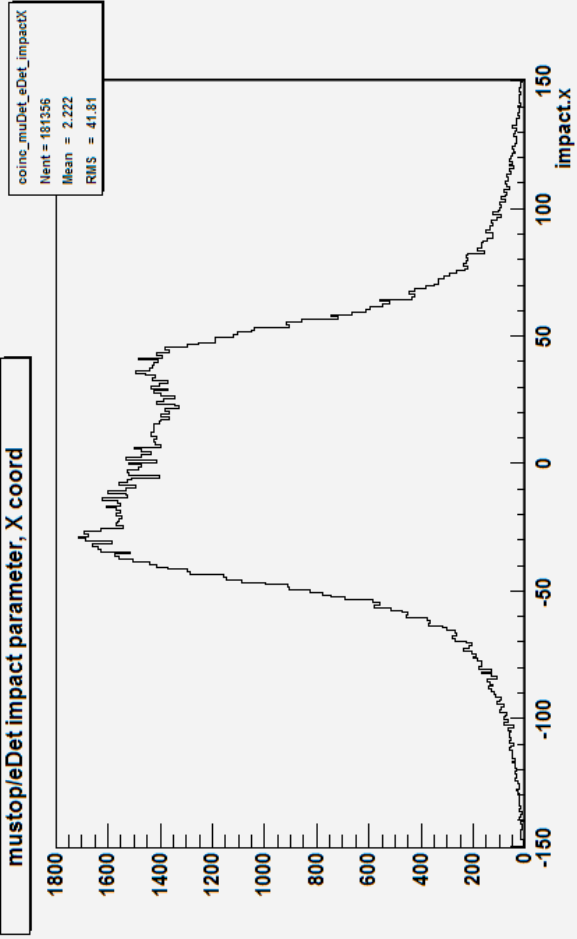
File: ms30muV11/PC1/TPC/SC/25V.V

Mean = 15723

Stdev = 75.47

100% = 15844





GMU output file

```
102. 1. 0.000133334106 0.00197528116 0.0336118937 -4.73958731 -3.71567488
0.0219486021 -0.0343704596 -0.0268877968 0.00809834246 -4.73958731
-3.71567488 0.0219486021 -0.0113953957 -0.0130531611 -0.00329832174 1. 0.
0.
731111115010
5001 5311 20 36.960 0.014473 6
5001 5310 20 37.529 0.014508 6
5002 5310 20 37.684 0.029586 6
5002 5310 19 38.190 0.011700 6
5003 5310 19 38.415 0.020775 6
5004 5310 19 39.154 0.020193 6
5005 5310 19 39.897 0.019404 6
5006 5310 19 40.644 0.021476 6
5007 5310 19 41.397 0.025859 6
5042 5302 6 28822.592 0.000428 3
5042 5302 5 28822.635 0.000954 3
5042 5302 4 28822.744 0.000098 3
5042 5301 4 28822.768 0.000576 3
5042 5301 3 28822.855 0.000509 3
5042 5301 3 28822.941 0.000149 3
5042 5301 2 28822.965 0.000695 3
5042 5301 1 28823.074 0.000513 3
4005 0 0 5.993 0.030439 6
4061 0 0 8.140 0.031737 6
4109 0 0 22.106 0.026363 6
4161 0 0 23.131 0.023719 6
317 772 1025 28826.344 0.000600 3
2640 3240 3659 28830.711 0.000544 3
7011 0 46 28833.930 0.397097 3
7051 0 46 28833.988 0.458766 3
7051 0 46 28834.000 0.285826 3
7011 0 46 28834.000 0.441590 3
7011 0 46 28833.936 0.222539 3
6001 0 0 1.057 0.669112 6
```

GMUD output file

```
102 1 0.000133 0.001975 0.033612 -4.739587 -3.715675 0.021949 -0.034370 -0.026888
0.008098 -4.739587 -3.715675 0.021949 -0.011395 -0.013053 -0.003298 1.000000 0.000000
70
6001 0.105700 0 0.105700 0.669112 6
4005 0.599300 0 0.599300 0.030439 6
4061 0.814000 0 0.814000 0.031737 6
4109 2.210600 0 2.210600 0.026363 6
4161 2.313100 0 2.313100 0.023719 6
317 2882.634400 0 2882.634400 0.000600 3
772 2882.634400 0 2882.634400 0.000600 3
1025 2882.634400 0 2882.634400 0.000600 3
2640 2883.071100 0 2883.071100 0.000544 3
3240 2883.071100 0 2883.071100 0.000544 3
3659 2883.071100 0 2883.071100 0.000544 3
7011 2883.395533 0 2883.395533 1.061226 3
7031 2883.395533 0 2883.395533 1.061226 3
7051 2883.399400 0 2883.399400 0.744592 3
7071 2883.399400 0 2883.399400 0.744592 3
5001 7670.391193 0 3.724450 0.028981 6
5002 7670.460443 0 3.793700 0.041286 6
5003 7287.174906 0 3.841500 0.020775 6
5004 7287.248806 0 3.915400 0.020193 6
5005 7287.323106 0 3.989700 0.019404 6
5006 7287.397806 0 4.064400 0.021476 6
5007 7287.473106 0 4.139700 0.025859 6
5008 7287.559006 0 4.225600 0.039675 6
5009 6904.292869 0 4.292800 0.021226 6

5306 7615.595097 0 2882.195050 0.000887 3
5305 6826.713489 1 2882.213450 0.001208 3
5304 6432.284460 1 2882.234425 0.000985 3
5303 5643.398061 0 2882.248033 0.001132 3
5302 5248.967899 1 2882.267875 0.001480 3
5301 4065.643720 1 2882.293708 0.002442 3
end_of_event
```