

# Lab 2 # Cosmic Rays <sup>9/25</sup>

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- Setup stage:

- objectives:

1.)

- Set 10mV for threshold

- measure individual thresholds

- 2.)
- measure each PMT's count.
  - Random  $\frac{1}{3}$  true

3.)  $\chi^2$  dist of  
mean count rates

4.) Calibrate the  $\tau_{ec}$   
Preas PP  $\rightarrow$  delay  
and full range

- Count rate collection :
- $t = 20 \text{ sec}$
- 10 - 20 data points

- 2 PMT  $\leftrightarrow$  all 4 sides
- screw rotate threshold  
10-20 times

•  $N \rightarrow$  counts

$\dot{N} \rightarrow$  count rate

$V_{TH} \rightarrow$  volts threshold

• PMT: Bar#1 Left :

• Trial # |  
 $N = 227,753$   
 $\dot{N} = 11,387.65$   
 $V_{TH} = 70.8$

- Trial #2

$$V_{Th} = 75.4$$

$$n = 20,679$$

$$\dot{n} = 1,033.95$$

- Trial #3

$$V_{Th} = 80.2$$

$$n = 20,030$$

$$\dot{n} = 1001.5$$

- Trial #5

$$V_{Th} = 85.8$$

$$n = 19,302$$

$$\dot{n} = 965.1$$

• Trial # 6

$$V_{Th} = 90.1$$

$$n = 20,092$$

$$\dot{n} = 1004.6$$

• Trial # 7

$$V_{Th} = 97.5$$

$$n = 19,486$$

$$\dot{n} = 974.3$$

• Trial # 8

$$V_{Th} = 102.7$$

$$n = 19,790$$

$$\dot{n} = 989.5$$

• Trial # 9

$$V_{th} = 108.1$$

$$n = 21,197$$

$$\dot{n} = 1059.88$$

• Trial # 10

$$V_{th} = 111.7$$

$$n = 19854$$

$$\dot{n} = 992.7$$

• Trial # 11

$$V_{th} = 152.2$$

$$n = 18317$$

$$\dot{n} = 915.85$$

• Trial # 12

$$V_{th} = 201.7$$

$$n = 15848$$

$$\hat{n} = 792.4$$

• Trial # 13

$$V_{Th} = 161.9$$

$$n = 17,990$$

$$\hat{n} = 899.5$$

• Trial # 14

$$V_{Th} = 170$$

$$n = 17390$$

$$\hat{n} = 869.5$$

• Trial # 15

$$V_{Th} = 181.5$$

$$n = 17,621$$

$$\bar{n} = 881.05$$

• Trial # 16

$$V_{Th} = 190.1$$

$$n = 17,399$$

$$\bar{n} = 869.96$$

• Trial # 17

$$V_{Th} = 40.3$$

$$n = 386,887$$

$$\bar{n} = 19,344.35$$

• Trial # 18

$$V_{Th} = 45.6$$

$$n = 56,657$$



$$\bar{n} = 2,832.85$$

• Trial # 19 :

$$V = 50.2$$

$$n = 27,569$$

$$\bar{n} = 1378.45$$

• Trial # 20 :

$$V = 57.2$$

$$n = 26479$$

$$\bar{n} = 1323.95$$

• Trial # 21 :

$$V = 64.7$$

$$n = 21823$$

$$\bar{n} = 1091.15$$

• Trial # 22:

$$V = 71.8$$

$$n = 23969$$

$$\bar{n} = 1,198.45$$

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Day # 2 :

9/30

Cosmics

Bar #1 Right :

- $V = 50 - 100 \text{ V}$   
(every 10V)
- $t = 20 \text{ sec}$

Trials:       $n$  :       $V$  :

1.)

12,453

51.4V

2.)

13,307

60.4V

3.) 12,400 69.8V

4.) 11,014 81.4V

5.) 11,097 90.2V

6.) 9,562 100.1V

•  $V = (100 - 150V)$   
(every 10V)

7.) 8,238 110.6V

8.) 7,441 120.1V

9.) 6,374 130.5V

10.) 5,624 139.1V

11.) 4,880 150.8V

•  $V = (0 - 4.5 \text{ V})$  (avg)  
10V

12.) 466 0.3V

13.) 306,259 20V

14.) 62,981 30.5V

15.) 41,034 41.0V

16.) 17,676 49.8V

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Bar #2  
Data Day 3

10/2

$$\bullet t = 20 \text{ sec}$$

Bar 2  
left

Trials

$$\begin{matrix} (50 - 100) & (110 - 160) \\ (20 - 50) & \end{matrix}$$

$$V_1 = 50.2$$

$$u_1 = 11252$$


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$$V_2 = 58.6$$

$$u_2 = 11284$$


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$$V_3 = 69.5$$

$$u_3 = 10983$$


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$$V_4 = 81.8$$

$$u_4 = 11171$$


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$$V_5 = 91.5$$

$$u_5 = 11951$$


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$$V_6 = 99.2$$

mv

$$u_6 = 10516$$

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$$v_7 = 111.3$$

$$u_7 = 10660$$

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$$v_8 = 120.5$$

$$u_8 = 10690$$

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$$v_9 = 132.6$$

$$u_9 = 10724$$

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$$v_{10} = 140.2$$

$$u_{10} = 10814$$

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$$v_{11} = 149.99$$

$$u_{11} = 10255$$

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$$v_{12} = 171.8$$

$$u_{12} = 10067$$

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$$v_{13} = 199.1$$



$$n_{13} = 9644$$

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$$V_{14} = 230.2$$

$$n_{14} = 9288$$

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$$V_{15} = 298.9$$

$$n_{15} = 6579$$

(20-50)  
↓

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$$V_{16} = 22.1$$

$$n_{16} = 12414$$

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$$V_{17} = 31.3$$

$$n_{17} = 13082$$

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$$V_{18} = 40.1$$

$$n_{18} = 12138$$

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• Bar #2 Right; (50-100mV)  
(110-160mV)  
(20-50mV)

Trials

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∩

1.)

50.9

14744

2.)

58.1

13962

3.)

71.7

12150

4.)

81.9

12212

5.)

90.7

10323

6.)

100.9

9210

7.)

110.5

7756

8.)

121.4

6433

9.)

130.7

5579

10.)

141.6

4969

11.)

150.4

4612

12.)

20.8

18627

13.)

30.2

17420

14.)

40.0

15977