

# Noise in cosmic ray plastic scintillator detectors: ambient room light getting into the detectors and pmt dark rate noise obscure the muon signal

R. Armendariz  
Queensborough Community College (QCC)  
Dept. of Physics

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Pictures of Detectors

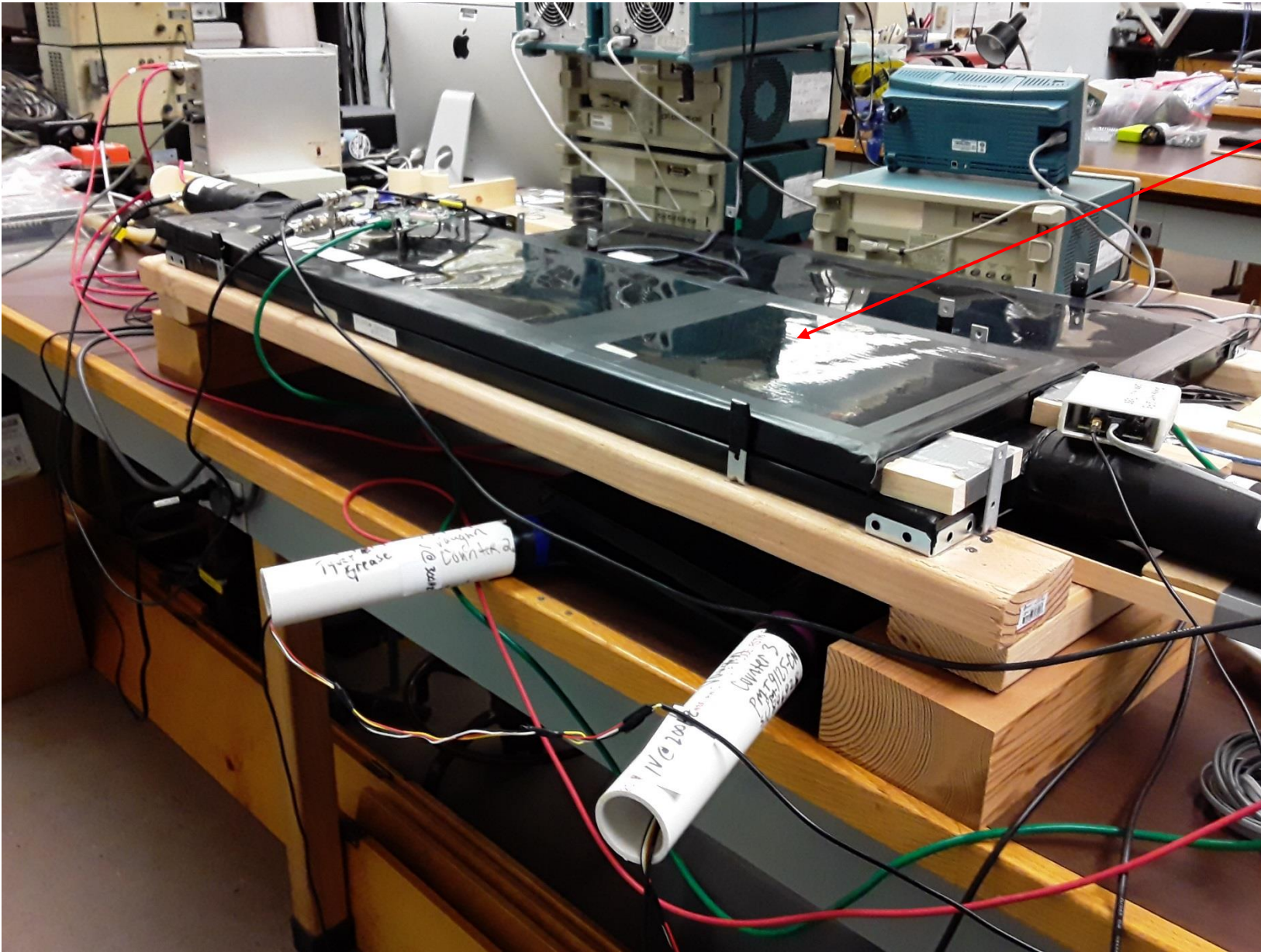


Fig 1: The CUNY counters are the two long counters stacked on top of the wooden frame. The Vaughn counters are much smaller and stacked underneath the wooden frame (the white PVC tubes house their PMTs)

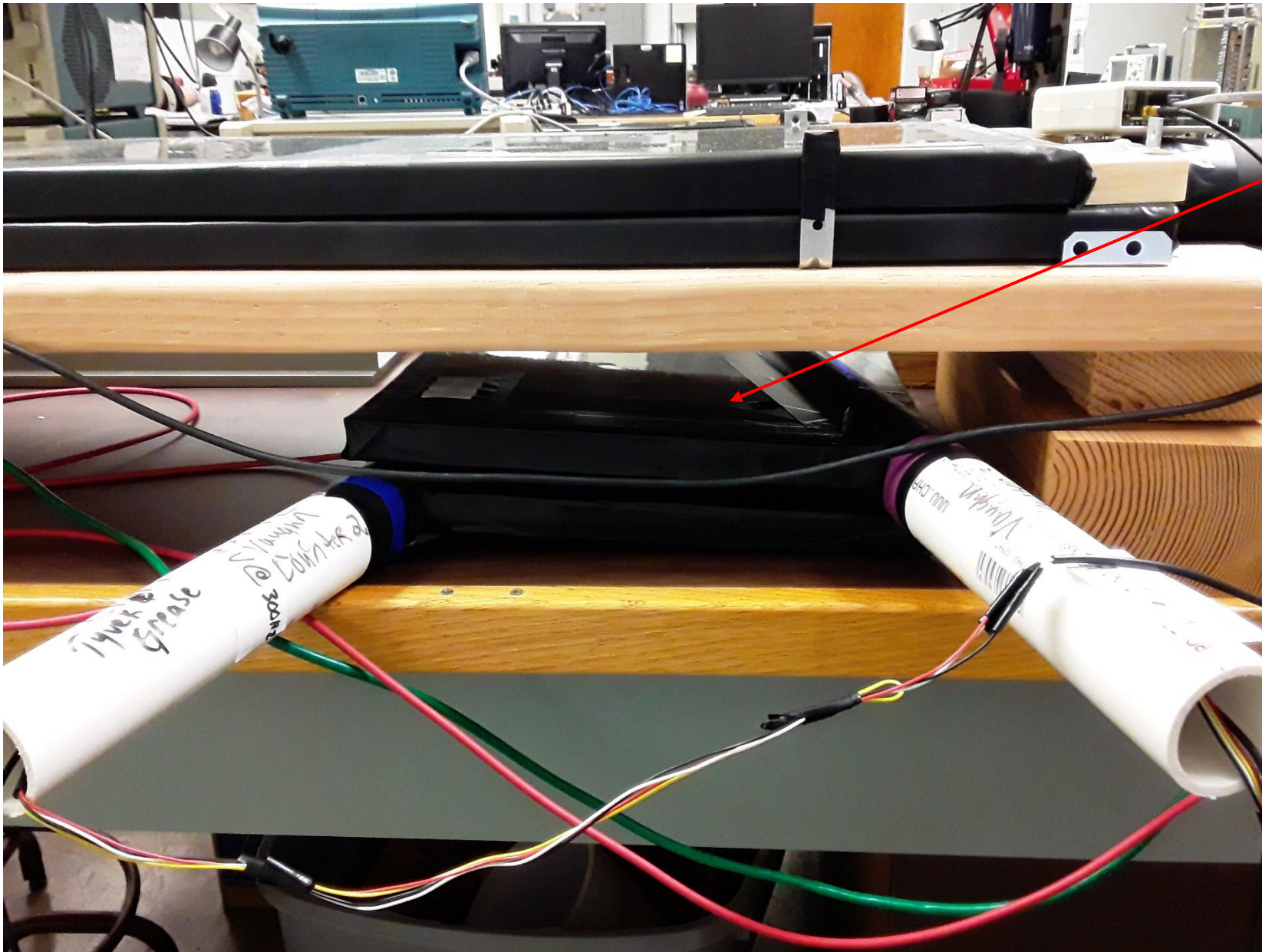


Fig 2: The Vaughn counters are the smaller ones stacked underneath the wooden frame.

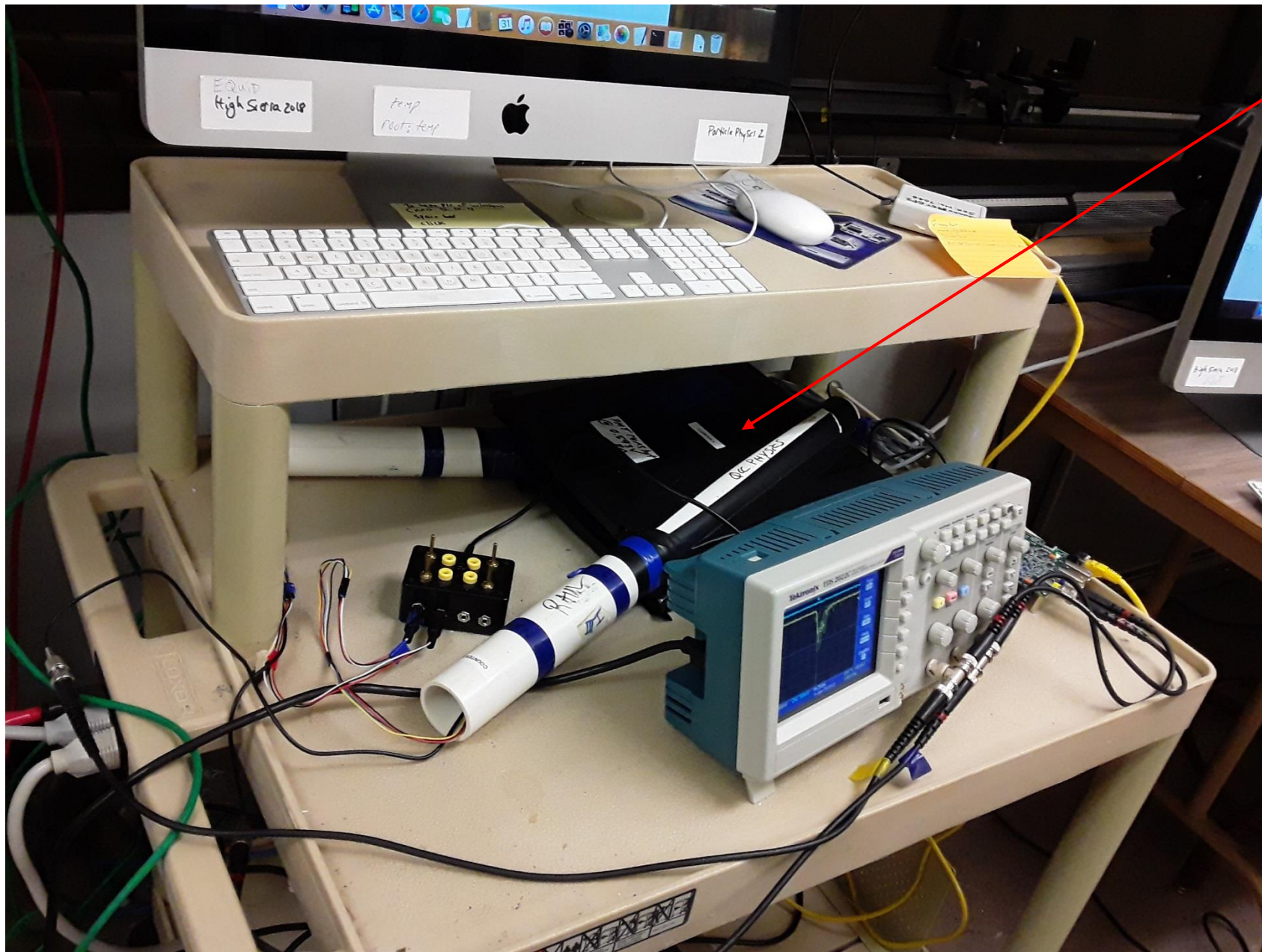


Fig 3: The Quarknet counters are stacked one on top of the other.

EQUIP - e-Lab Qn User Interface Purdue

Control Panel
TOT Monitor
Rate Monitor
Shower Monitor
Geometry

Log file:  Choose File

Serial port:

S/N:  Update Reset scalars(RB) Reset board(RE) GPS(DG)

Help: Page 1(H1) Page 2(H2) Barometer(HB) Status(HS)  
Trigger(HT) Setup(V1) Voltages(V2) GPS Lock(V3)

GPS status:  Sats used:  T=  deg C P=  hPa DAC=

Latitude:  Longitude:

Altitude:  Time:

Scalars(DS):

Control registers(DC):

Timing registers(DT):

Trigger  
 Ch. 1  Ch. 2  Ch. 3  Ch. 4 Coincidence level:   
 Gate width:  ns Pipeline delay:  ns

Threshold(TL):     mV

Status output:  time interval:  min

Data output: Enable(CE) Disable(CD)

Command:  Save(SA 1)

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09E92ED4 BB 00 3C 00 00 00 00 0980562D 185302.014 151099 A 07 0 +0057
09E92ED5 00 00 00 20 00 00 00 0980562D 185302.014 151099 A 07 0 +0057
09E92ED5 2D 2B 00 00 00 00 00 0980562D 185302.014 151099 A 07 0 +0057
09E92ED5 00 30 00 00 00 00 00 0980562D 185302.014 151099 A 07 0 +0057
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13611009 00 32 00 32 00 00 00 00 127127AD 185308.014 151099 A 06 0 +0056
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14AAC8B7 00 00 3E 00 00 00 00 00 13EE9FED 185309.006 151099 A 07 0 +0065
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16D05E86 39 00 00 3E 00 00 00 00 156C182D 185310.014 151099 A 06 0 +0056
16D05E87 00 22 00 00 00 00 00 00 156C182D 185310.014 151099 A 06 0 +0056

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Fig 17: CUNY detector setup:  
 2-fold coincidence  
 300 ns gate width  
 3 mV discriminator;  
 30 mV is shown here but  
 there is a x10 amp before the  
 discriminator on the DAQ  
 board

Control Panel TOT Monitor Rate Monitor Shower Monitor Geometry

Log file:  Serial port: S/N:     Help:       GPS status:  Sats used:  T=  deg C P=  hPa DAC= Latitude:  Longitude: Altitude:  Time: Scalars(DS):     Control registers(DC):    Timing registers(DT):    

Trigger

 Ch. 1  Ch. 2  Ch. 3  Ch. 4 Coincidence level: Gate width:  ns Pipeline delay:  nsThreshold(TL):     mVStatus output:  Data output:  Command:  

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404DA8CA 38 00 00 00 00 00 00 00 3FD2F8DB 184503.002 151099 A 08 0 +0060
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41A4F5AE 00 2C 00 00 00 00 00 00 4150711C 184504.010 151099 A 08 0 +0052
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41B1EB00 00 00 3B 00 00 00 00 00 4150711C 184504.010 151099 A 08 0 +0052

```

Fig 18: Vaugh detector setup:

2-fold coincidence

300 ns gate width

7 mV discriminator;  
70 mV is shown here but there is a x10 amp before the discriminator on the DAQ board

Log file:  Serial port: S/N:     Help:       GPS status:  Sats used:  T=  deg C P=  hPa DAC= Latitude:  Longitude: Altitude:  Time: Scalers(DS):     Control registers(DC):    Timing registers(DT):    

Trigger

 Ch. 1  Ch. 2  Ch. 3  Ch. 4 Coincidence level: Gate width:  ns Pipeline delay:  nsThreshold(TL):     mVStatus output:  time interval:  minData output:  Command:  

```

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9B9D6F59 00 20 00 00 00 00 00 00 9ADEEB30 185733.013 151099 V 01 0 +0039
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9BB7169D 24 00 00 00 00 00 00 00 9ADEEB30 185733.013 151099 V 01 0 +0039
9BB7169D 00 2A 00 00 00 00 00 00 9ADEEB30 185733.013 151099 V 01 0 +0039
9BB7169E 3E 00 00 00 00 00 00 00 9ADEEB30 185733.013 151099 V 01 0 +0039
9BB7169F 00 20 00 00 00 00 00 00 9ADEEB30 185733.013 151099 V 01 0 +0039
9BB716A3 80 00 3C 00 00 00 00 00 9ADEEB30 185733.013 151099 V 01 0 +0039
9BB716A4 00 00 00 22 00 00 00 00 9ADEEB30 185733.013 151099 V 01 0 +0039
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9BB716A4 00 00 00 31 00 00 00 00 9ADEEB30 185733.013 151099 V 01 0 +0039
9BB716A8 B6 00 00 00 00 00 00 00 9ADEEB30 185733.013 151099 V 01 0 +0039
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9BB716A8 00 00 36 00 00 00 00 00 9ADEEB30 185733.013 151099 V 01 0 +0039
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9BC3A829 00 00 00 24 00 00 00 00 9ADEEB30 185733.013 151099 V 01 0 +0039
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9BC4A810 00 00 23 00 00 00 00 00 9ADEEB30 185733.013 151099 V 01 0 +0039
9BC4A810 00 00 00 2F 00 00 00 00 9ADEEB30 185733.013 151099 V 01 0 +0039
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9BC4A810 00 00 00 3C 00 00 00 00 9ADEEB30 185733.013 151099 V 01 0 +0039
9BCC0007 B2 00 32 00 00 00 00 00 9ADEEB30 185733.013 151099 V 01 0 +0039
9BCC0007 00 00 00 38 00 00 00 00 9ADEEB30 185733.013 151099 V 01 0 +0039
9BCC0008 00 36 00 00 00 00 00 00 9ADEEB30 185733.013 151099 V 01 0 +0039

```

Fig 19: Quarknet detector setup:

2-fold coincidence

300 ns gate width

7 mV discriminator;  
70 mV is shown here but there is a x10 amp before the discriminator on the DAQ board