# $d_2^n \mathbf{BB}$

## Matthew Posik<sup>1</sup>

<sup>1</sup>Temple University, Philadelphia, PA

#### **1pe LED Fits**

• Fit used for the LED runs is a Poisson and Gaussian convolution.

$$C_{0} \frac{\exp\left[\frac{(x-ped)^{2}}{2\sigma^{2}}\right]}{\sigma\sqrt{2\pi}} \exp(-\lambda) + \sum_{n} C_{n} \frac{\exp\left[\frac{(x-ped-n\times pe)^{2}}{2n\sigma_{n}^{2}}\right]}{\sigma_{n}\sqrt{2n\pi}} \lambda^{n} \frac{\exp(-\lambda)}{n!}$$

- n is number of photoelectrons
- C<sub>0</sub> constant for pedestal
- $C_n$  constant for  $n^{th}$  photopeak
- pe is location on one photoelectron
- $\lambda$  is the average photoelectron number

#### Some LED Fits



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## Some LED Fits

PMT	HV	1pe(chan.)	PMT	HV	1pe(chan.)
1	1401	39.23±0.48	11	1522	44.69±0.31
2	1411	35.54±0.45	12	1750	24.77±0.15
3	981	44.1±0.30	13	1469	27.59±0.19
4	1251	46.46±0.30	14	1555	37.20±0.20
5	1150	33.62±0.36	15	1371	33.20±0.20
6	1166	29.02±0.42	16	2070	25.63±0.19
7	1390	33.39±0.34	17	1821	64.63±1.36
8	1151	37.05±0.38	18	1451	37.53±0.22
9	850	69.71±0.49	19	1403	69.18±0.37
10	1291	75.59±0.42	20	1657	45.15±0.45

#### **Photoelectrons**

- Cerenkov performance for runs 1848-1849 (fivepass energy) were looked at.
- Each ADC spectrum does not have a gain coefficient applied (Z.E. suggested) so the one photo electron peak is different for each PMT.
- ADC of PMTs were plotted using the following cuts:
  - One track reconstruction
  - ADC range of 0*channel* < ADC < 2000*channel*
  - momentum range of 0.4GeV
  - TDC peak cut

## **TDC peak Cuts**



Figure 1: Corrected TDCs for run 1848

- ADCs were fit with same fit as LED runs.
- since using ped subtracted ADCs, ped parameters were removed.
- PMT 3 is not fitted. The fit on PMT 3 says that there are less than 2 pe. This maybe because of the higher background the fit is messing up.

## **Fivepass ADC**



Figure 2: ADCs for run 1848-1849



## • To try and clean background, mirror cuts were used

## **Fivepass ADC**



Figure 3: mirror cuts for run 1848-1849

- Mirror cuts were applied to ADC 3 and 12
- The ratio of events after and before the mirror cut were recorded.
- for ADC 3 about 7.4% of events remain.
- for ADC 12 about 21.8% of events remain.

## **Fivepass ADC**



Figure 4: ADCs with mirror cuts for run 1848-1849

- A lot of 'good' electrons are lost with mirror cuts
- Need a way to reduce the background on the nearside some more
- Not too sure where to go from here

#### **Fivepass Performance**

- BB Scalar replay is now working on the d2n machine
- Plotted L1A and bcmu3 for 1848
- Which bcm should I be looking at?
- Will include scalar variables in the next replay of the Cerenkov to include cuts on bcm and L1A

#### **Five Pass Scalar**



Figure 5: L1A and BCMu3 for run 1848

- Reconstruction script now sees all events
- When using the reconstructed script to minimize the the energy and output coefficients I get a Singular Matrix error while doing the minimization.
- I think that this is due to not having enough events in each block that causes the minimization to diverge.
- When not using the T2 trigger and having 1 million events the minimization converges.
- Run the script and fix coefficients of those blocks who do not have a certain number of events.
- Require 50 events per block ?

- I will be presenting the d2n experiment at the February 13<sup>th</sup> APS meeting
- If you have any plots, you can send them to me. I will send out a reminder again in a few weeks.