E02-013 Analysis Update

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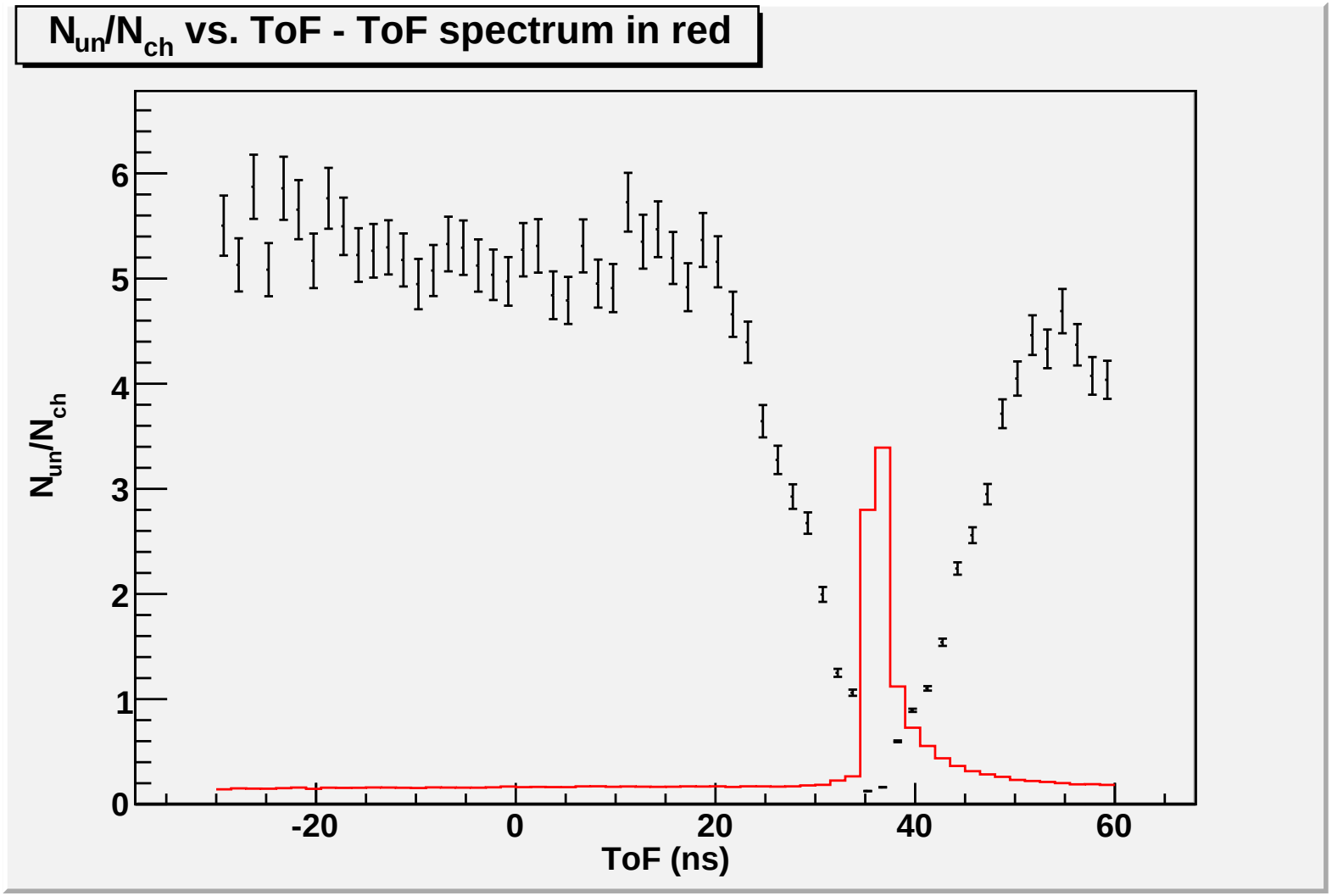

N_{un}/N_{ch} vs. ToF - ToF spectrum in red
N_{un}/N_{ch}
0
1
2
3
4
5
6
-20
0
20
40
60
ToF (ns)

$$N_n^{\mathrm{obs}} = N^{\mathrm{QE}}(1-P^{\mathrm{back}})P_n^{\mathrm{QE}}+2N^{\mathrm{QE}}P_n^{\mathrm{QE}}P^{\mathrm{back}}P_{\mathrm{un}}^{\mathrm{back}}+N^{\mathrm{ft}}P^{\mathrm{back}}P_{\mathrm{un}}^{\mathrm{back}} \quad (1)$$

- N_n^{obs} is the total number of observed neutrals passing quasielastic cuts
- N^{QE} is the number of real quasielastic events
- P_n^{QE} is the probability a real quasielastic event is neutral.
- P^{back} is the probability of having a background event pass the quasielastic cuts
- $P_{\mathrm{un}}^{\mathrm{back}}$ is the probability a background event would be tagged as uncharged without any other events interfering
- N^{ft} is the number of false triggers, i.e. triggers where no quasielastic event is present

Only unknown is P_n^{QE}.

$$N^{\mathrm{QE}} = N^{\mathrm{obs}} - N^{\mathrm{back}} \tag{2}$$

$$P^{\mathrm{back}} = \frac{N^{\mathrm{back}}}{N^{\mathrm{QE}} + N^{\mathrm{ft}}} = \frac{N^{\mathrm{back}}}{N^{\mathrm{trig}}} \tag{3}$$

$$N^{\mathrm{ft}} = \frac{N^{\mathrm{obs}}}{P^{\mathrm{back}}} - N^{\mathrm{QE}} \tag{4}$$

$$P^{\mathrm{back}}_{\mathrm{un}} = \frac{N^{\mathrm{back}}_{\mathrm{un}}}{N^{\mathrm{back}}} \tag{5}$$

$$\tag{6}$$

Alternate approach to assume ignorance on background misidentification rate:

$$N_{\mathrm{un}}^{\mathrm{back}} = \frac{N_{\mathrm{un}}^{\mathrm{back,obs}}}{2} \pm \frac{N_{\mathrm{un}}^{\mathrm{back,obs}}}{\sqrt{12}} \tag{7}$$

$$N_{\mathrm{ch}}^{\mathrm{back}} = N_{\mathrm{ch}}^{\mathrm{back,obs}} + \frac{N_{\mathrm{un}}^{\mathrm{back,obs}}}{2} \pm \frac{N_{\mathrm{un}}^{\mathrm{back,obs}}}{\sqrt{12}} \tag{8}$$

Using old analysis:

```
GEn(1.69 GeV^2) = 0.039 +/- 0.005

d/GEn   (%)
dsys/GEn          0.118
dstat/GEn         0.068

dP_nucl/GEn       0.062
dP_n/GEn          0.000
dP_beam/GEn       0.020
dD_back/GEn       0.002
dD_prot/GEn       0.059
dD_N2/GEn         0.002
dK/GEn            0.078
dA_back/GEn       0.012
dA_prot/GEn       0.003
```

Using new analysis:

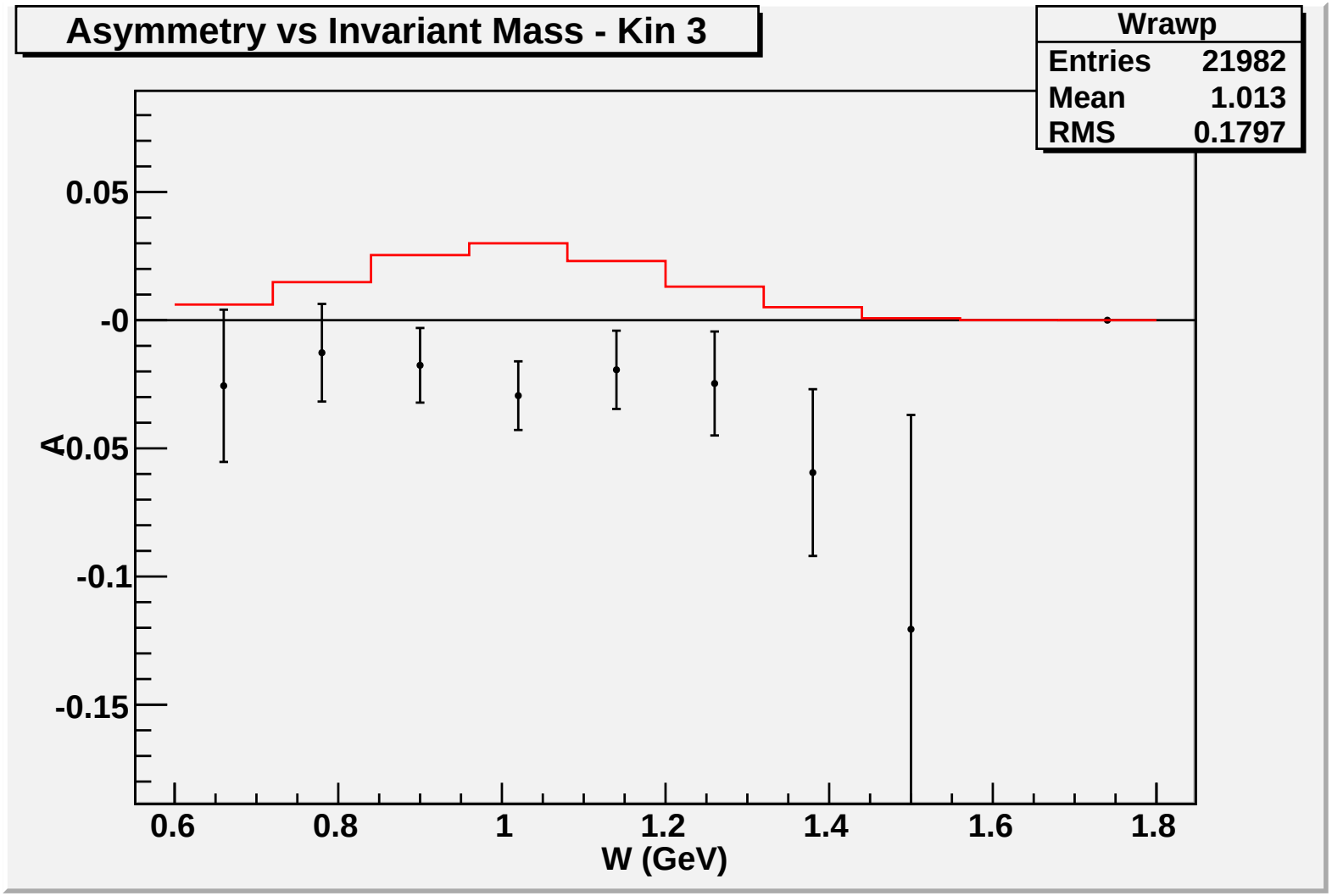
```
GEn(1.69 GeV^2) = 0.039 +/- 0.006

d/GEn   (%)
dsys/GEn          0.125
dstat/GEn         0.068

dP_nucl/GEn       0.062
dP_n/GEn          0.000
dP_beam/GEn       0.020
dD_back/GEn       0.037
dD_prot/GEn       0.062
dD_N2/GEn         0.002
dK/GEn            0.078
dA_back/GEn       0.012
dA_prot/GEn       0.003
```

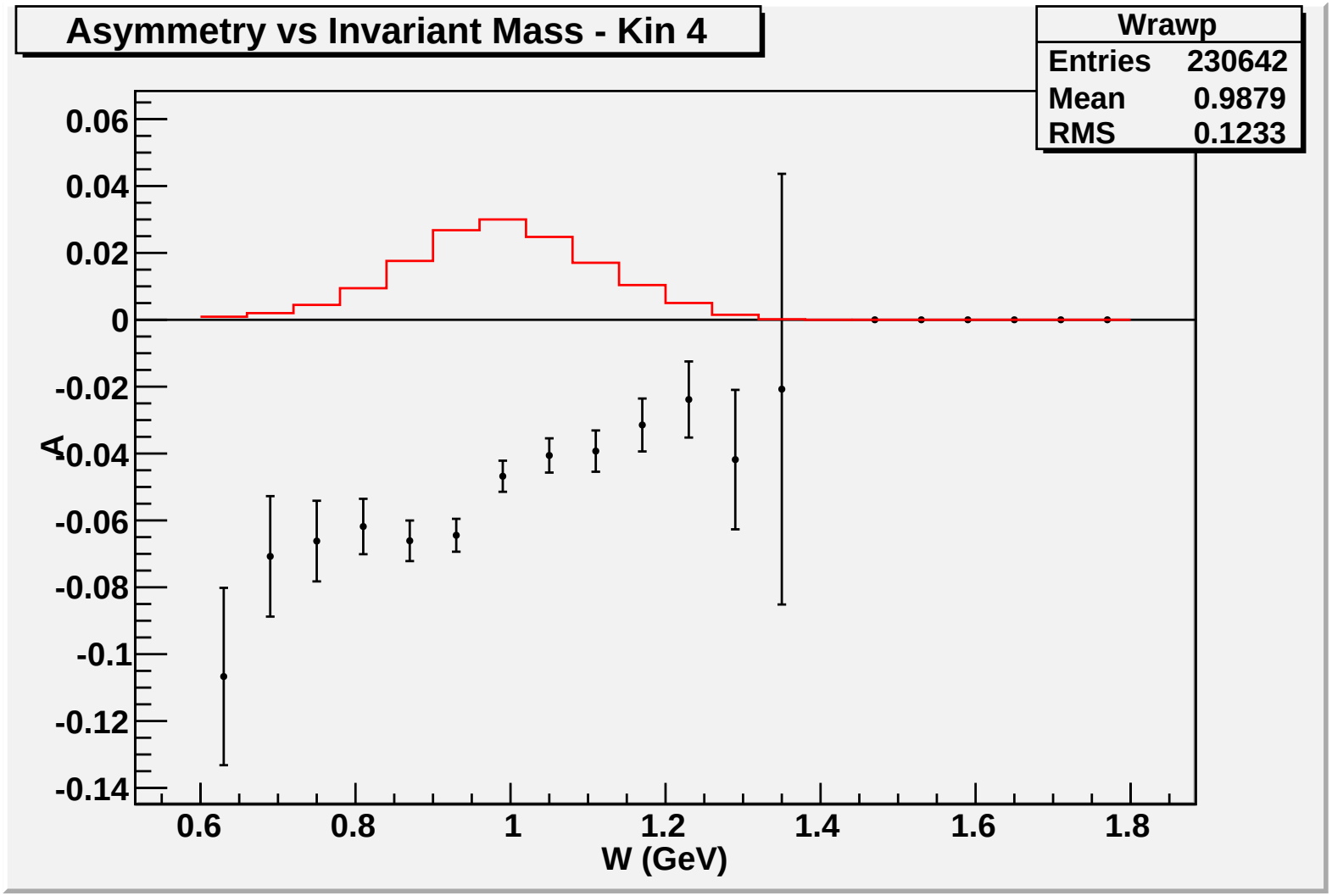
Nitrogen dilution concerns:

- Not all runs were taken using 135psi N_2 (kin. 4 was, it appears)
- QE rate factor 5 too small?

Run	N^{QE}	Q μC	P (psig)	Livetime	$N^{QE}/(\text{nucleon} * \text{de}$
N2 (4585)	7161	4116	135	0.6	4.13×10^{-28}
H2 (4427)	12316	7826	135	-	3.14×10^{-27}
3He (4510)	15085	19659	117	0.5	2.30×10^{-27}

Also need to work on asymmetry vs W




Asymmetry vs Invariant Mass - Kin 4
Wrawp
Entries 230642
Mean 0.9879
RMS 0.1233
0.06
0.04
0.02
0
-0.02
-0.04
-0.06
-0.08
-0.1
-0.12
-0.14
A
0.6
0.8
1
1.2
1.4
1.6
1.8
W (GeV)