Dilution Factor and Time Dependence Report

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Wednesday, October 08, 2008

Dilution Factor

Kinematic 2b only

Name	Value	Uncertainty
Ratio of 3He	0.148	0.003
Ratio of N2	0.228	0.016
Ratio of H2	0.030	0.004
F	2.15	Not Included in Analysis
Dilution Factor	0.847	0.037 (.04)

Kinematic 2a + 2b

Name	Value	Uncertainty
Ratio of 3He	0.141	0.002
Ratio of N2	0.230	0.016
Ratio of H2	0.037	0.003
F	2.15	Not Included in Analysis
Dilution Factor	0.775	0.039 (.05)

Dilution Factor - Cont

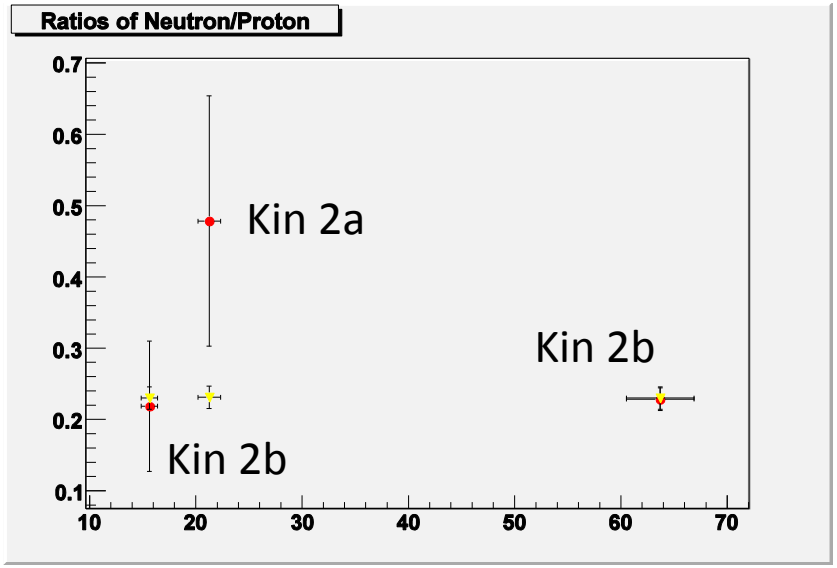
Kinematic 2a + 2b – Only helium from 2a

Name	Value	Uncertainty
Ratio of 3He	0.141	0.002
Ratio of N2	0.228	0.016
Ratio of H2	0.030	0.004
F	2.15	Not Included in Analysis
Dilution Factor	0.824	0.041 (0.05)

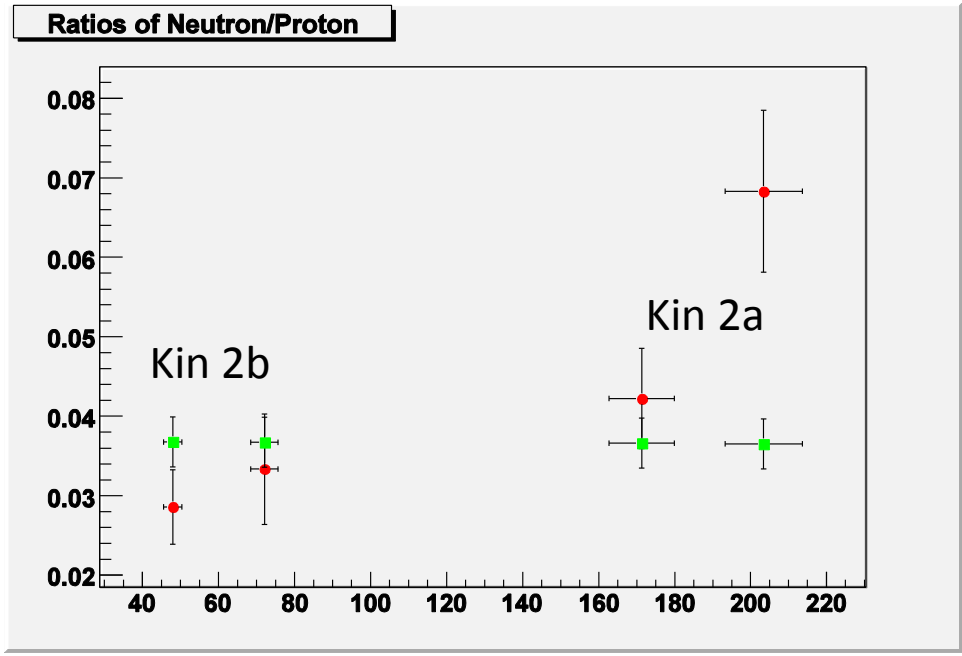
Any data from kin2a being included meant that I couldn't do the same function as before. I couldn't allow \beta to be a parameter and still get a sane result.

$$R = \frac{R_f T_f (\zeta_r)^\beta}{R_f T_f (T_r - (\zeta_r)^\beta) + ((\zeta_f)^\beta - R_f (T_f - (\zeta_f)^\beta))T_r}$$

Plots for kin2a + kin2b

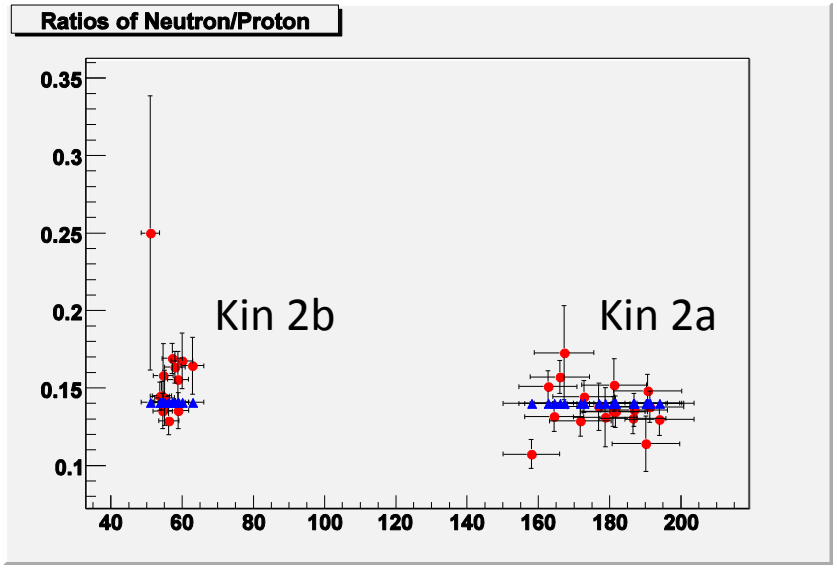


Left is that for nitrogen and below is for hydrogen. Yellow is after the fit, red is before.



X axis is average Veto Rate, while Y axis is the uncharged to charged ratio.

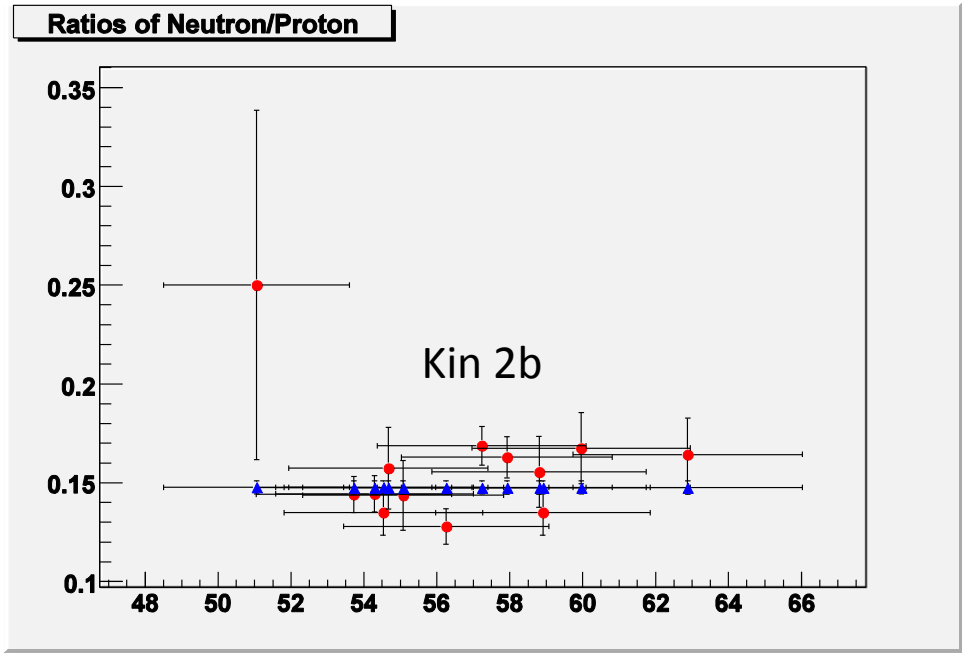
Plots for Helium



Left is that for kin2a + kin2b and below is for kin2b only. Yellow is after the fit, red is before.

X axis is average Veto Rate, while Y axis is the uncharged to charged ratio.

All of kin2a, both early and late kin2a, was taken at a very different setting compared to kin2b.



Dilution Factor - conclusions

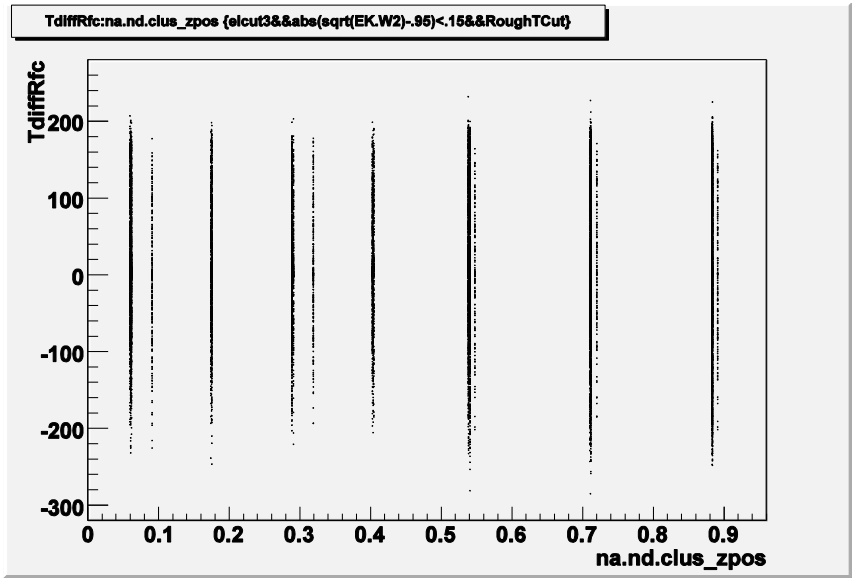
- Including the different threshold does appear to make a difference in our dilution factor.
- Reasonable (including He3 only) difference is 3%
- Kin2b only has raw neutral asymmetry is -0.039 +- 0.007
- Kin2a (50% subset) has raw neutral asymmetry of -0.042 +- 0.009
- Difference in raw asymmetry is 7%
- Change from 0.015 +- 0.003 to 0.016 +- 0.003 for GEn using 0.824 Proton to Neutron Dilution Factor for kin2b
- Using 0.847, kin2a gives GEn = 0.017 +- 0.004
- I think we can not just apply kin2b numbers or models to kin2a without at least adjusting uncertainty

GEn Collaboration Meeting

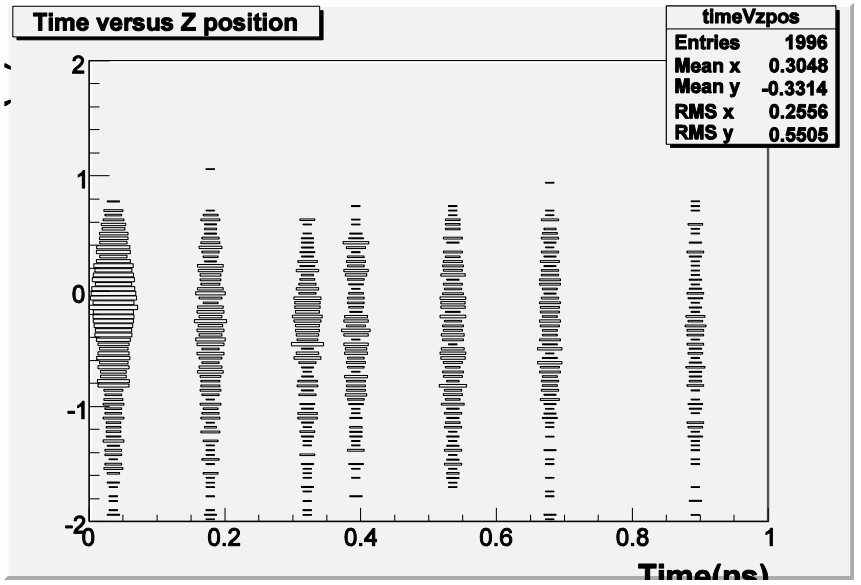
- Done
  - Contacted Staff, Hall A Meeting Dec 3-5
    - Not Finalized – will be in next 2 weeks
- Proposed
  - Send email out to see interest in collaboration meeting on one of the following days:
    - Dec 1
    - Dec 2
    - Dec 8
    - Dec 9

Time Dependence

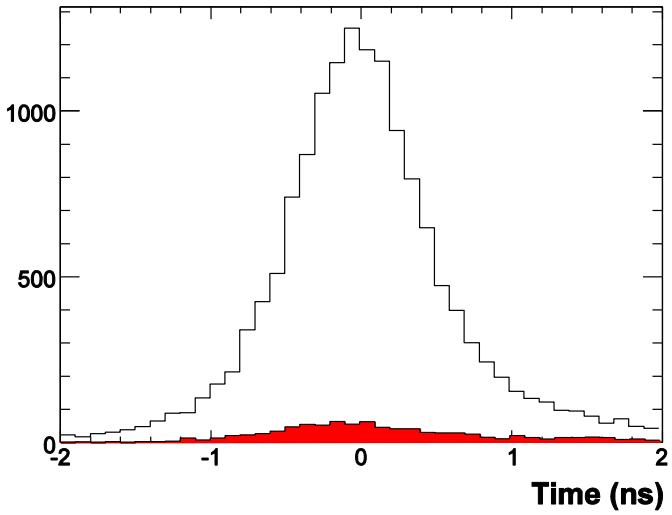
Raw Time Dependence, This shows that the z-locations are correct. The double lines come from the inclusion of the Glascow detectors.



Time after all cuts for neutrals in the analysis. This is a Box plot with the strange z-positions relating to the size of the bins.



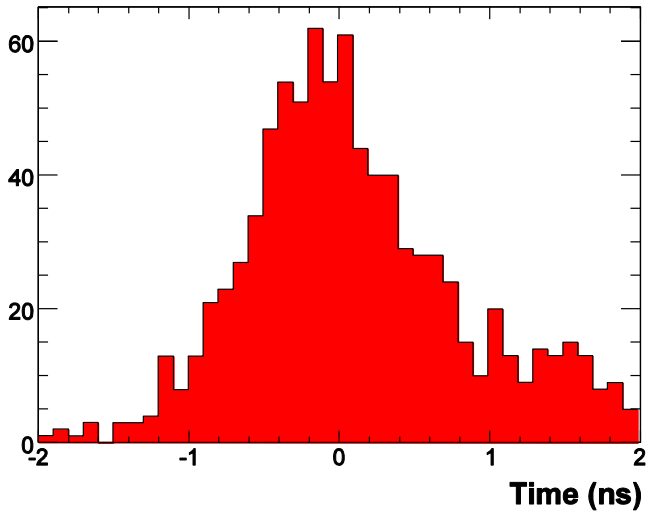
Charged Check



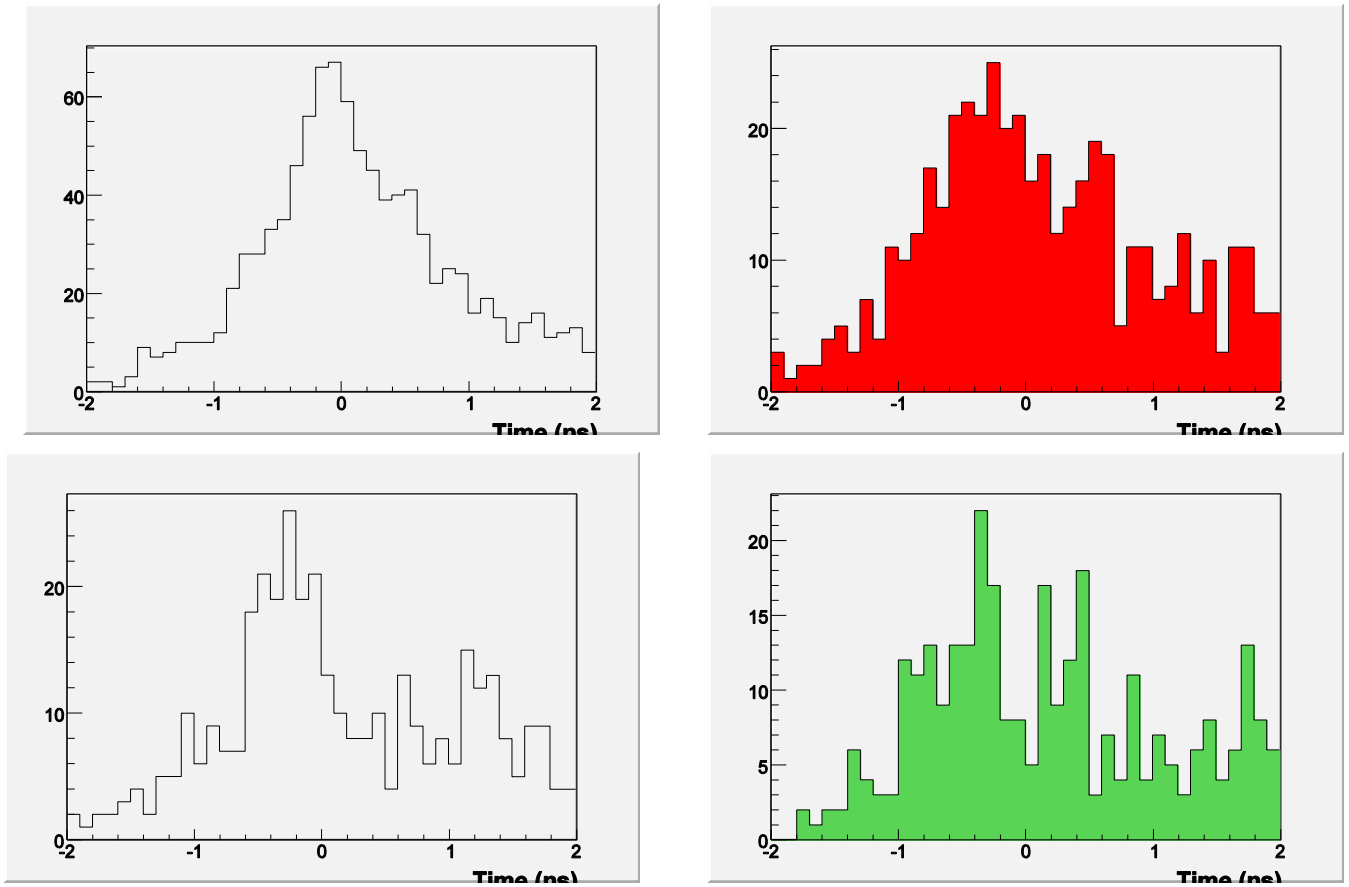
This is the time spectrum after all cuts except the missing mass cut for charged events. The red is for events beginning in the second plane and the clear is for events beginning in the first plane.

All of this analysis is for the 10 runs in kinematic 2a 3160-3169.

The 1st plane peak of the charged events is very nice, the 2nd is nice, but not as nice. This might be due to low statistics. Or scattering.

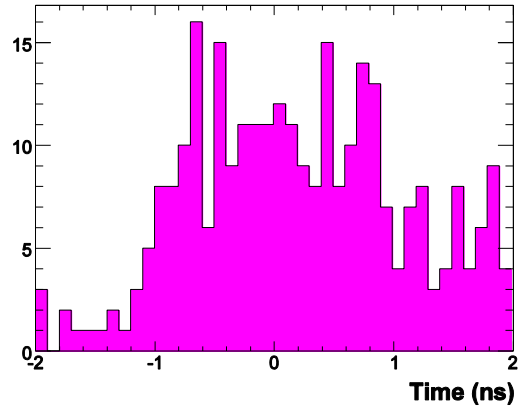


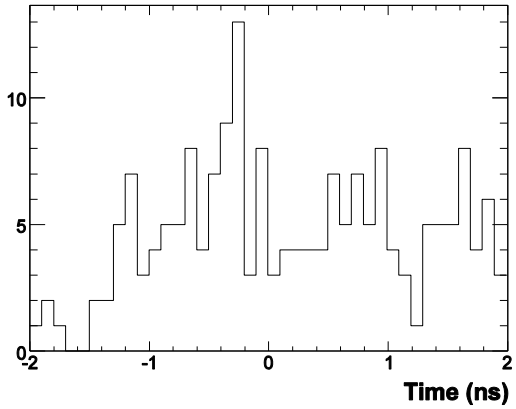
Neutral Events



These are also the time spectrum of neutral events not including the missing mass. Time is in ns. Top left and right is planes 1 and 2 respectively, bottom left and right is planes 3 and 4. It looks like the neutrons arrive a bit before the protons.

Neutral Events





These are also the time spectrum of neutral events not including the missing mass. Time is in ns. Top left and right is planes 6 and 7 respectively. This does not look to be clear enough to draw any conclusions, likely because of scattering rather than low statistics.

My conclusion from this is that the neutron events are coming in a little bit earlier than the proton events (and this should maybe be added into the analysis), but that most of the widening of the peak is due to scattering in the neutron detector before detection of the neutron.