^{3}He, ^{3}H(e,e'p) Cross section analysis

Efficiency Calculation first round

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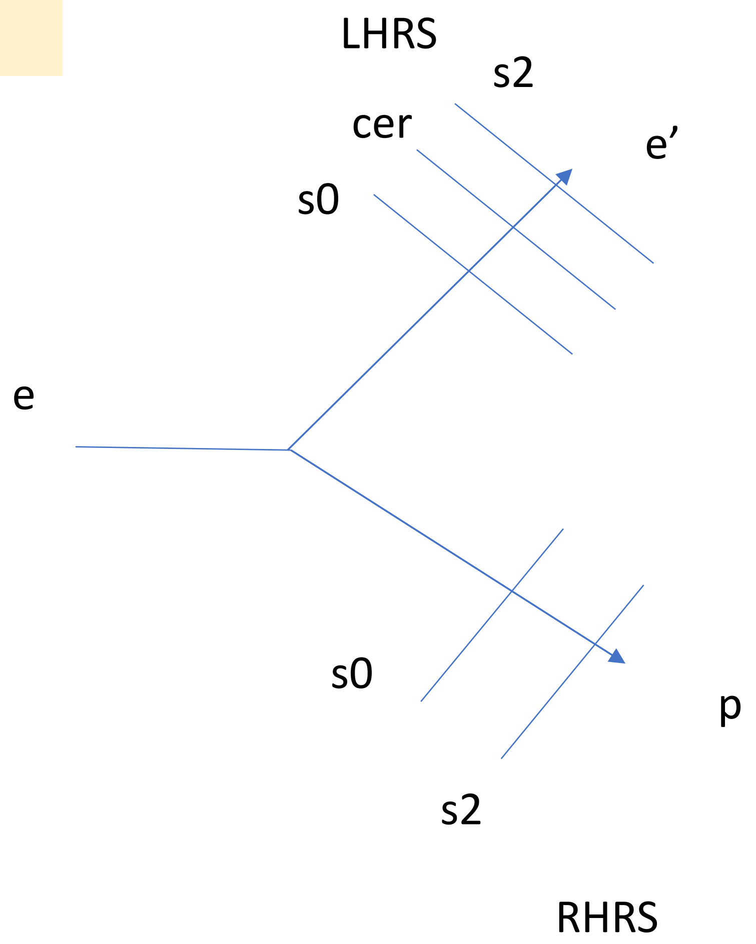
Efficiencies Calcualtion:

1. Trigger efficiency
2. PID efficiency
3. Tracking efficiency



Trigger design:

Single Triggers on the LHRS

T1: (S0 & S2)
T2: (S0 & S2) & Cer
T3: (S0 || S2) & Cer

3 coincident triggers on the RLRS

T4: T1 & (S0 & S2) RHRS
T5: T1 & S0 RHRS
T6: T1 & S2 RHRS

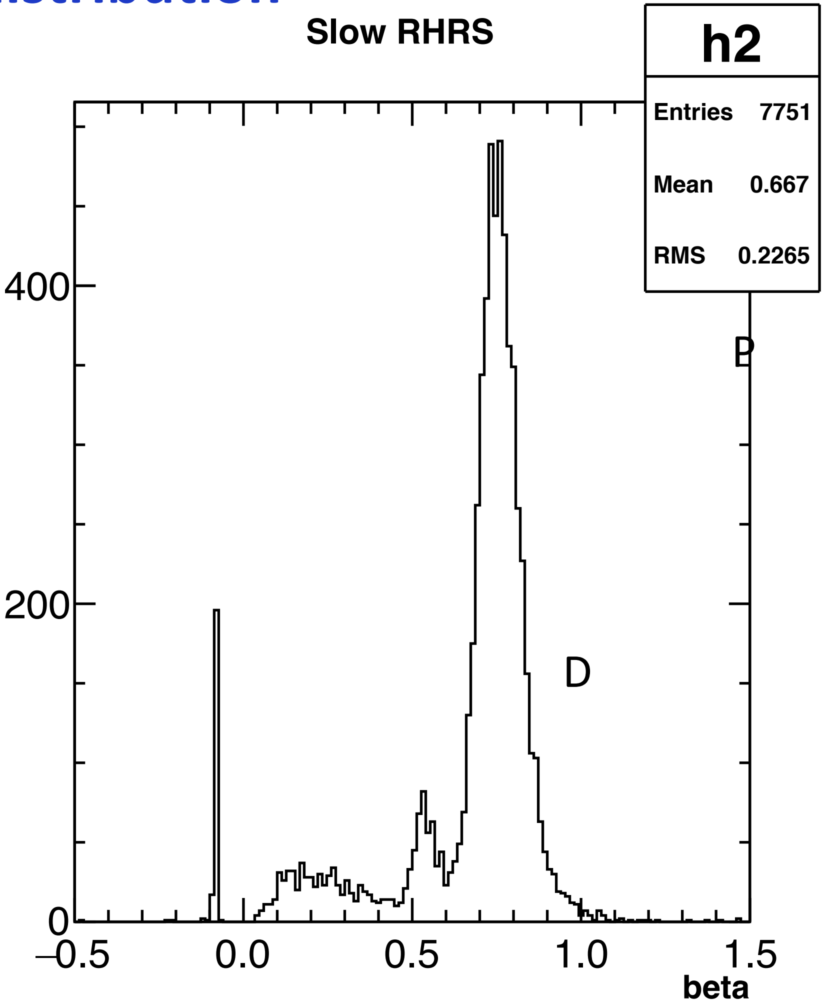
Single trigger on the RHRS

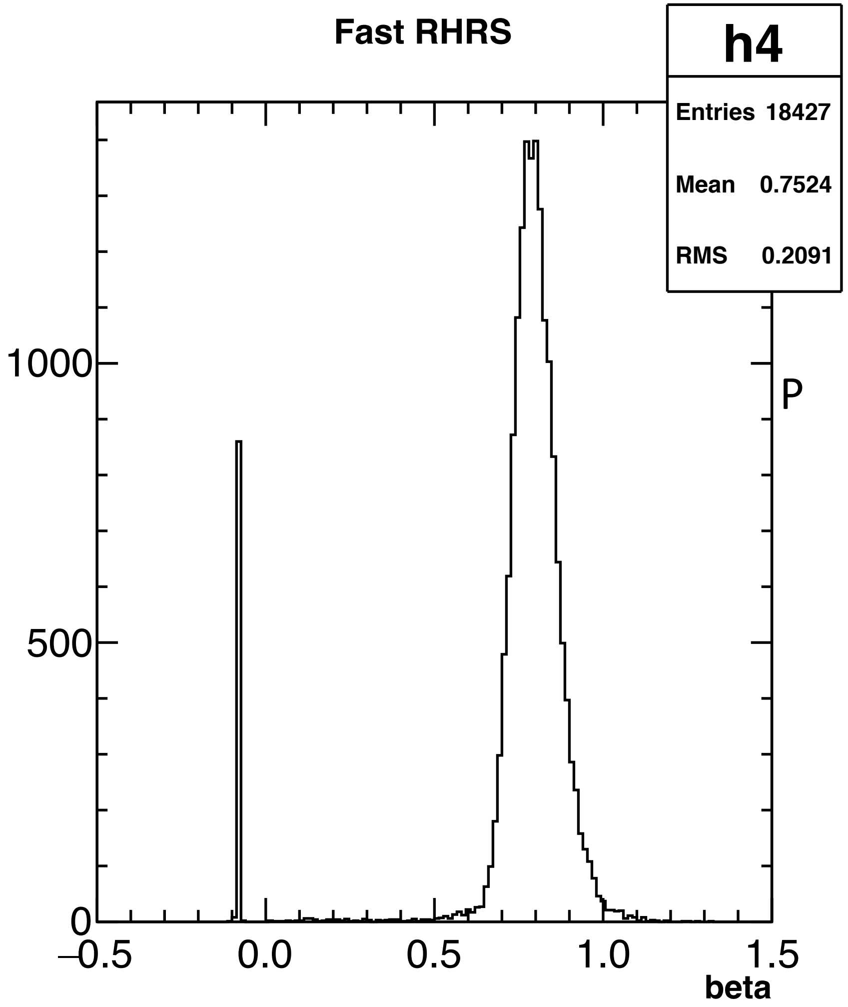
T7: (S0 & S2) RHRS

Note:

- Only the single arm triggers were used in selecting data (coinc trigger PS = Zero)
- The "REAL" coincidence timing to select (e.e'p) event: (T1 – T7).

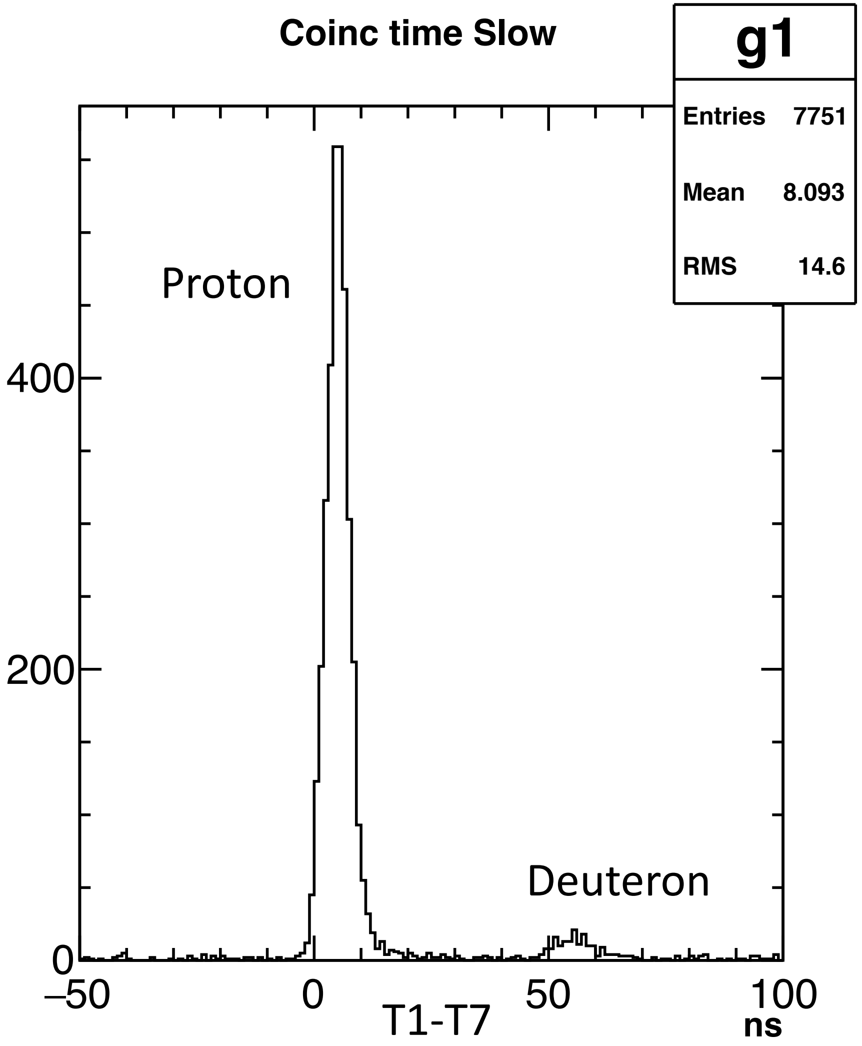
RHRS Beta distribution

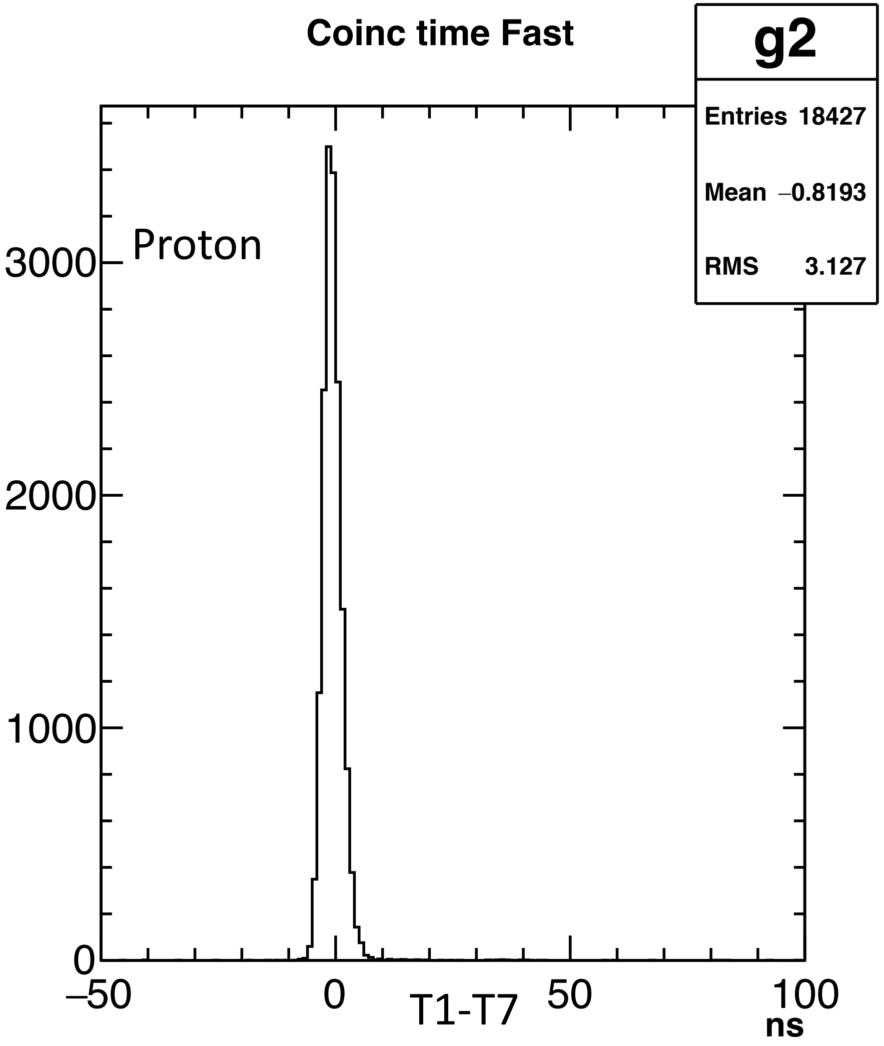




Kin	Pmom	Beta_P	Beta_D	Beta_pi	(P-D) relative time
Slow	1.4805 GeV	0.84 C	0.62 C	1 C	~30 ns
Fast	1.246 GeV	0.8 C	0.55 C	1C	~40 ns

Coincidence timing T1- T7:



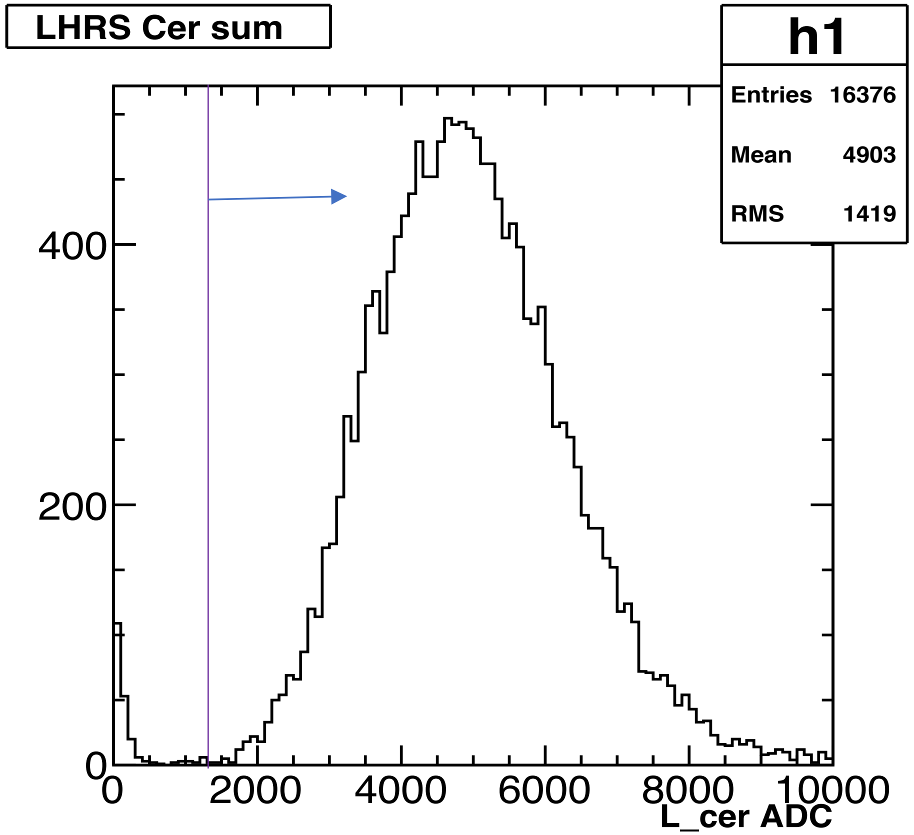


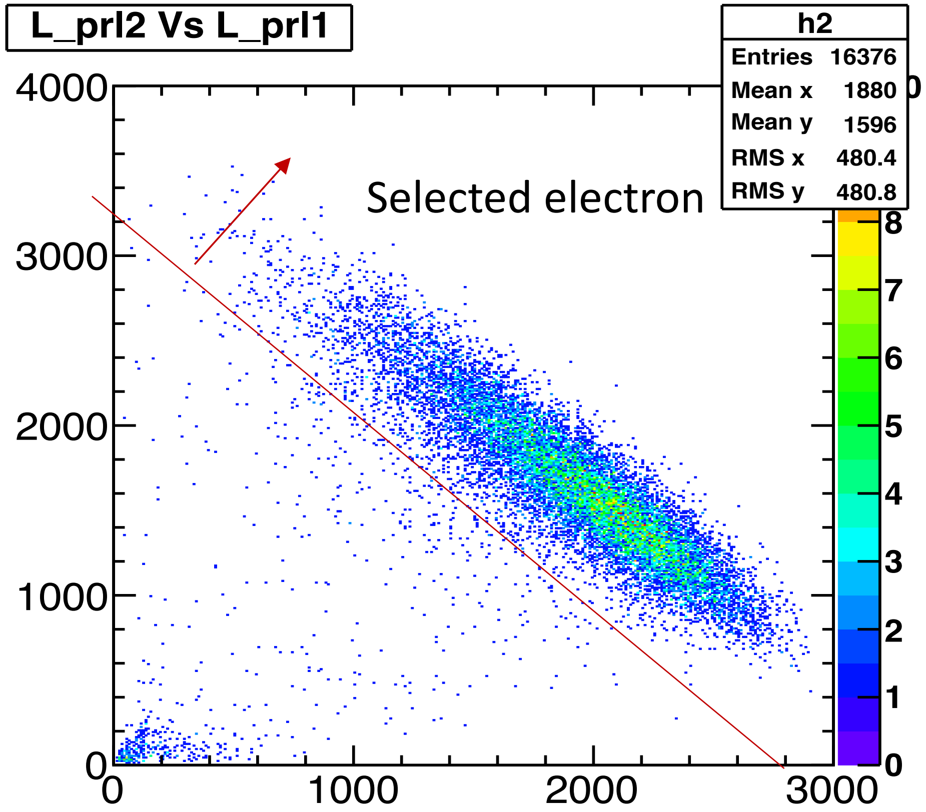
Conclusions:

- Coinc timing is clean. No background subtraction needed.
- Using the coinc timing to select the proton is better than using beta on the RHRS.
- No need timing calibration to improve Beta distribution

PID study: selecting (e,e'p) event – separated from (e,pion, p)

3H fast kinemati





Add Cer_sum cut : L_cer >1500 => Ncut

Select electron sample: Ne

- Good tracking on both HRSs : (L.tr.n ==1 && R.tr.n ==1)
- Real coincident timing cut: abs(T1-T7) < 20
- Nominal acceptance
- E/p >0.8

Electron_eff = Ncut/Ne = 99.96 %

Conclusion:

- Coinc time cut is enough to select proton
- Need to estimate coinc time and tracking eff

T1 efficiency: S0&S2 efficiency on the LRHS

LHRS single triggers

T1: (S0 & S2)
T2: (S0 & S2) & Cer
T3: (S0 || S2) & Cer

T1 is inefficient due to the inefficience of S0 and S2

Select sample: Ne
- L.cer_sum >3000 -> good electron
- L.tr.n ==1 -> good tracking

Inefficiency of s0 and S2 happened => we only have T3 events
If S0 &S2 are efficient => All 3 triggers have to fired

3H- fast kinematic check

T1_eff = (1 - T3/Ne) ~ 98.5 %

Using Trigger bits to select trigger events

- Only trigger T3 event: DR.evtypebits == 8
- All 3 triggers fired: DR.evtypebits == 14
- As long as T1 fired, T2 and T3 have to fired
  so we can use: (DR.evtypebits>>1)&1

T7 efficiency: S0&S2 efficiency on the RHRS

Coinc trigger

T4: T1 & (S0 & S2) RHRS
T5: T1 & S0 RHRS
T6: T1 & S2 RHRS

Select sample: Np
- R.tr.n ==1 => good tracking
- R.tr.Beta > 0.6
- abs(L_vz – R_vz) < 0.01

If S0 and S2 are both efficient => All 3 triggers will fired when T1 fired

T7_eff = (T4 & T5 &T6)/Np ~

?

Still need to check a bit in sample selection

Using hit on TDC to select T

Coincidence timing : T1 – T7

Coinc_eff = T1_eff * T7_eff ~

Moving forward:

- Check the coinc trigger eff and track for both 3H and 3He, fast and Slow. Move on and come back in the end
- Move to acceptance check
- Calculation 6D effective volume
- Extracting “raw” cross section
- Correction