



RF Time Corrections

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Coin Time Corrections

- Want to apply corrections to RF time dependent upon particle
- Want flat RF distributions across δ
- Apply in a similar manner to CT corrections

$$CT = CT_{Raw} \pm (eCorr - hadCorr) - Offset$$

- \pm depending upon which arm is e/had
- eCorr/hadCorr are time corrections for path length

$$Corr = \frac{Length}{\beta * c},$$

$$Length_{HMS} = 2200 + (0.12 * X'_{tar} * 1000) + \left(\frac{0.17 * \delta}{100} \right),$$

$$Length_{SHMS} = 1810 + (0.11 * X'_{tar} * 1000) + \left(\frac{0.057 * \delta}{100} \right)$$

- Lengths in cm from Carlos' CTime class

RF Time Corrections

- Calculate lengths in same way for RF time
- Can determine a correction for each
- Initially, applied correction in same way as Shuo

$$RF = \text{mod}_{4,008}(RF_{Raw} - FPTime + Corr_{Cent} - Corr_{\delta} + Offset)$$

- Shuo actually applied the correction outside the modulo
 - I don't really get why, I applied it inside
- Didn't really correct distributions
- Made things worse if anything

RF Time Corrections

- Correction as shown on previous slide is small, difference on the order of 0.1 ns at most
- Need to correct for any assumptions made
 - Should correct for *assumed* β versus actual β for particle type?
 - Assumed β will depend upon std.kin
- Testing two methods
 - 1. Simply add on ToF for path, use δ and a calculated β
 - 2. Determine difference between ToF with golden track β and calculated β , correct by this
- 1 is done, 2 in progress

Cuts Used

- Unless otherwise specified, the following **general** and **PID** cuts are used

$$-8 < \delta_{HMS} < 8,$$

$$-10 < \delta_{SHMS} < 20,$$

$$0.7 < E_{TotTrackNorm}(HMS) < 1.4,$$

$$NPE_{HMS} > 1,$$

$$abs(\beta_{HMS} - 1) < 0.3$$

$$E_{TotTrackNorm}(SHMS) < 0.7,$$

$$NPE_{Aero} < 3(p), > 1.5(e, \pi, K),$$

$$NPE_{HGC} > 1(e, \pi), < 3(K), < 5(p)$$

- Cointime cuts are also used

Runs Analysed

- Took a look at the $Q^2 = 3.0$, $W = 2.32$, low ϵ , SHMS centre data
 - Spring 2019 data ($E_e = 6.19$ GeV)
 - $P_{HMS} = 2.185$ GeV/c
 - $P_{SHMS} = 3.486$ GeV/c
 - $\theta_{HMS} = 27.25^\circ$
 - $\theta_{SHMS} = 13.30^\circ$

Plots - See other files

Actual plots are multi-page pdfs - See other files