HRS TOF setup

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Single arm and coincidence

- TOF between S0 and S2
  - information on particle momentum (usually much worse than momentum), can be used for PID

- TOF between Left S2m and Right S2m
  - best timing resolution
  - long path length
  - also used for PID
 - useful for ee'p, Kaon, APEX

Corrections

- Offsets : cable, TDC offset fixed, usually use overlap or reference scintillator to calibrate
- Time propagation in scintillator
- Timewalk effect
- Pathlength correction
- RF timing

Example transversity experiment

- http://hallaweb.jlab.org/data_reduc/AnaWork2009/Big Bite-Coincidence-Time-Calibration-Jin.pdf

  ▸ Reached a 1σ resolution ≤140ps
  ▸ Checked with RF Structure $\text{RF Time}_{\text{Spectrometer}} - t_{\text{RF}}$
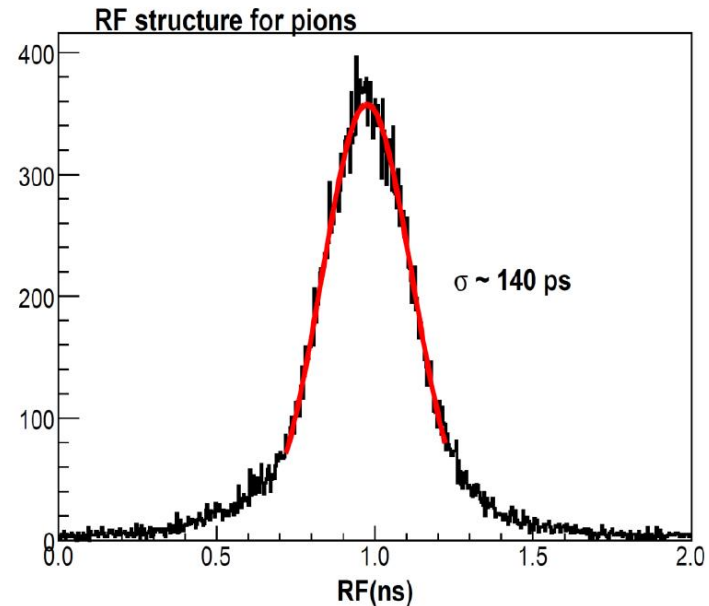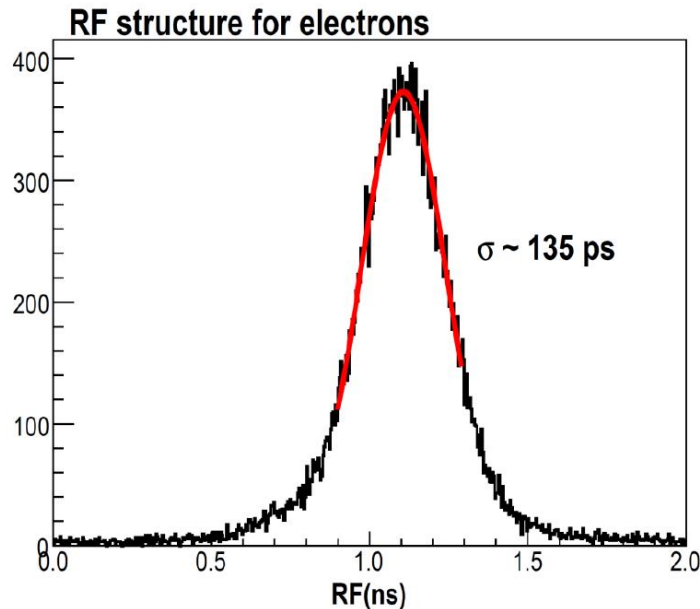
Coincidence TOF
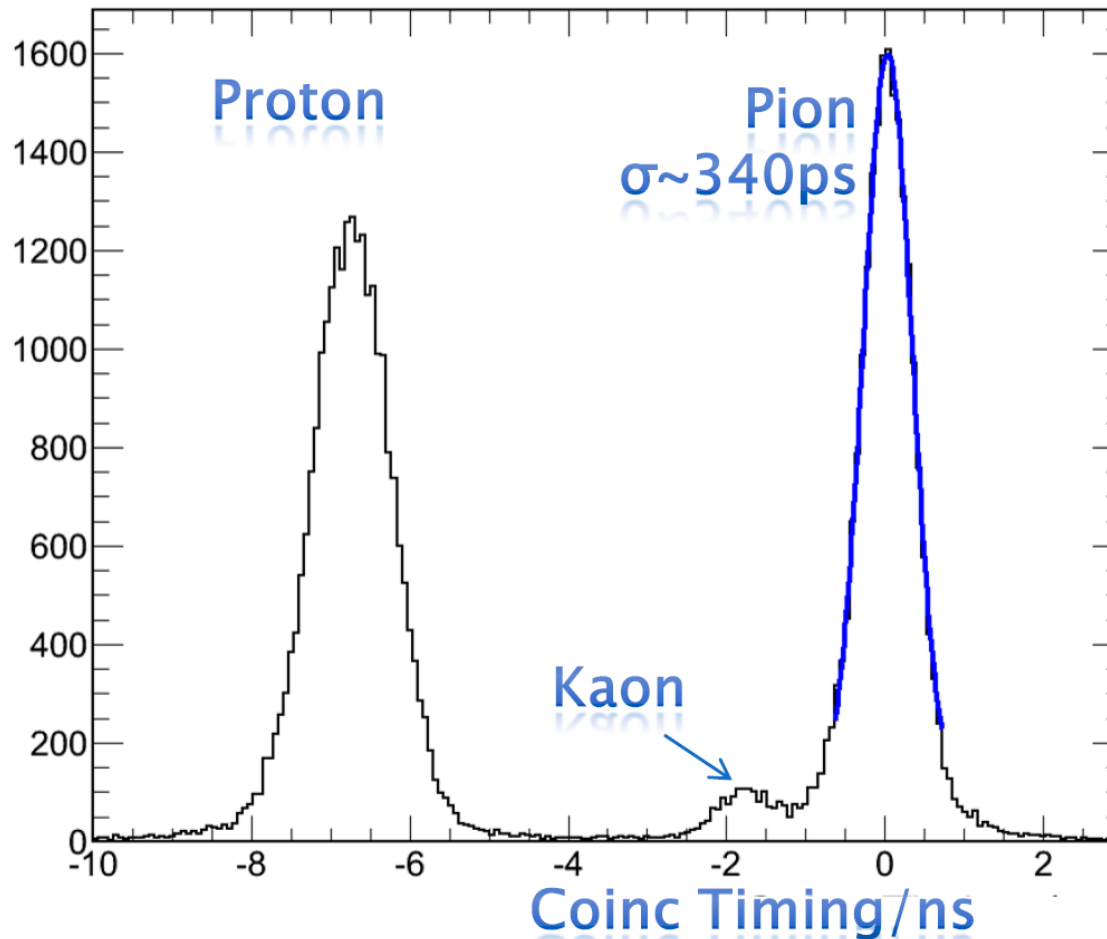
BigBite was 270 ps timing resolution : should be able to do better with two HRS

Readout

- Old way : Fastbus 1875 50 ps

- New TDCs
  - F1 : 60 ps 32 channels
  - V1290 : 25 ps 32 channels
  - VETROC : 20 ps 128 channels

RF signal

- 499 MHz signal from accelerator
- Allow to know the time with reference to the bunch
- 250 MHz now if 4 halls are running

Plan

- Deploy 2F1 TDC in both HRS
  - copy of S2m
  - test V1290 and VETROC in Test Lab
  - add V1290 and VETROC in one arm to compare performance and split F1 signal
- Send RF signal to TDC
  - found signal
  - most likely prescaled by 8 to be easier to handle