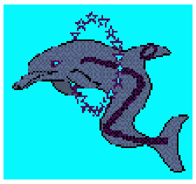
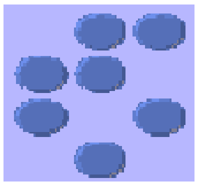


Measurement of $A_{FB}^{\mathrm{b\overline{b}}}$ using $\mathrm{K}^{\pm}$ for $\mathrm{b}/\overline{\mathrm{b}}$ separation: New NTUPLEs and stuff



STATUS REPORT

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I Intro and Recapitulation

II Measurement with NEWTAG Ident.

III Measurement with MACRIB Ident.

IV Comments

Intro and Recapitulation

- Aim: Measuring $A_{FB}^{b\bar{b}}$ using charged kaons

  Asymmetry for kaons coming from b($\bar{\text{b}}$:)

$$A_{\mathrm{K}}(\vartheta) = \frac{N_{\mathrm{K}^-}(\vartheta) - N_{\mathrm{K}^+}(\vartheta)}{N_{\mathrm{K}^-}(\vartheta) + N_{\mathrm{K}^+}(\vartheta)}$$

  is connected to the $b\bar{b}$ forward-backward asymmetry as:

$$\boxed{A_{\mathrm{K}}(\vartheta) \approx \frac{c_{\mathrm{b}} - w_{\mathrm{b}}}{c_{\mathrm{b}} + w_{\mathrm{b}}} \frac{8}{3} A_{FB}^{b\bar{b}} \frac{\cos\vartheta}{1+\cos^2\vartheta} - \frac{\delta}{2}}$$

  where coefficients are:

$$\frac{c_{\mathrm{b}} - w_{\mathrm{b}}}{c_{\mathrm{b}} + w_{\mathrm{b}}} = \frac{[c^-(\vartheta) + c^+(\vartheta)] - [w^-(\vartheta) + w^+(\vartheta)]}{[c^-(\vartheta) + c^+(\vartheta)] + [w^-(\vartheta) + w^+(\vartheta)]}$$

$$\frac{\delta}{2} = \frac{[c^+(\vartheta) + w^+(\vartheta)] - [c^-(\vartheta) + w^-(\vartheta)]}{[c^+(\vartheta) + w^+(\vartheta)] + [c^-(\vartheta) + w^-(\vartheta)]} .$$

- Method:
  - Non-$b\bar{b}$ contribution determined by using MC is subtracted from the measured number of kaons
  - Coefficient $\frac{c_{\mathrm{b}} - w_{\mathrm{b}}}{c_{\mathrm{b}} + w_{\mathrm{b}}}$ is determined from data by the double tag:

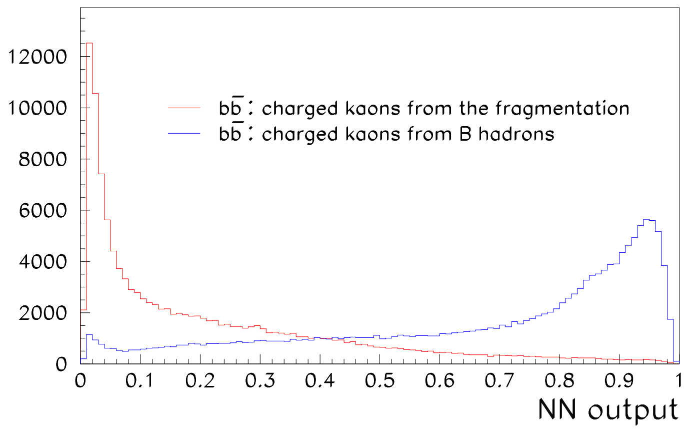
$$\boxed{\frac{N^{opp}(\vartheta) - N^{like}(\vartheta)}{N^{opp}(\vartheta) + N^{like}(\vartheta)} = \left(\frac{c_{\mathrm{b}} - w_{\mathrm{b}}}{c_{\mathrm{b}} + w_{\mathrm{b}}}\right)^2}$$

  - Second coefficient is left as a free (constant) parameter of the fit.

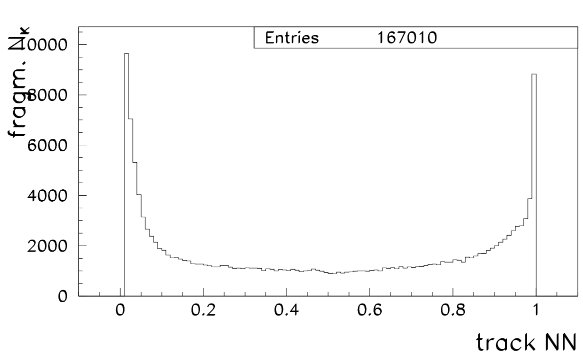
Measurement with NEWTAG ident.

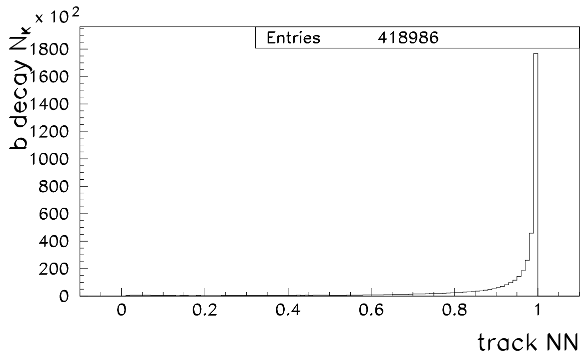
- Data selection:
  - 1994 multihadronic Z^0 decays, b-tagging $((\log_{10} P_b)_{max} = -2.525)$
  - Charged kaons identified with B-RICH(NEWTAG.ge.1), $p_K > 2.5$ GeV/c, $K^{\pm}$ from the decays of B hadrons are selected according to the B-SAURUS neural network output - one kaon per event

Old NTUPLEs:

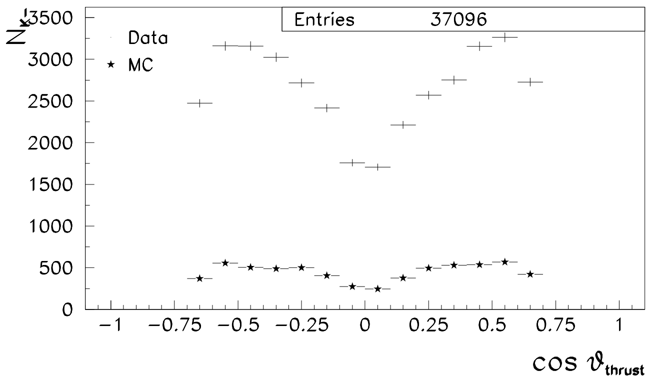


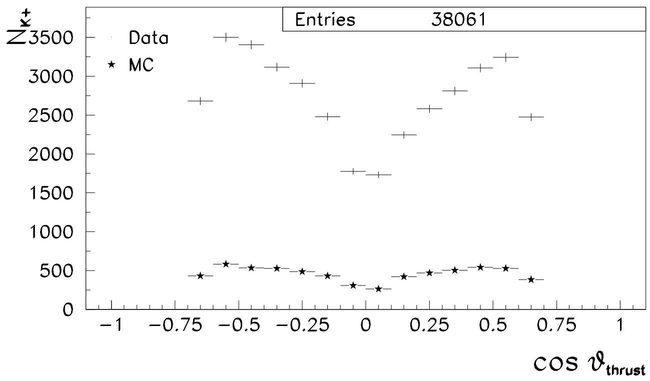
New NTUPLEs:



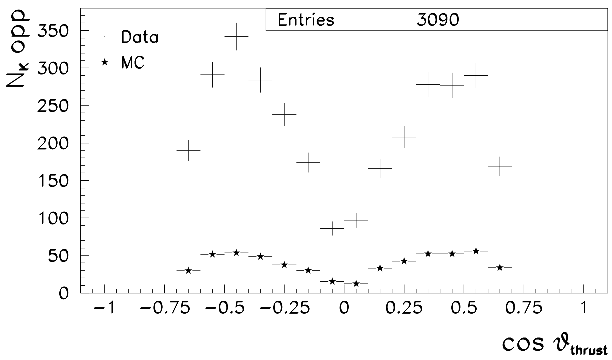


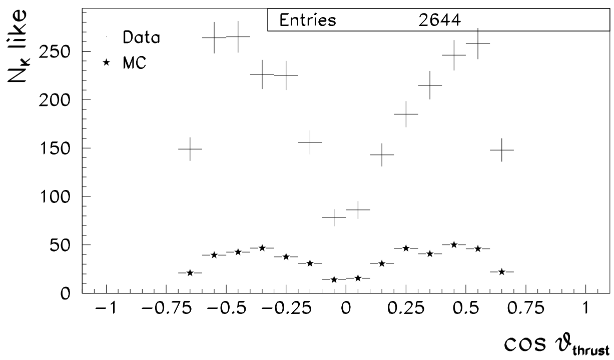
$\Rightarrow$ Cut value $(NNoutput)_{min} = 0.8$ (∼same eff.-pur.)



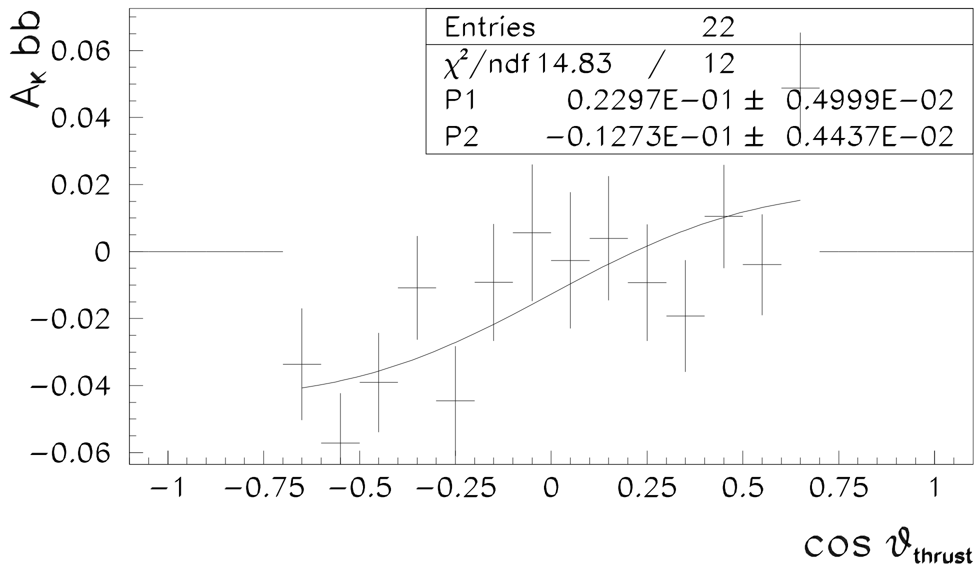


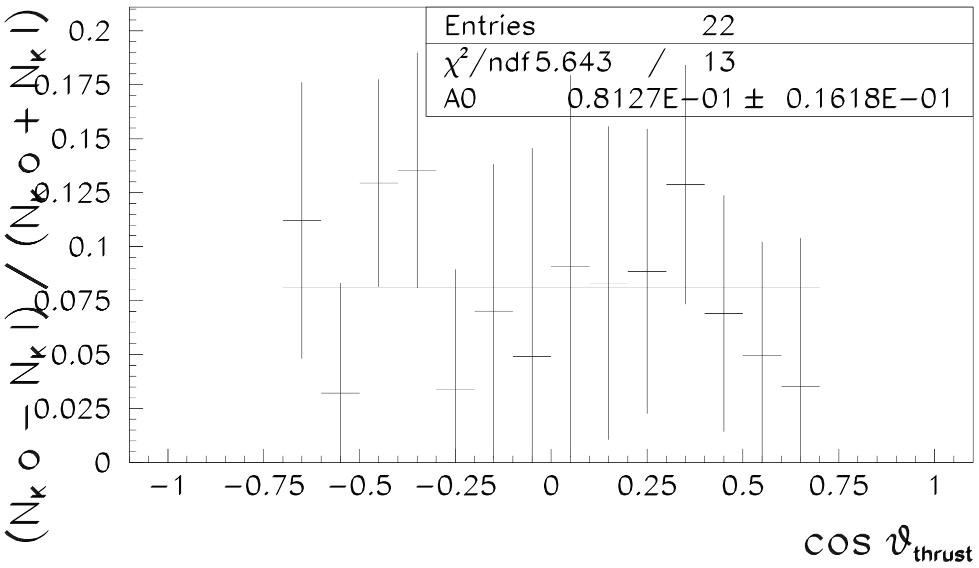
- Double tag data selection:
  - Same as for single tag
  - One selected kaon per hemisphere is allowed





- Results:





$\rightarrow (c_\mathrm{b} - w_\mathrm{b})/(c_\mathrm{b} + w_\mathrm{b}) = 0.285 \pm 0.028$

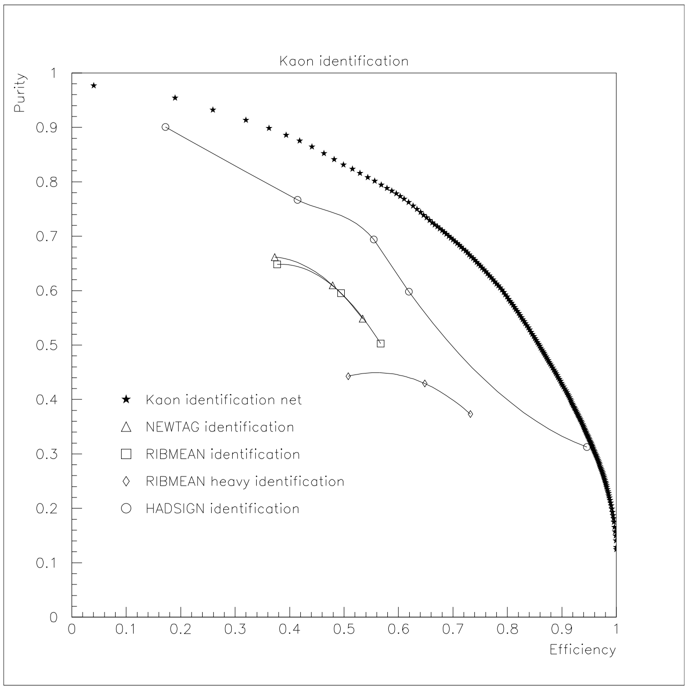
- Measured value for the asymmetry is then:

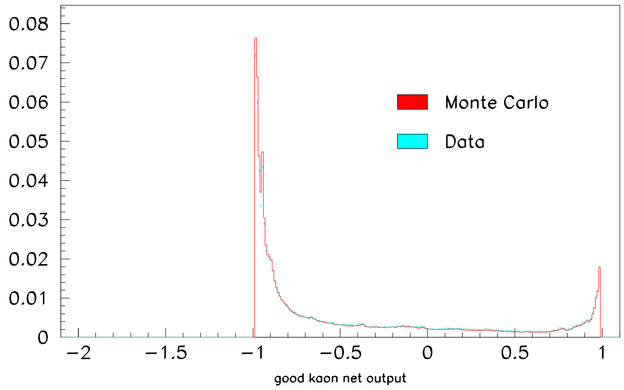
$$\boxed{A_{FB}^{\mathrm{b}\overline{\mathrm{b}}} = 0.081 \pm 0.019}$$

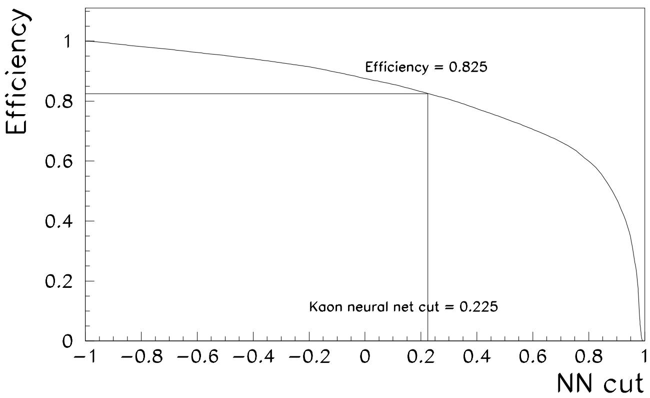
Measurement with MACRIB ident.

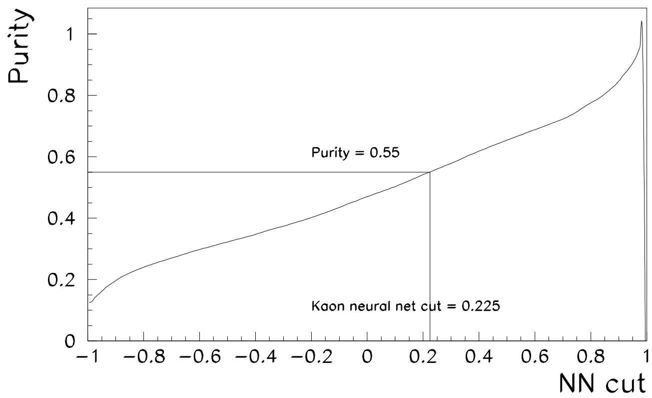
- MACRIB identification:

MACRIB is a neural network which combines RICH and TPC identification.
For analysis the working point with ∼same purity was selected.

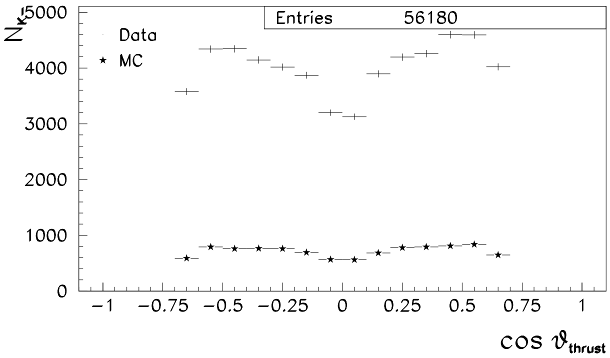


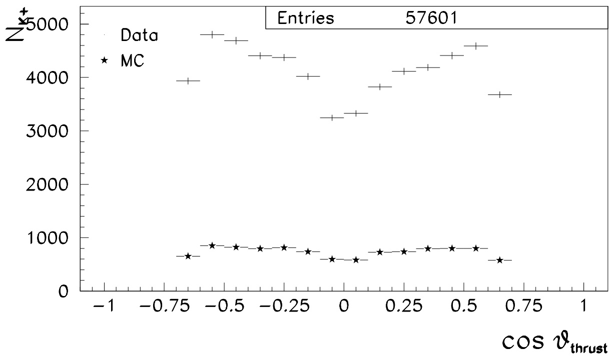




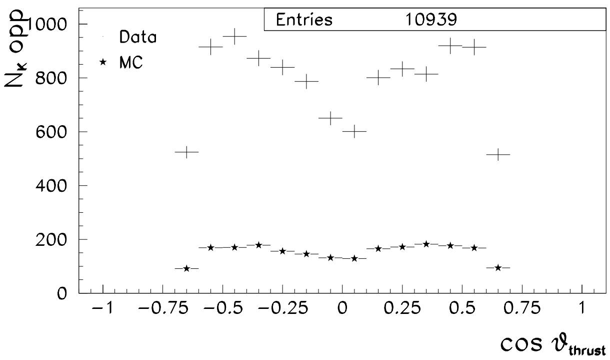


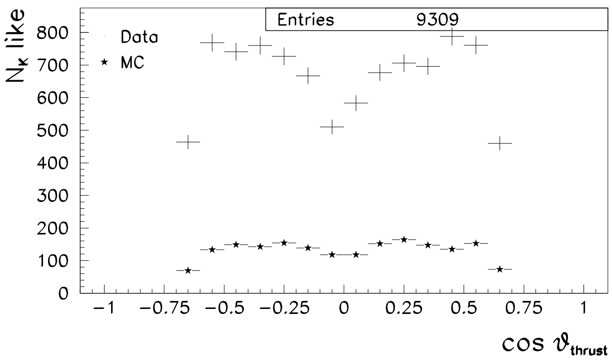
- Data selection:
  - 1994 multihadronic Z^0 decays, b-tagging $((\log_{10} P_b)_{max} = -2.525)$
  - Charged kaons identified with MACRIB, $p_K > 2.5$ GeV/c, $K^\pm$ from the decays of B hadrons are selected according to the B-SAURUS neural network output - one kaon per event



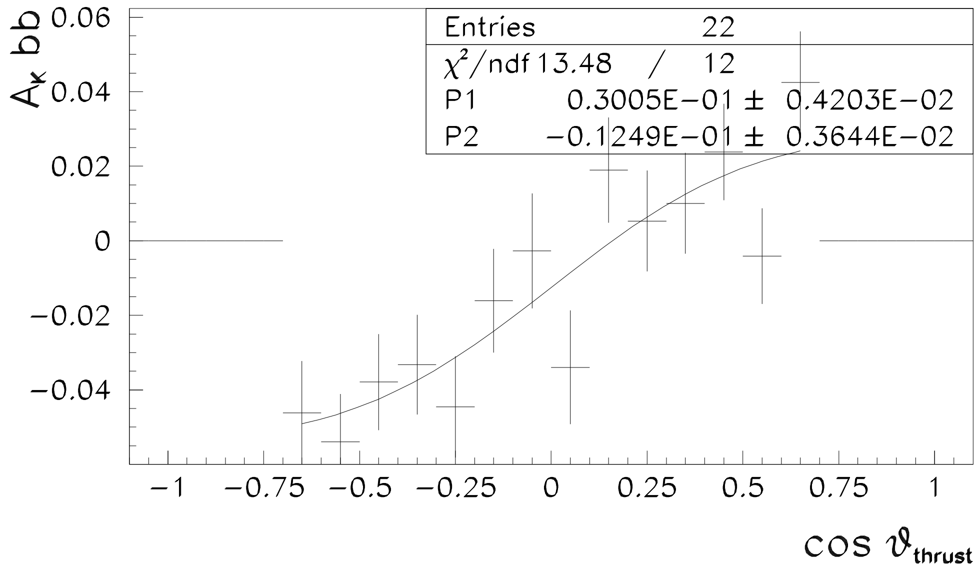


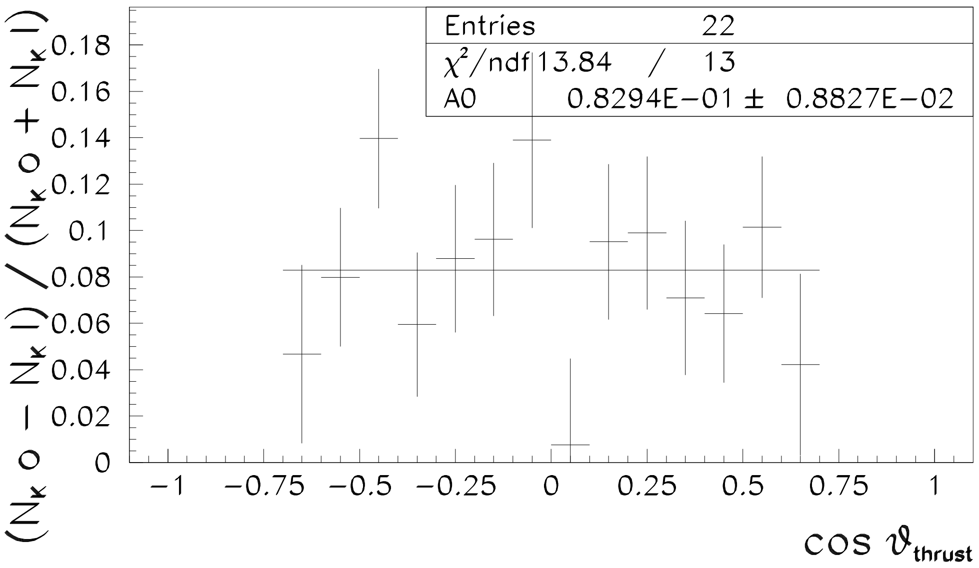
- Double tag data selection:
  - Same as for single tag.
  - One selected kaon per hemisphere is allowed.





- Results:





$\rightarrow (c_\mathrm{b} - w_\mathrm{b})/(c_\mathrm{b} + w_\mathrm{b}) = 0.288 \pm 0.015$

- Measured value for the asymmetry is then:

$$\boxed{A_{FB}^{\mathrm{b\bar{b}}} = 0.104 \pm 0.016}$$

Comments

- Kaon identification with MACRIB turns out to have better efficiency and will be used in the future.
- New b-tagging will be used.
- Other LEP1 (95,93,92) data have to be included.
- Systematic errors to be studied are:
  - Non-$b\bar{b}$ contribution determined by using MC.
  - The material asymmetry ($\delta/2$) treated as a free constant fit parameter (Possibility for determining it from a different measurement will be investigated)
  - The error due to treating coefficient η as a constant.
  - The error on determining the direction of the original quark from the direction of kaon(probably negligible).
- Statistical correlations with other measurements will have to be calculated $\rightarrow$ all ntuples are produced with the event and run number information.