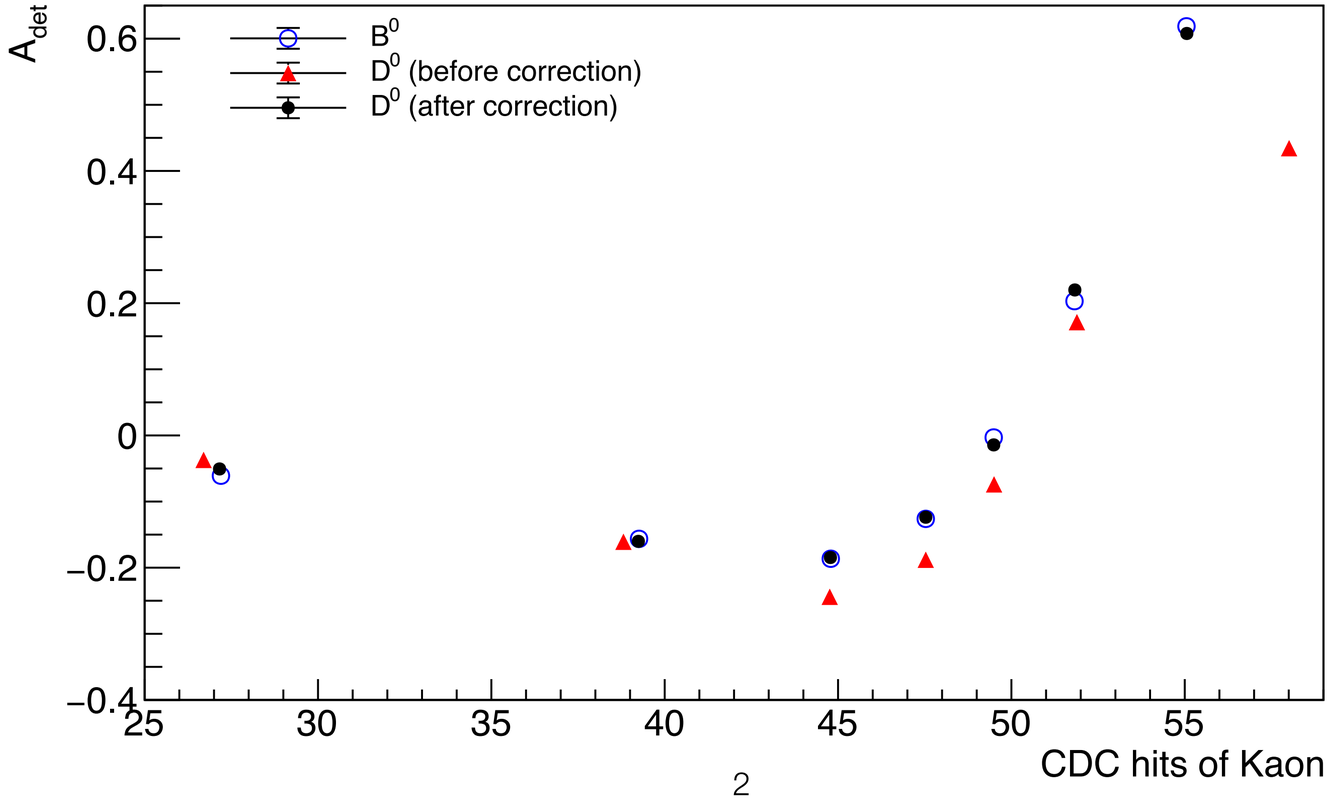
Instrumental asymmetries

M. Dorigo, D.Ghosh, M. Mantovano, S. Raiz
(University and INFN Trieste)

Weekly Meeting
June 24, 2022

Reminder

- Measured $\mathcal{A}_{det}(K\pi, K, \pi)$ using $D^0 \to K^-\pi^+$ and $D^+ \to K_s^0\pi^+$ decays.
- Studied sample-dependence of $\mathcal{A}_{det}$. Proposed a method to obtain $\mathcal{A}_{det}$ based on reweighing $(p, cos(\theta), \mathrm{CDC\ hits})$ distributions.
- Tested in several cases in MC $(B^0 \to K^+\pi^-, B^+ \to \rho^+\rho^0, B^+ \to D^0\pi^+)$.



$\mathcal{A}_{det}$ for $B^+ \to h^+\pi^0$

- We tested our method on $B^+ \to h^+\pi^0$ (MC): failed to obtain target $\mathcal{A}_{det}$.

- Use a conservative approach:

  - Take $\mathcal{A}_{det}$ measured in control channel from data.

  - Assign a systematic uncertainty to account for the sample-dependence from MC

$$\mathcal{A}_{det} = \frac{N_{\pi^-} - N_{\pi^+}}{N_{\pi^-} + N_{\pi^+}}$$

$$\mathcal{A}_{det} = \frac{N_{K^-} - N_{K^+}}{N_{K^-} + N_{K^+}}$$

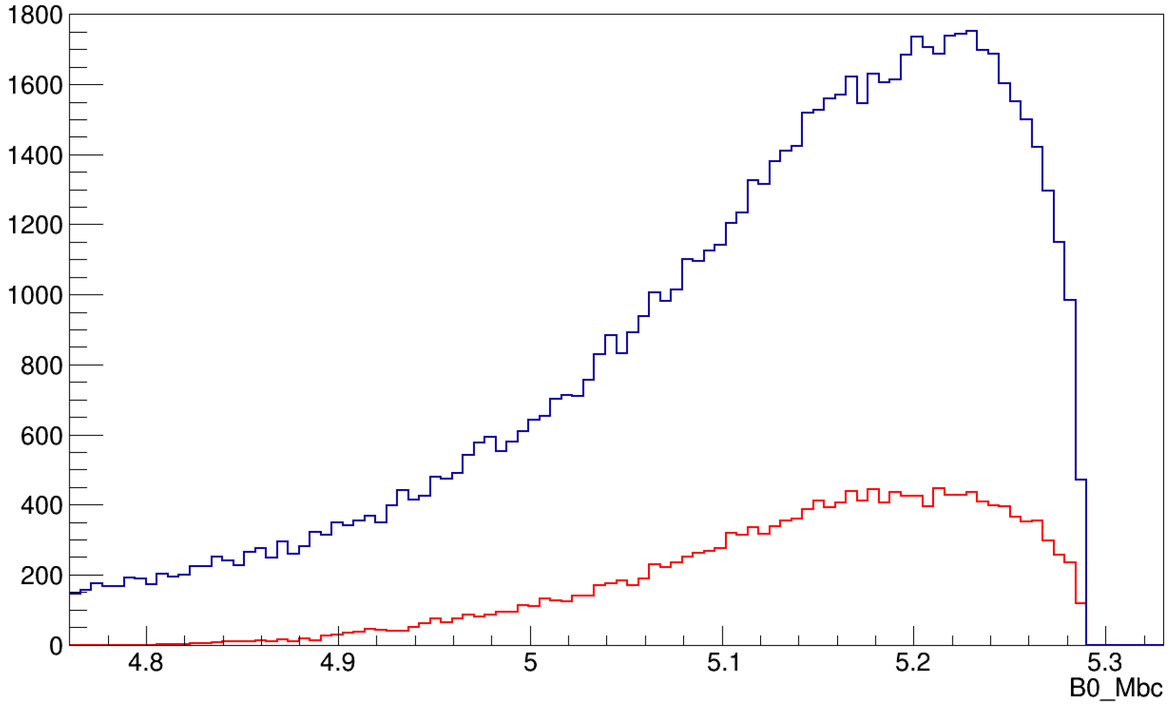
$\mathcal{A}_{det}(\pi^-)$	-0.005 ± 0.010
$\mathcal{A}_{det}(K^-)$	-0.011 ± 0.010

$$B^0 \to D^{*-} \mu^+ \nu_\mu$$

MC14ri vs MC14rd

I started to reconstruct $B^0 \to D^{*-} \mu^+ \nu_\mu$ decays (MC14ri and MC14rd).

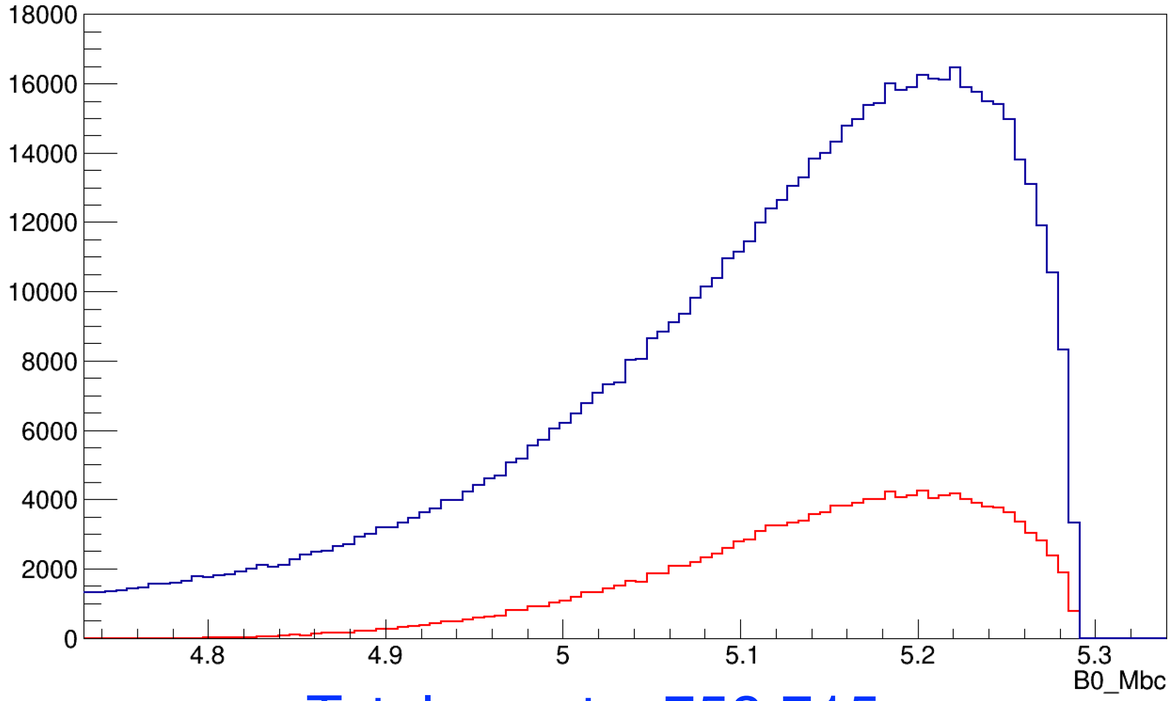
MC14rd (250fb-1)



Total events: 85 070

Signal events: 16 936

MC14ri (300fb-1)



Total events: 750 715

Signal events: 150 689

Why this large difference? (~ factor of 9)