Science & Technology Facilities Council
Rutherford Appleton Laboratory

Plans for misalignment studies with B → hh decays

LHCb

Outline

→ Plans for Velo/IT/OT misalignments

→ This is the outcome of a discussion with Marco and Eduardo

→ Some results with IT/OT misalignments

Work carried out with
Marco Gersabeck and Eduardo Rodrigues

Plans 1/3

What to Misalign ?

- Velo → Vertex/Proper time resolution [Marco &Eduardo]
- IT/OT → Momentum & Mass resolutions [Jacopo]
- To some extent problems are disentangled since they affect different things

→ for now we'll look at misalignments separately, combined later

Where ?

- Gauss is too painful for us [For that we'll wait for the alignment challenge]
- We'll proceed with misalignments in Brunel

→ Which Brunel ? The re-processing version v31r10

Plans 2/3

What to Misalign ?

- Velo → Module and Sensors
- IT/OT → Station // Half Station // Layers

Which degrees of freedom ?

- Velo → X/Y/Z translations and Z rotations
- IT/OT → X/Z [rotations later…]

How much ?

Let's define a sigma value.

We consider (now) 4 configurations: No-misalignment/1σ/5σ/10σ

We fixed σ -- OT : 100μ X translations and 500μ Z translations

IT : 25μ X translations and 100μ Z translations

VELO : 3μ X/Y translations, 10μ Z translations,

0.2mrad Z-rotation

Plans 3/3

Where are we ?

- *Get the CondDB going [this was painful]*

- *Get a set of $B_d \rightarrow \pi\pi$ Digi files*

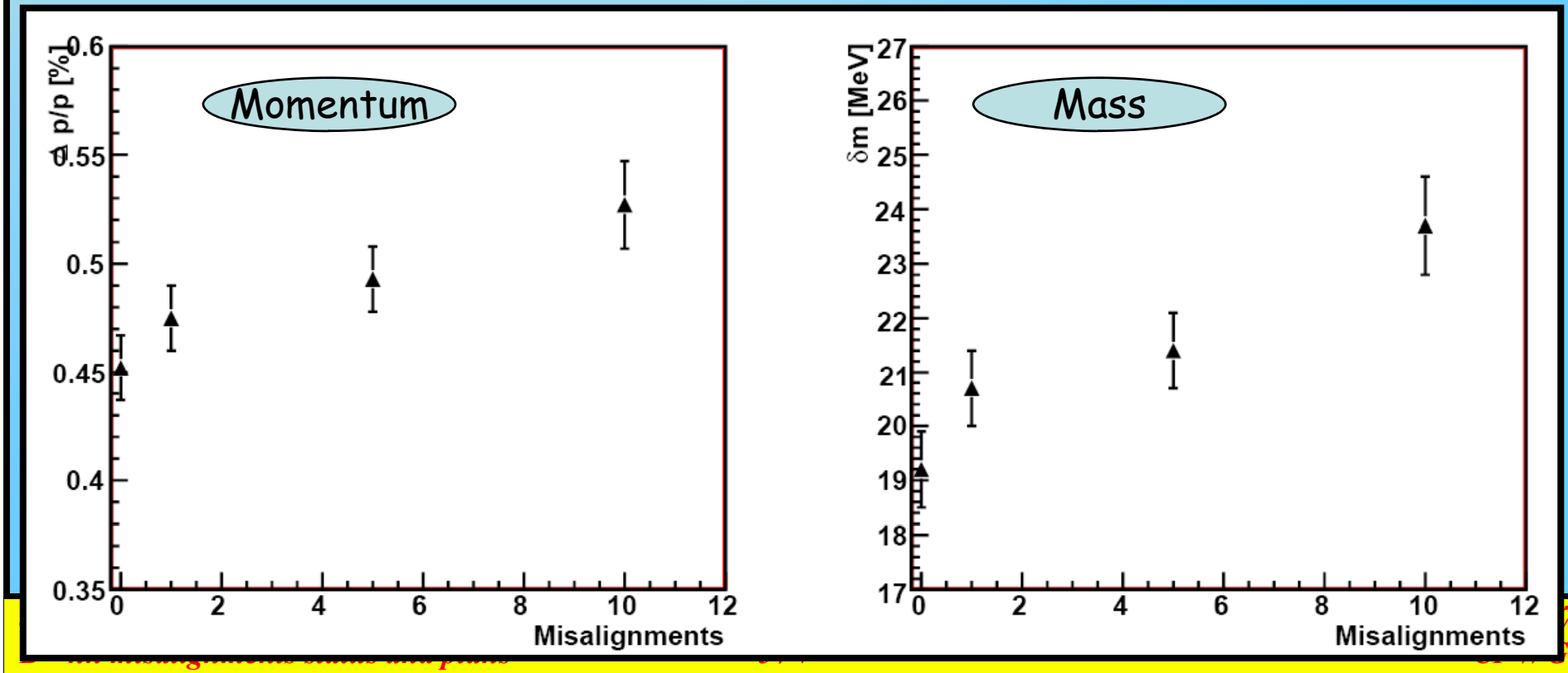
- *Start with misalignments on the $B_d \rightarrow \pi\pi$*
  Start to look at effects on momentum/mass [IT/OT]
  proper time [VELO]

- *Look at other decays (Bs $\rightarrow \pi K$)*
- *Look at background estimation*
- *Combined effects of Velo/T-Station misalignments*
- *Effects on sensitivity*
- *Final effects after introducing re-alignment*

First misalignments on IT/OT

Settings

- *Misalignments in Brunel*
- *Run 5k events in Brunel with no-misalignments/ 1 / 5 and 10 σ misalignments*
- *Run DaVinci B2hh to select events*



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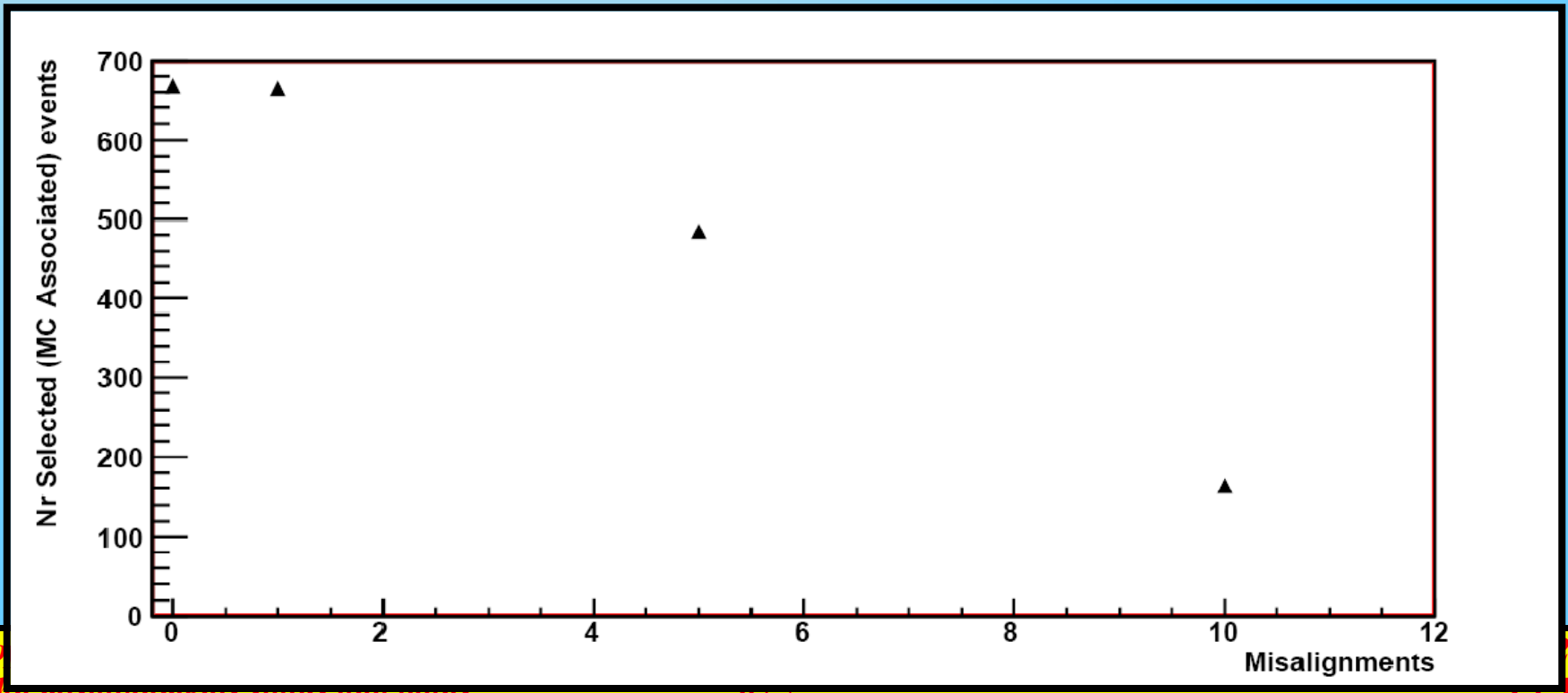

Conclusions

- *Work just started…*
- *First results look ok*
- *A lot to do*