Results of the Analysis of 2004 DT Test Beam

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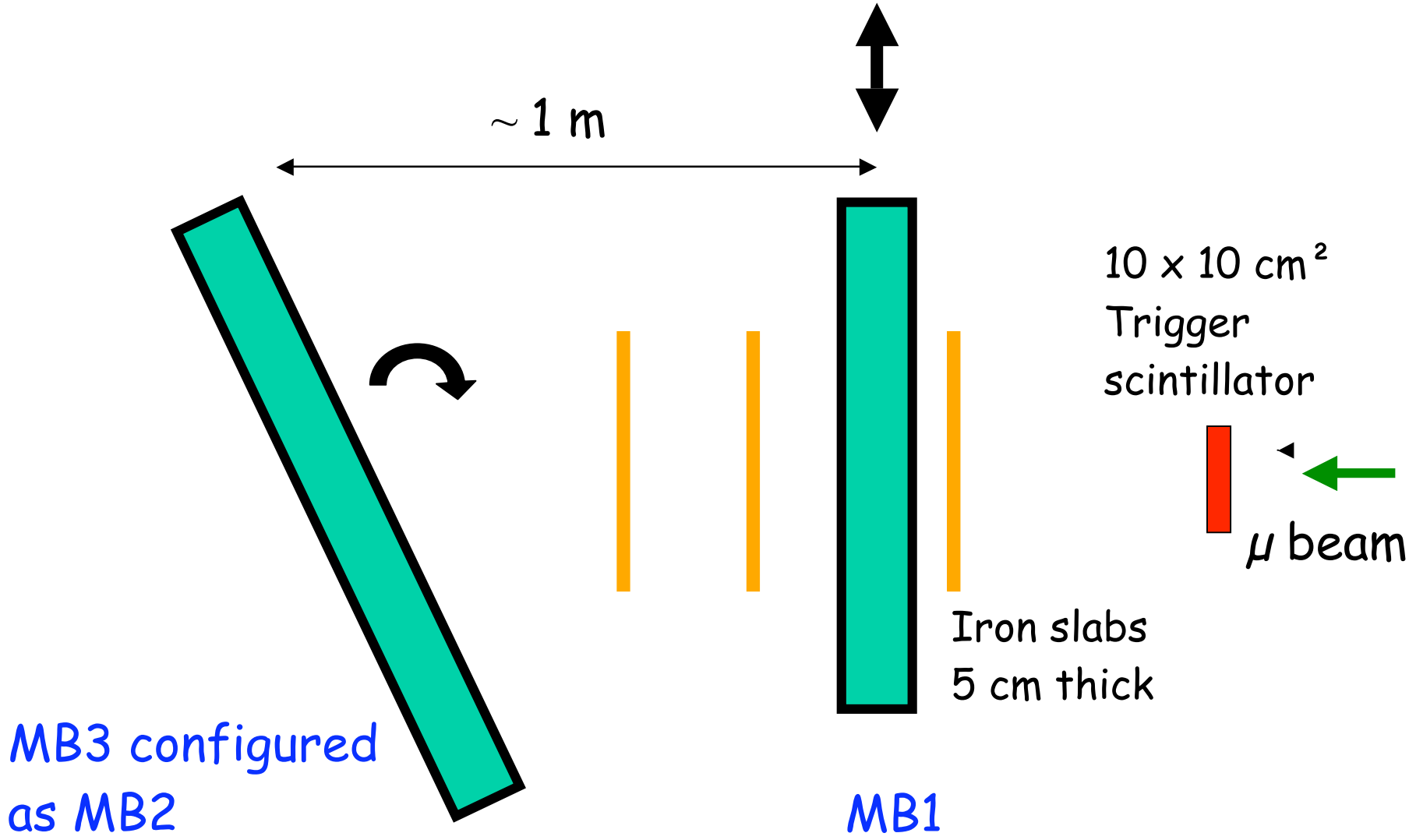
Trigger Performance:

-Single Muons

-Di-Muons

-Absorber and Energy Dependance

A Sketch of the Experimental Set-Up



Single Muon Analysis

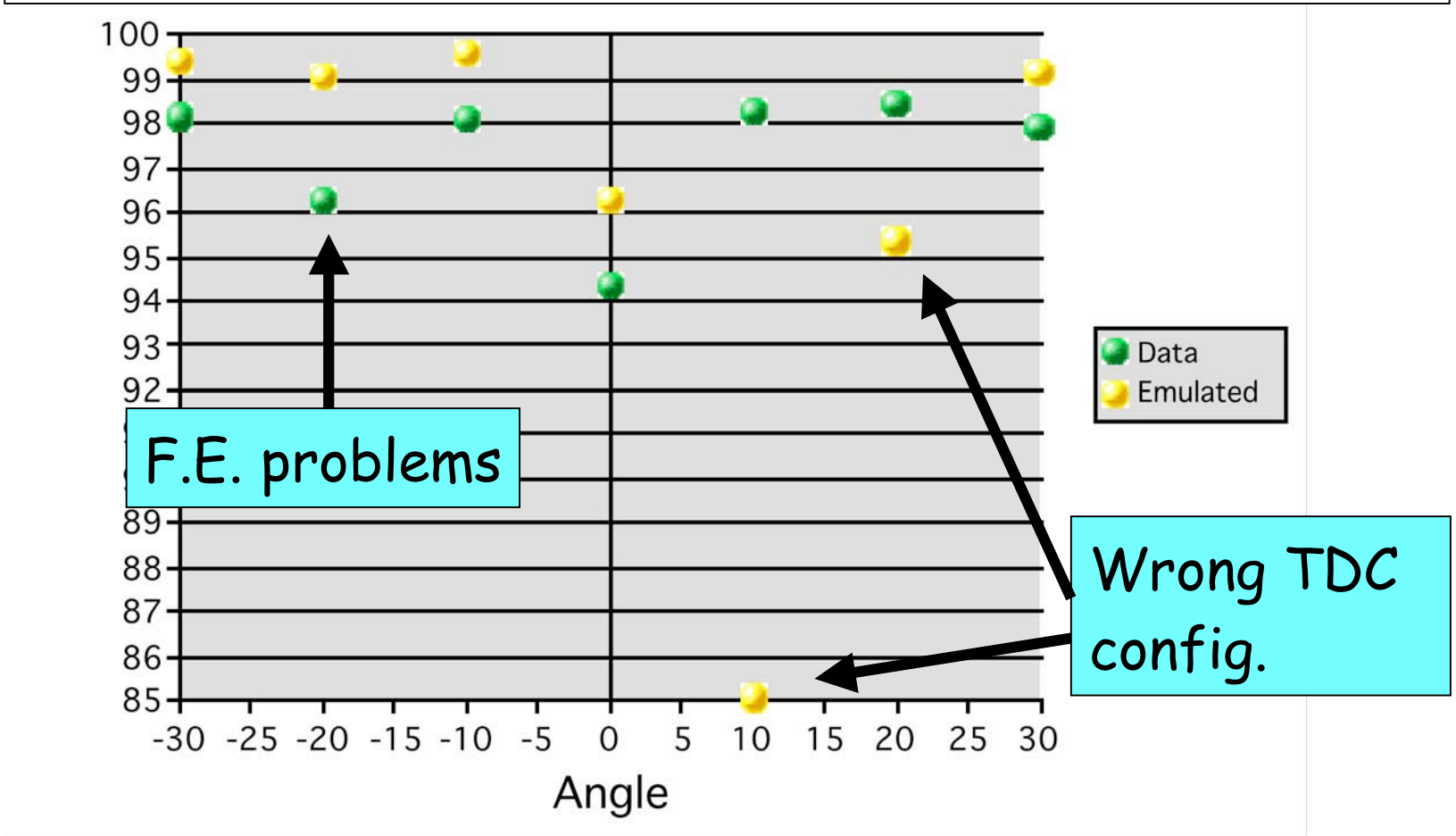
Event selection similar to TB2003 analysis.

Muon candidates are selected in MB1 and the output of the local trigger is studied in MB3 (or the other way around)

Some problems to deal with:

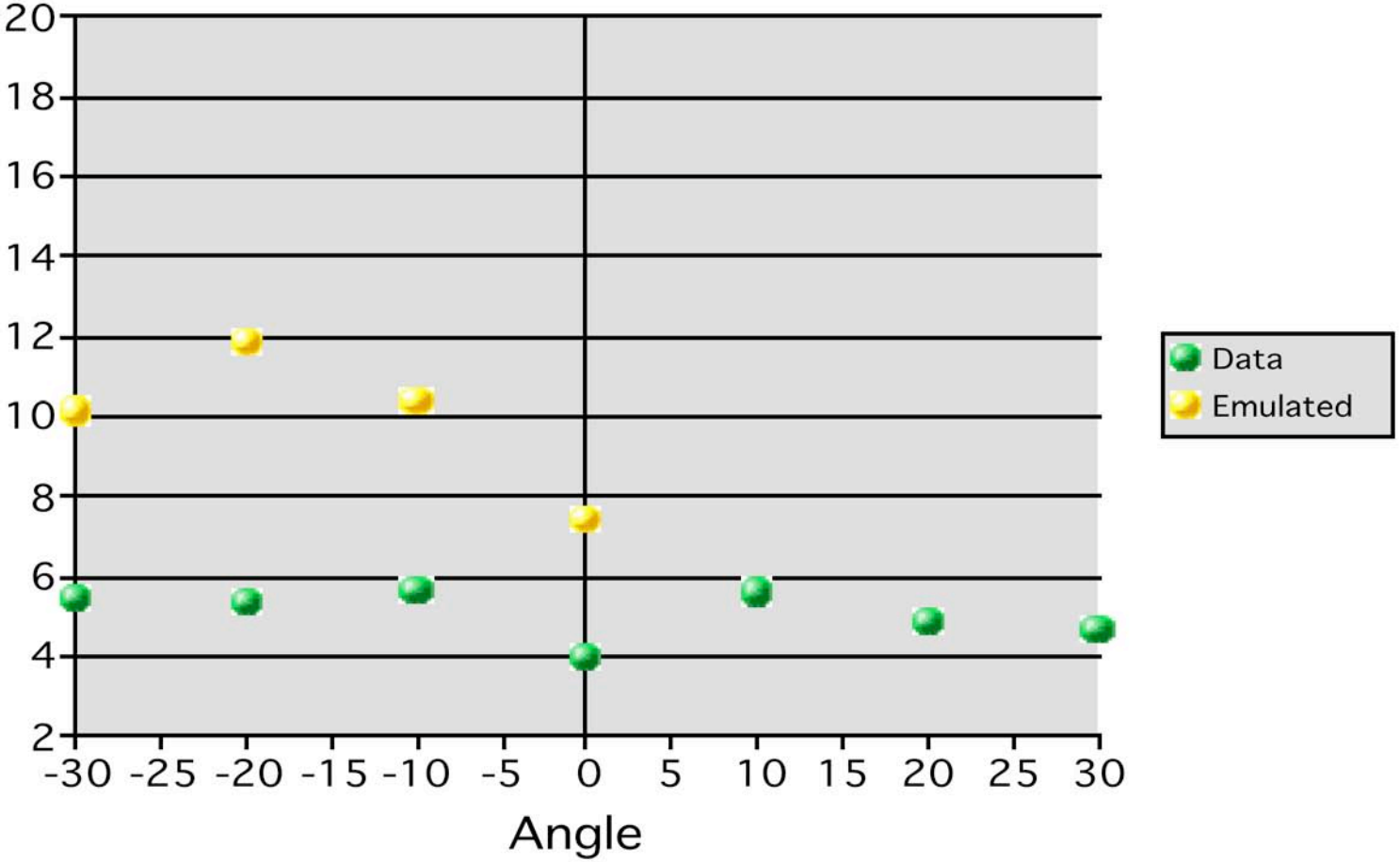
- Few Front-End problems
- Bad TDCs configuration in MB3 relevant in some cases
- Some Theta BTIs were masked by mistake, which turned into a wrong treatment of the uncorrelated Low quality triggers (as Theta Triggers validate uncorr. Low quality Triggers in the Phi view)

Trigger Efficiency at Correct BX vs Angle



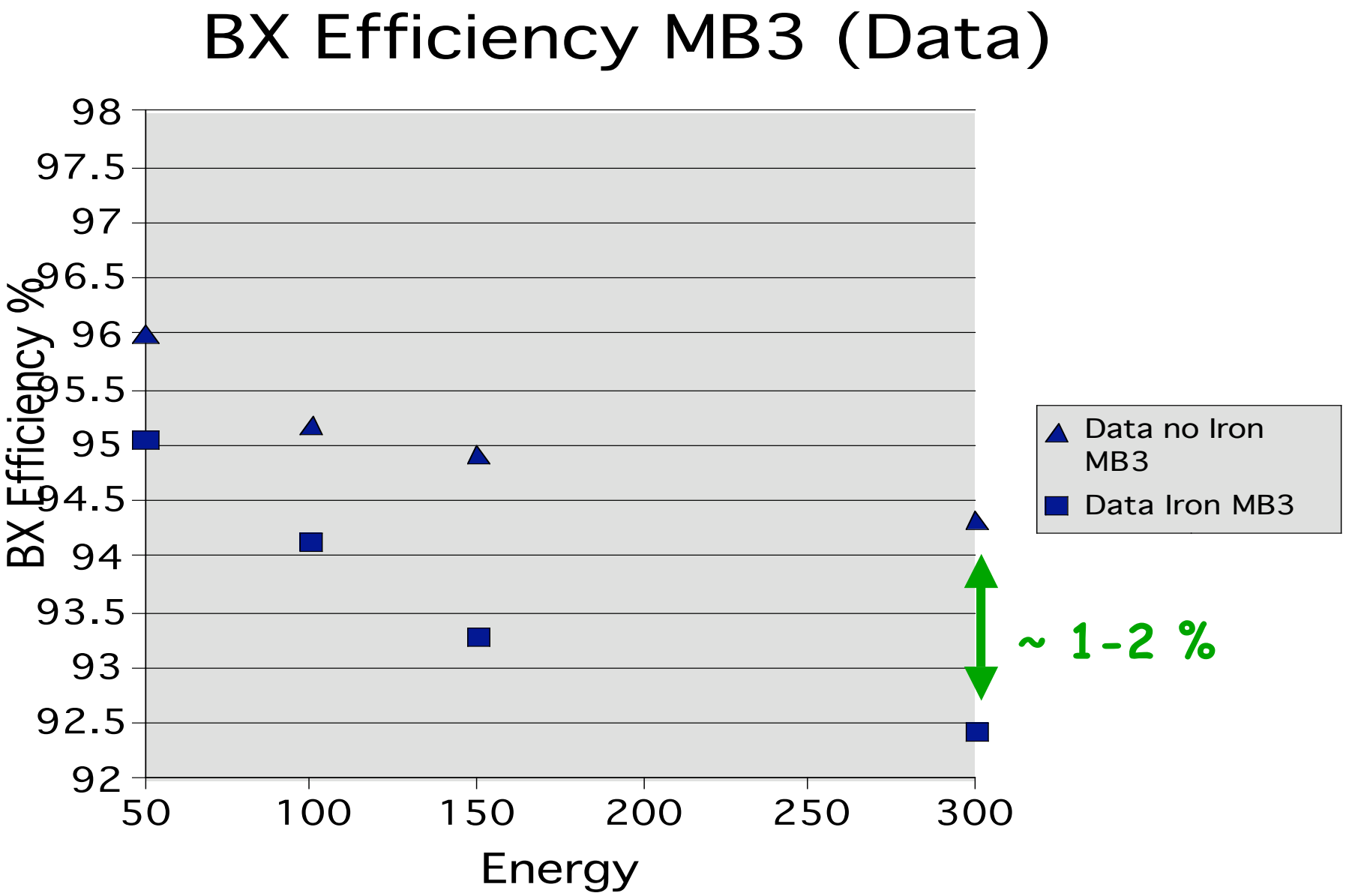
Higher efficiency for the emulation due to the uncorrelated Low trigger problem mentioned before.

Ghost Rate at Correct BX vs angle



Higher noise rate in the emulation, still due to the Low trigger problem mentioned before (most of the ghosts are uncorrelated Low triggers)

Effect of the Iron Absorber vs Beam Energy



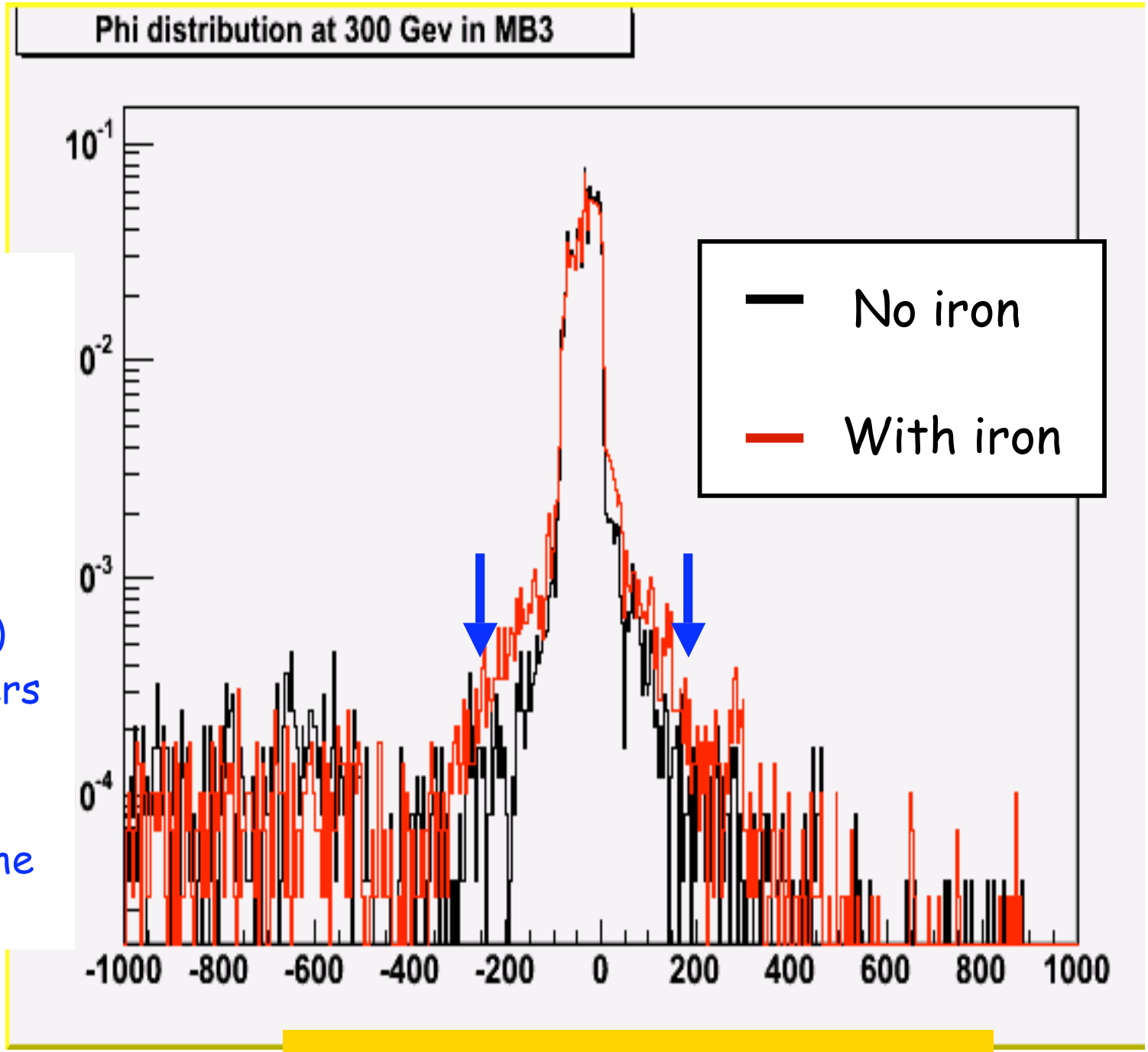
Actually when the **Track Finder** tries to match trigger segments from different stations, it opens a time window of **± 1 BX** around the centered BX.

This means that **also triggers at BX=±1 with respect to the correct BX** can in principle contribute to make a muon Trigger track, if they can be matched with other segments in the rest of the muon detector.

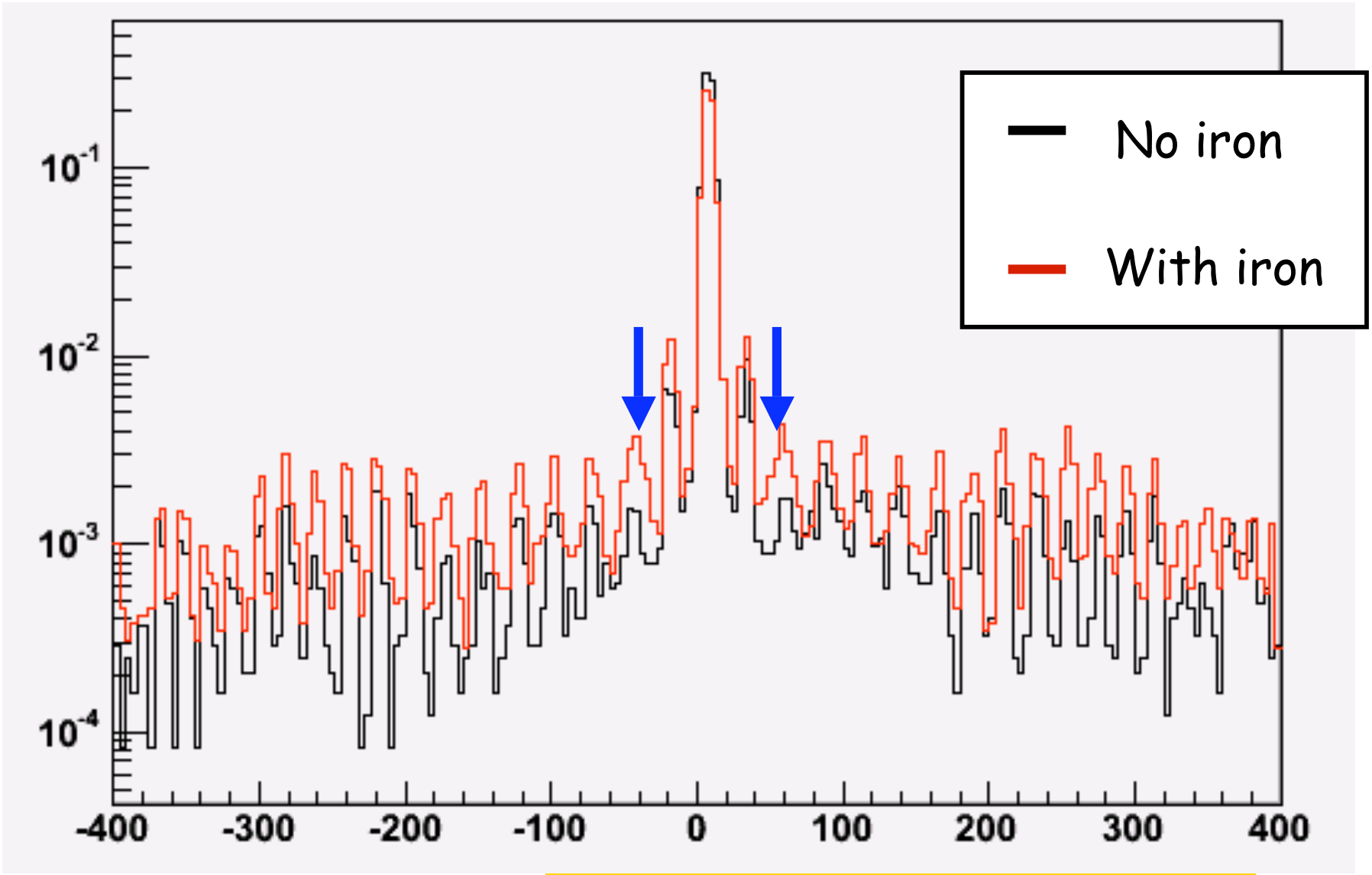
This happens if they have the **correct position and bending angle**, even if they occur at the wrong BX.

Therefore a fraction of the triggers at wrong BX can be recovered to **enhance the effective trigger efficiency**.

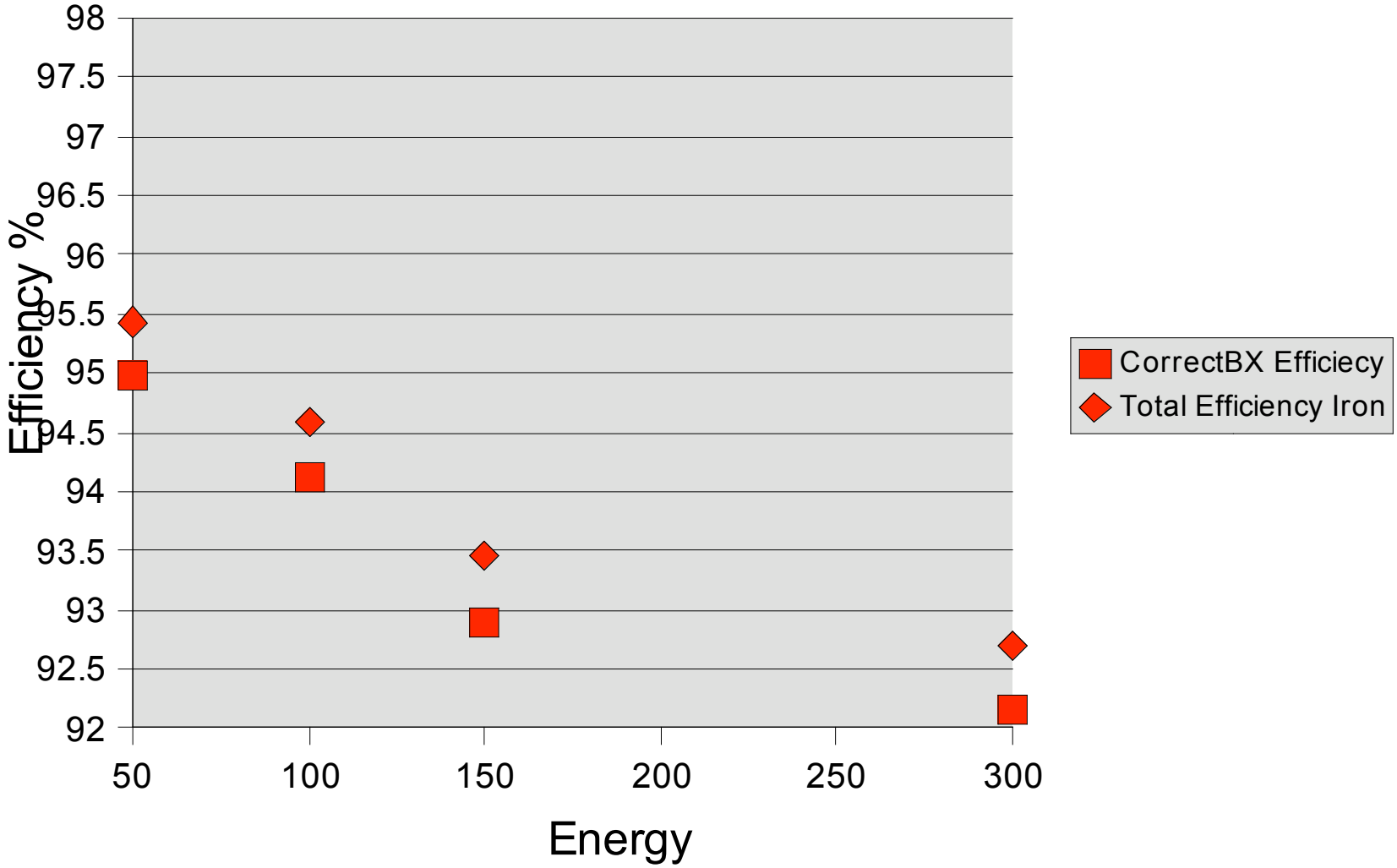
Among the triggers at BX=Correct±1 let's assume as good (i.e which contribute to the efficiency) only the triggers which occur in the range indidated by the arrows,



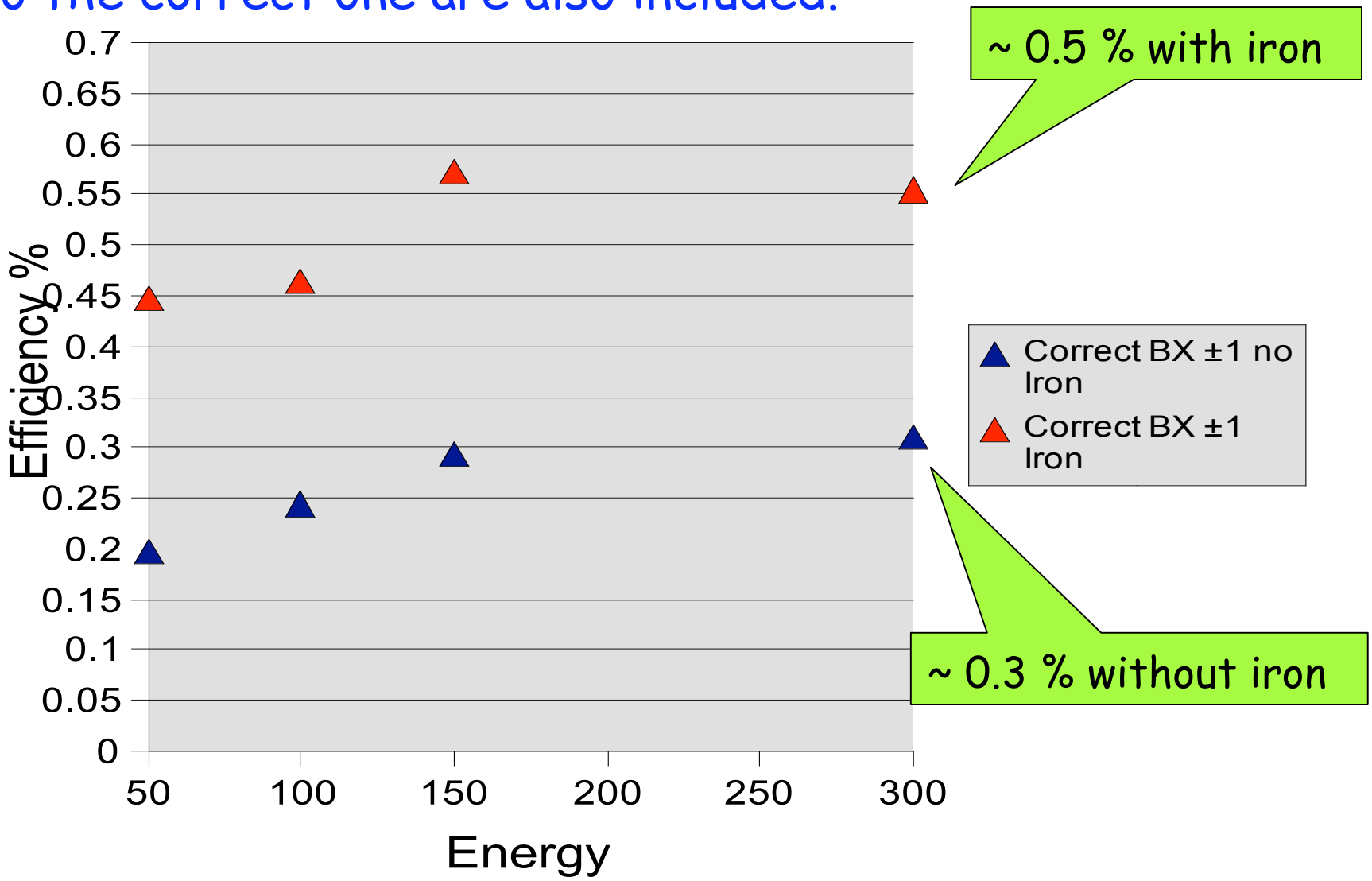
The same also for the **bending angle** of the trigger segment



The effective efficiency can be increased only by about 0.5 % if also triggers at BX=±1 with respect to the correct BX (and with correct position and bending) are also included



Efficiency gain as a function of beam energy, with and without iron, when triggers occurring at BX next to the correct one are also included.

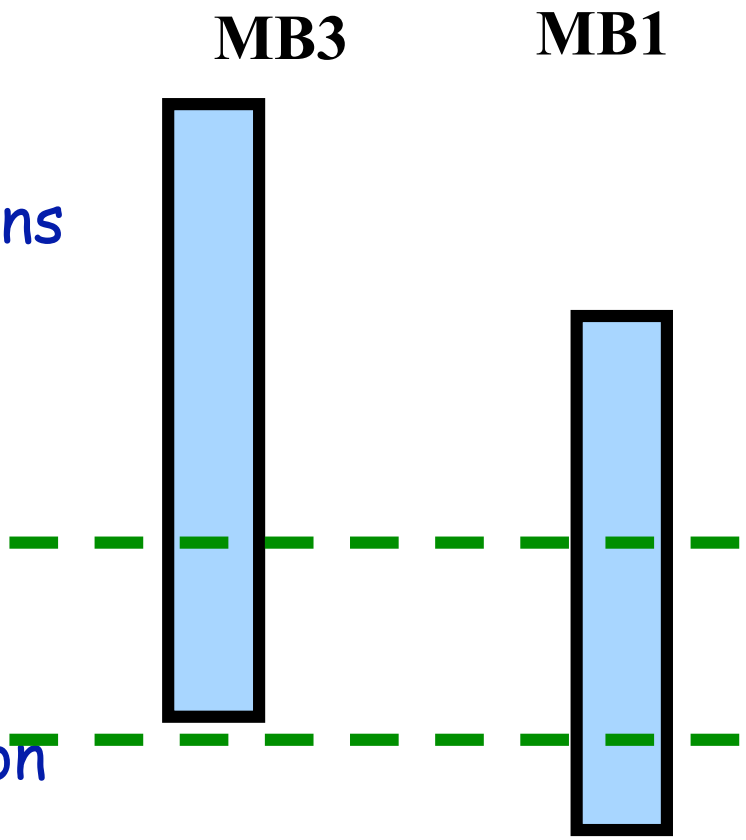


Di-Muon Analysis

As the two stations were often shifted and rotated during the data taking,it is not trivial to select di-muons in one station and check the trigger performace in the other one

Therefore for the moment the muon pair selection was performed as for 2003 test beam, i.e. each station was treated independently.

We are developing a more accurate di-muon selection

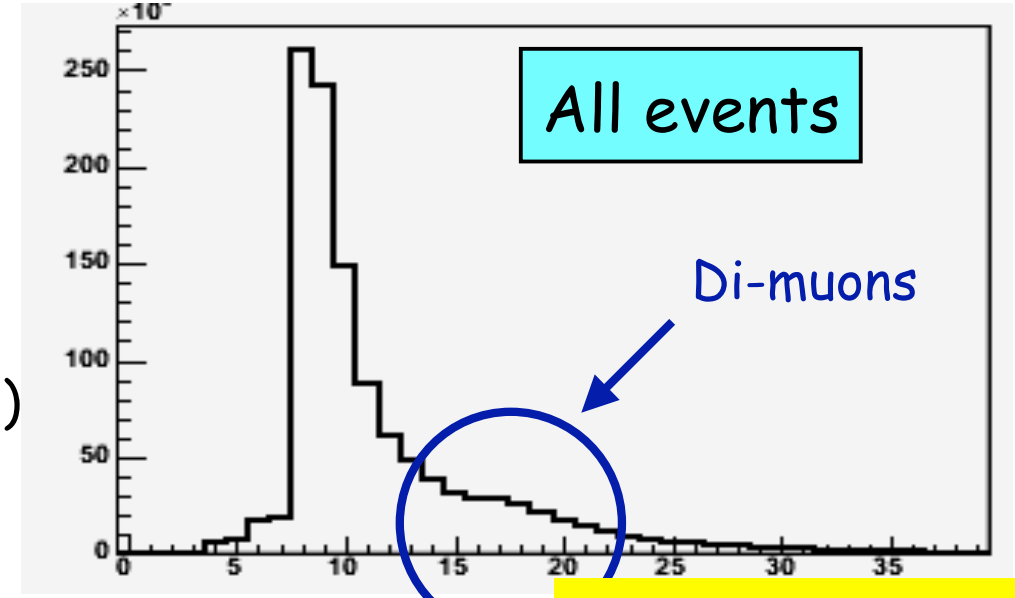


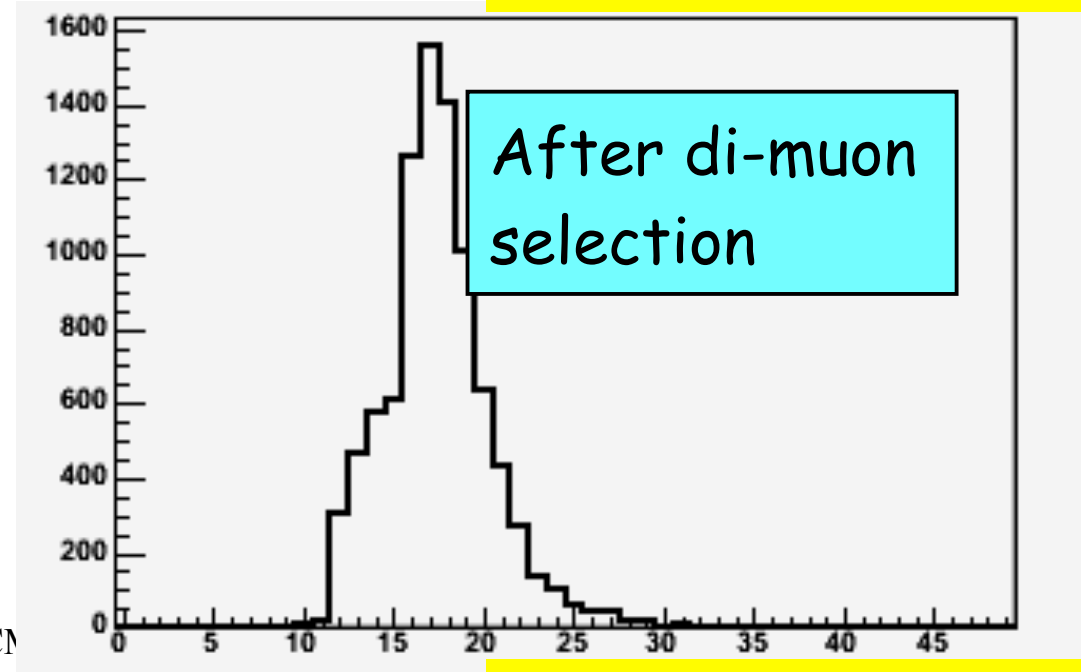
Di-Muon Selection

Two fitted tracks (TDC hits)
in the **Phi view**
with at least 4 hits and
average Mean Timer
in the espected time range
(to reject off time di-muons)

AND

Two fitted tracks (TDC hits)
n the **Theta view**





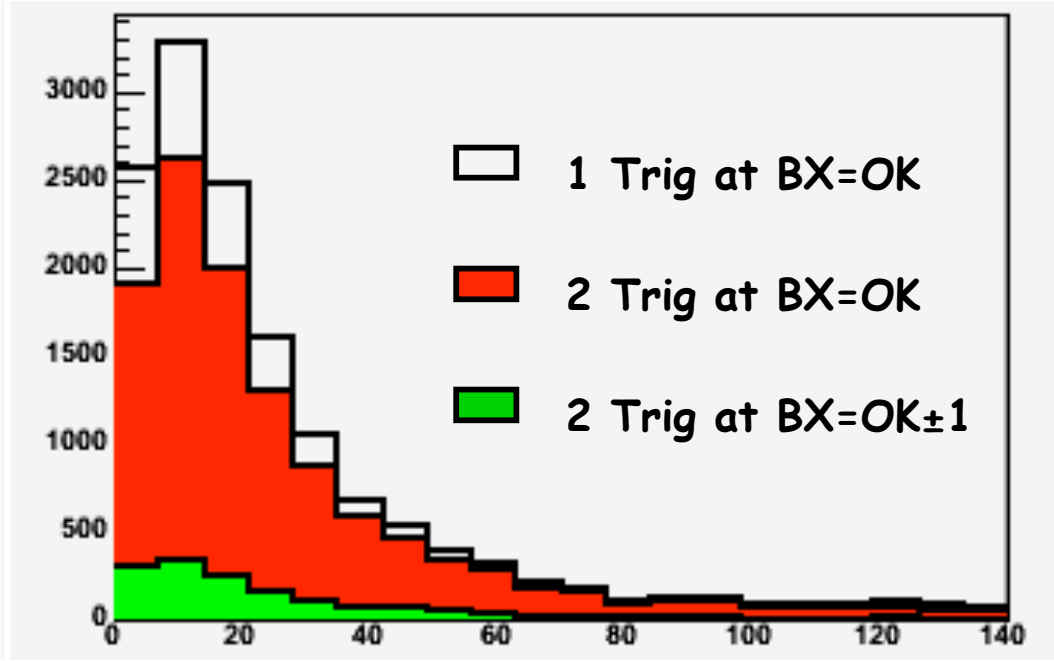
Di-Muon Efficiency

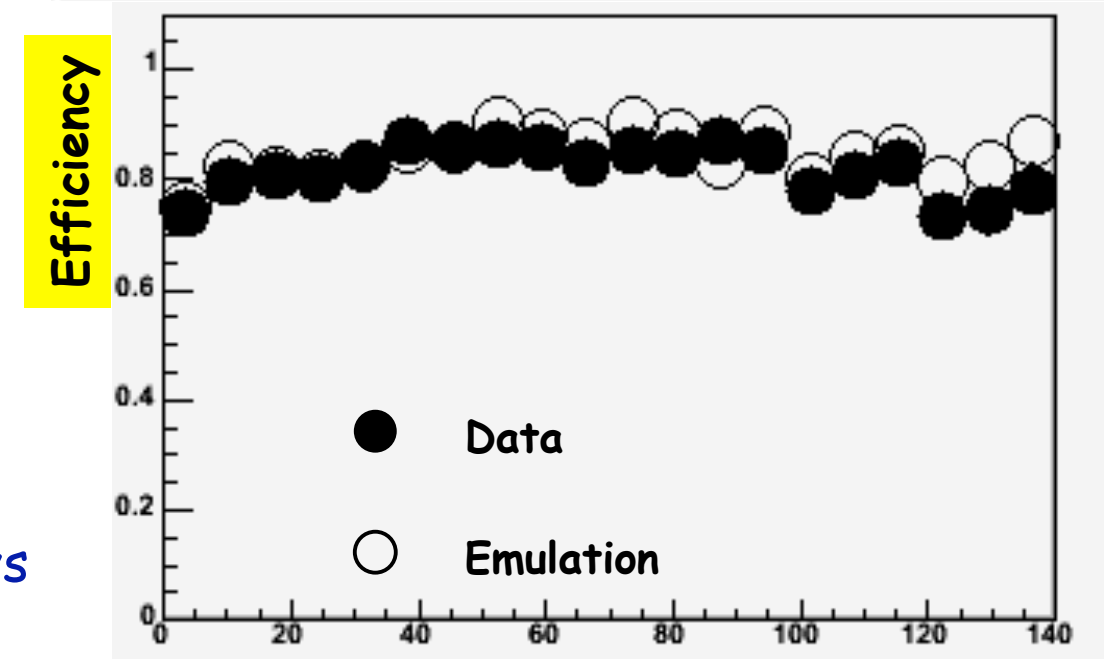
Most of the data usable for di-muon analysis are at 0 deg. for which effic. is lower than for other track incident angle.

Good agreeement with 2003 test beam results.

Good matching with emulation, also in view of the wrong uncorr. Low trigger treatment, which occurs only on Data and not in the Emulation

No cases with no triggers at all (at least 1 track is always triggered)

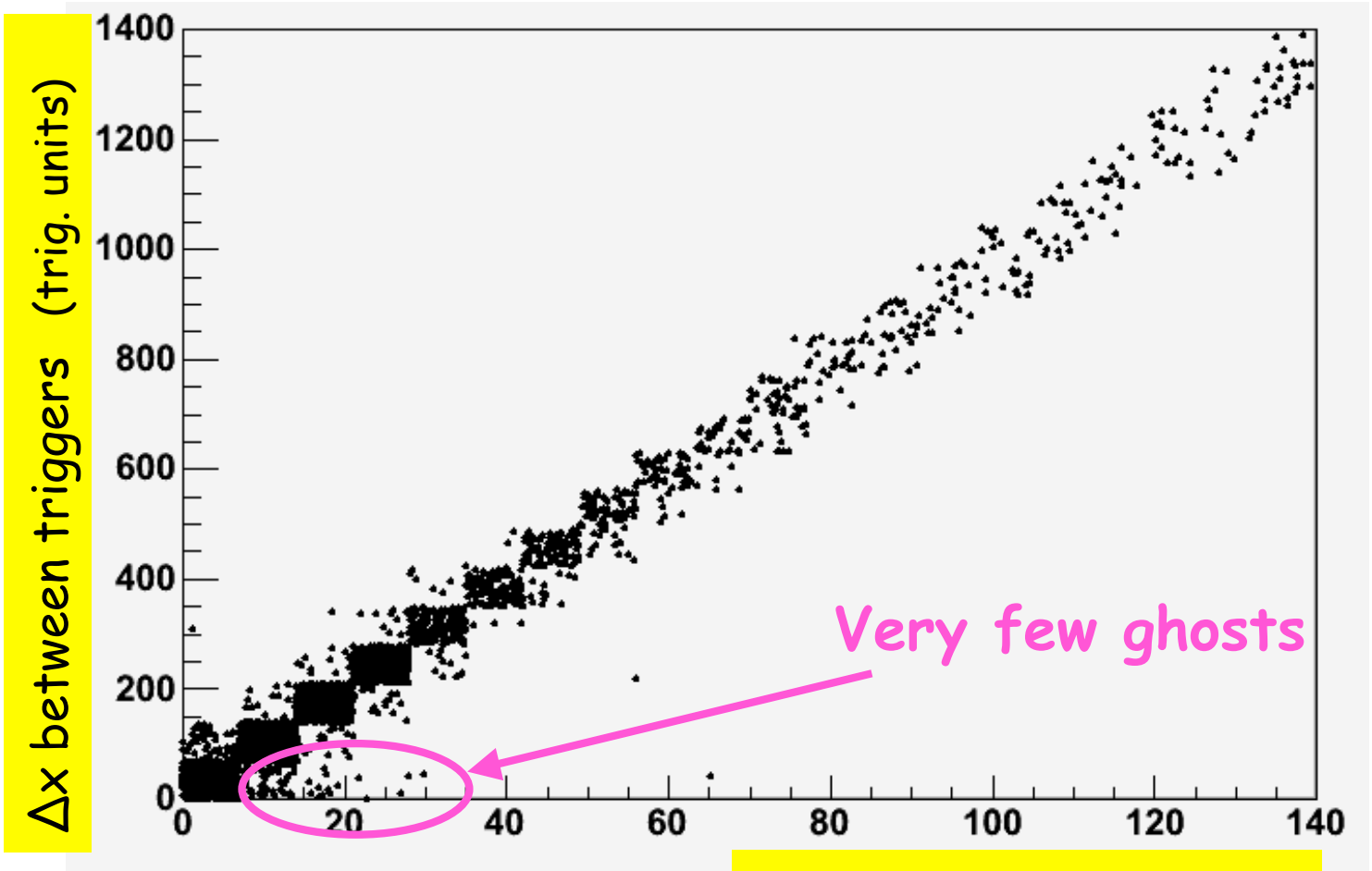




Di-Muons: are the two triggers the correct ones ?

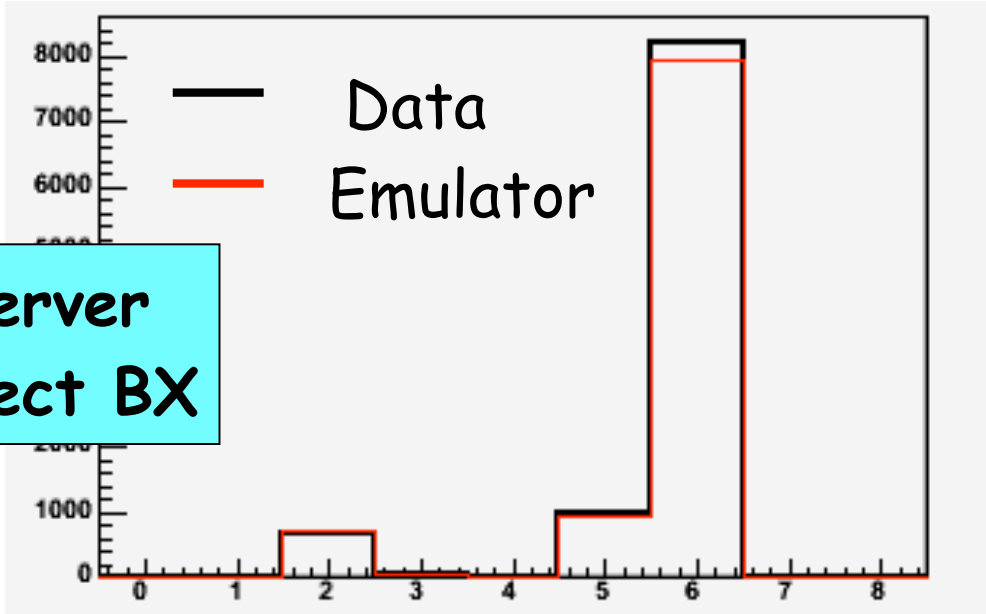
Correlation between track distance and trigger distance:

Ghost triggers lay out of the diagonal band



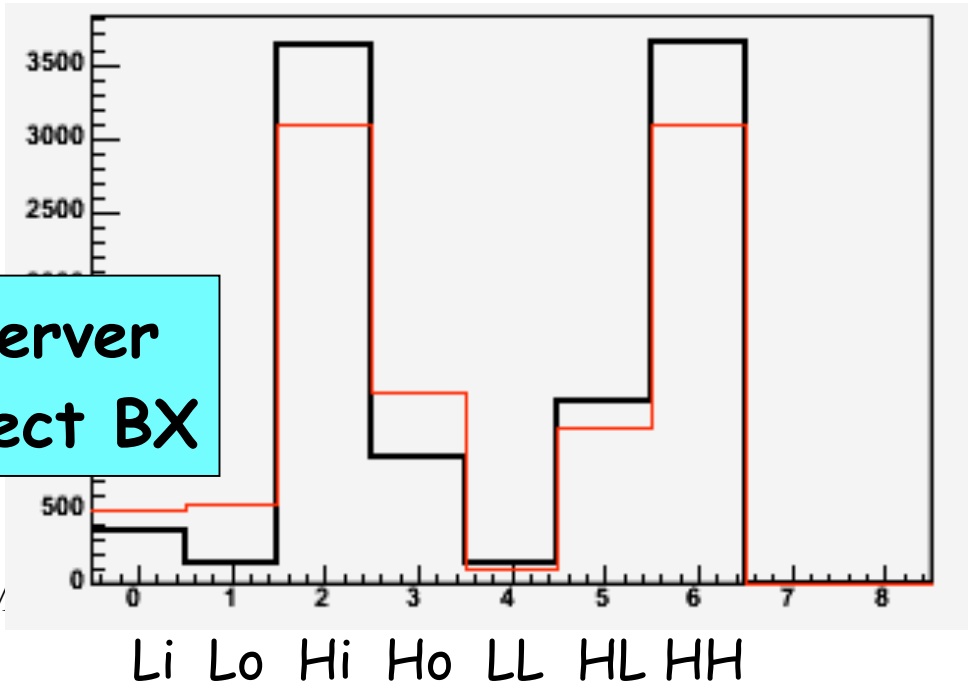
Quality of the Trigger Segments

1st Trigger Server Track at correct BX



Discrepancy with emulator due to wrong uncorr.
Low Trigger treatment and bad TDC configuration in MB3

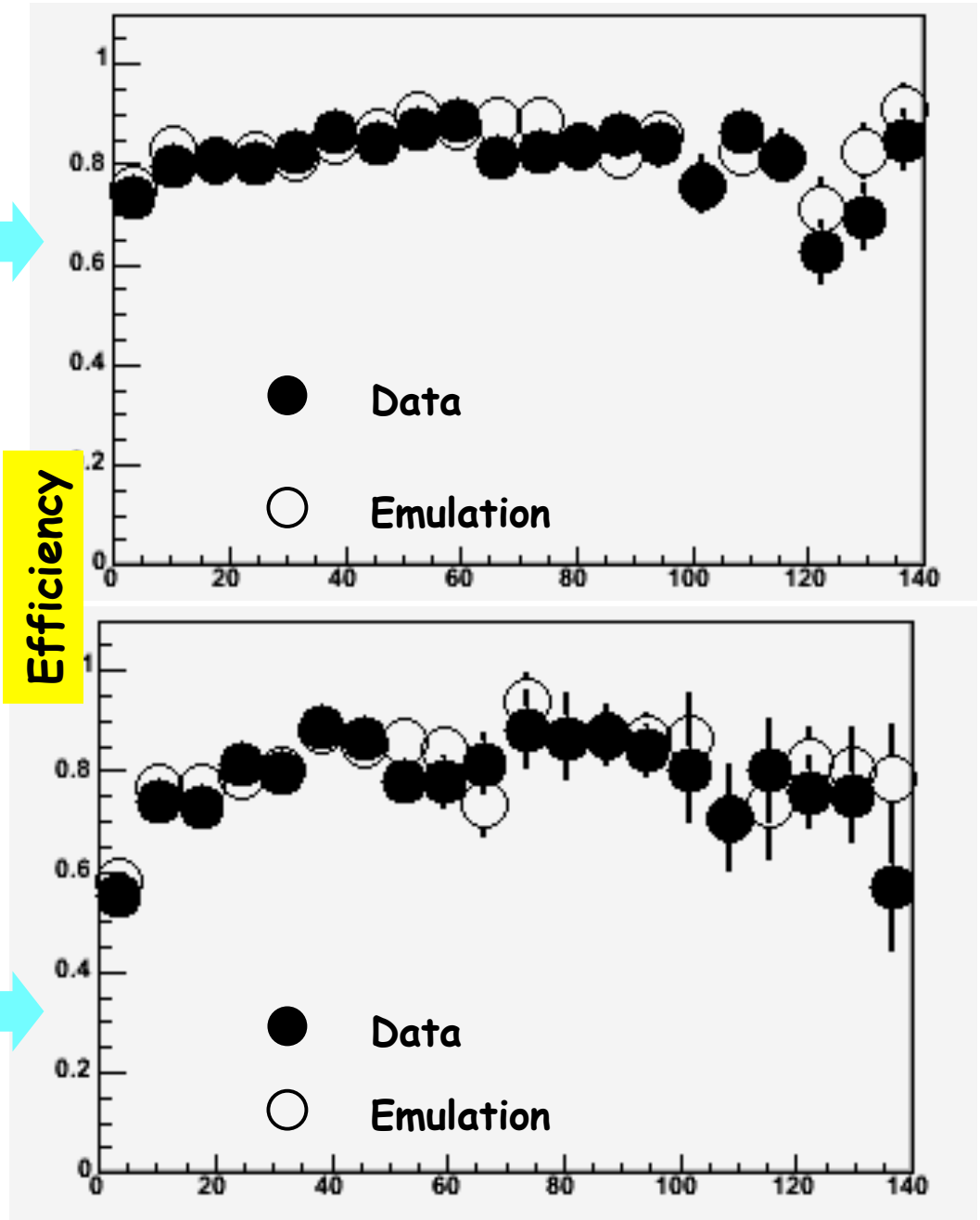
2nd Trigger Server Track at correct BX



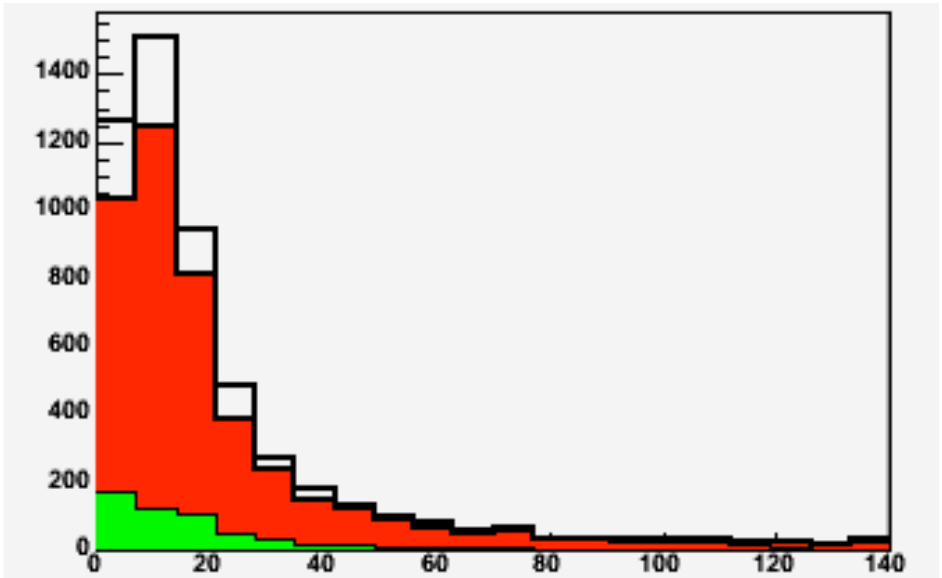
No absorber – 0 deg

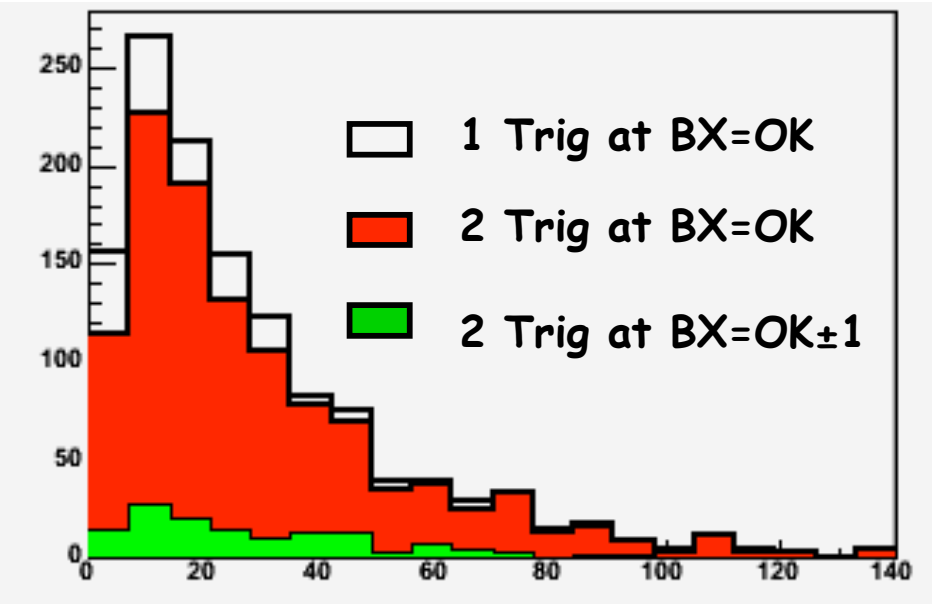
Small drop of efficiency when the iron absorber is placed in front of MB3, expecially when tracks are very close in space

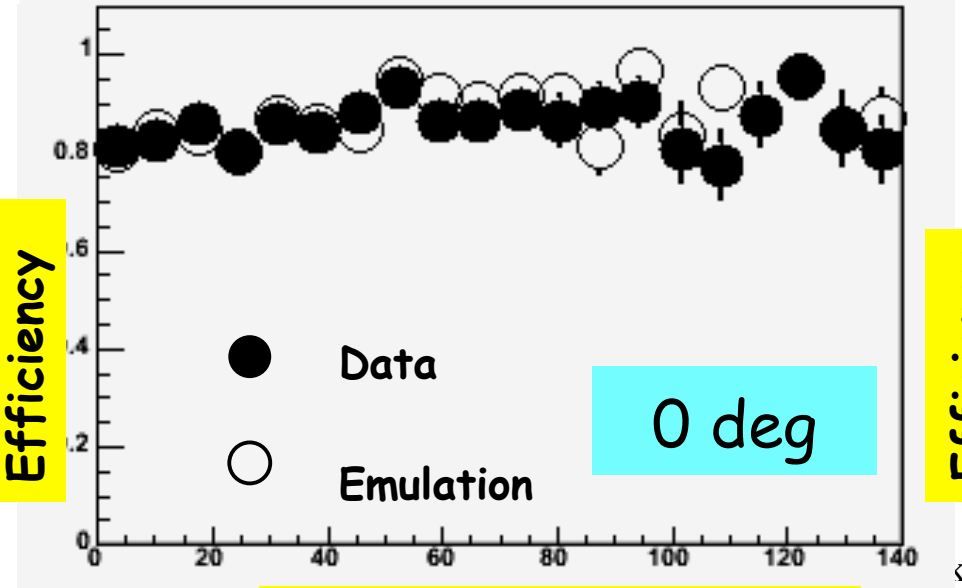
With absorber – 0 deg

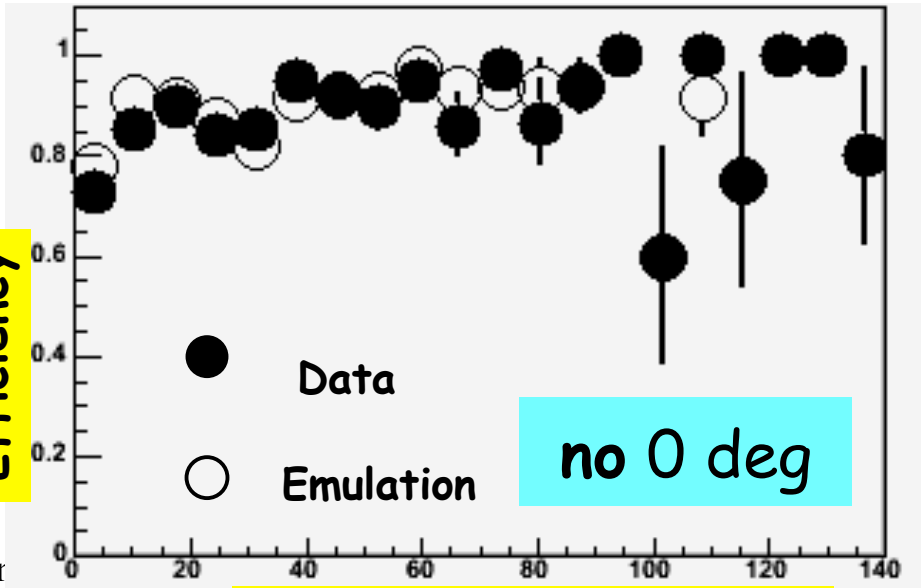


Incident angles different from zero









Conclusions

- Trigger performances in good agreement with 2003 results.
- New results from energy dependence and the effect of the iron absorber.
- Some refinements of the analysis is the two-muon selection will come soon.
- A written note is in preparation.
- Updated results from Track Finder performaces are expected also expected (Jorge)