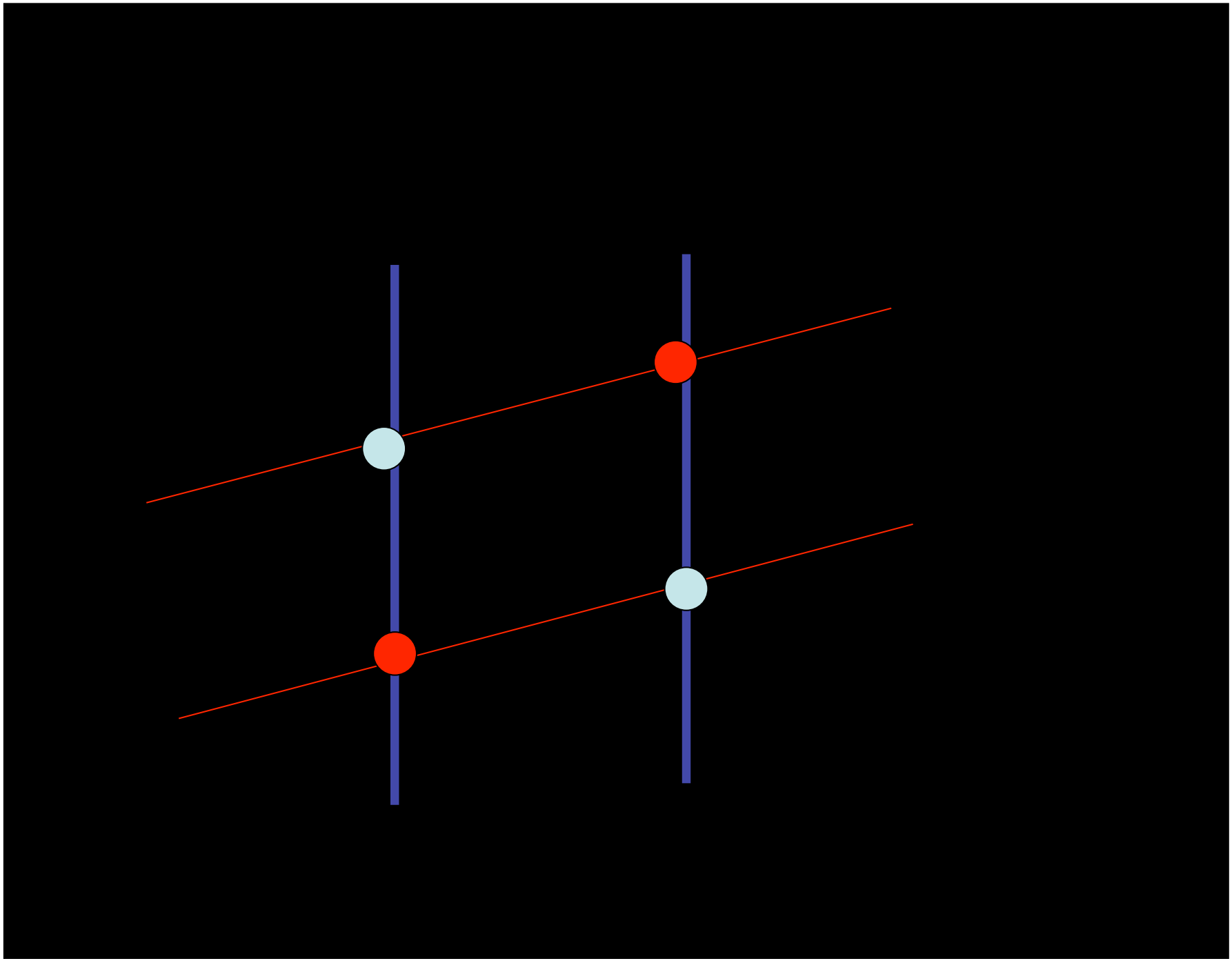
Solving rϕ – rz association ambiguity in the BESIII GEM Inner Tracker

- Present Inner Tracker provides stereo layers with small stereo angles ($\alpha \sim 3^0$) :
  - poor σ_z ~ 3-4 mm
  - but no wrong rϕ – rz association

- GEM readout provide rϕ and rz strips with large stereo angles ($\alpha \sim +/- \ 30^0$) :
  - very good σ_z ~ 400-500 μm
  - but ambiguity in rϕ – rz association

- However layers have different stereo angles , therefore small probability to have the same wrong association between layers



3 Layers Proposal

- Layer . Stereo angle . Foils

1	28.0^0	2
2	-30.4^0	2
3	33.0^0	2

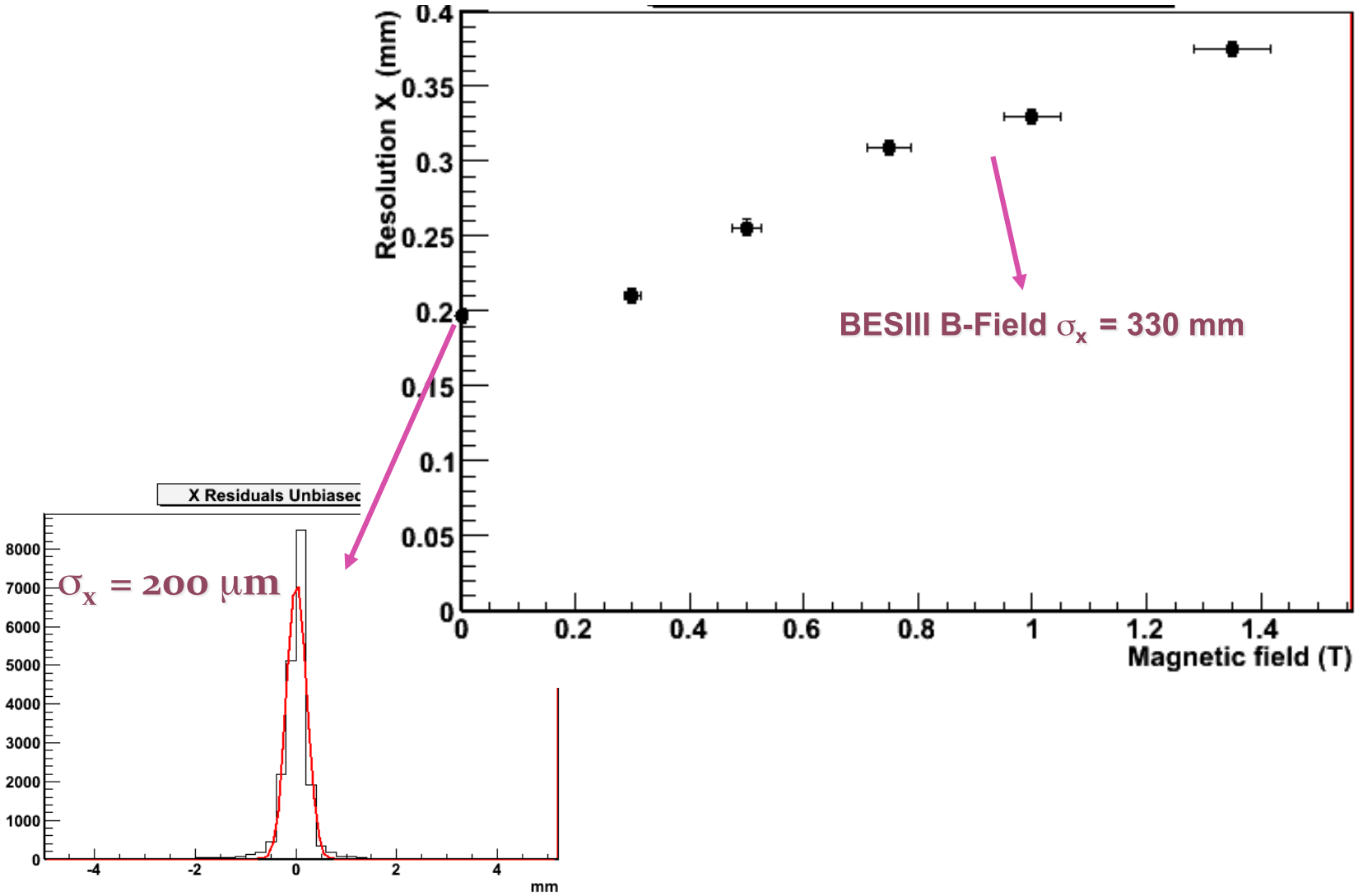
- Wrong aligned associations/event, < 2 mm

Tracks .	3 al. hits	. 2 al. Hits
2	0.00	0.05
4	0.04	0.31
6	0.10	1. 12
8	0.18	2.60

- No wrong association, < $r\phi$ ~ 200 μm, rz ~ 400 μm

- Background in the first layer to be considered yet

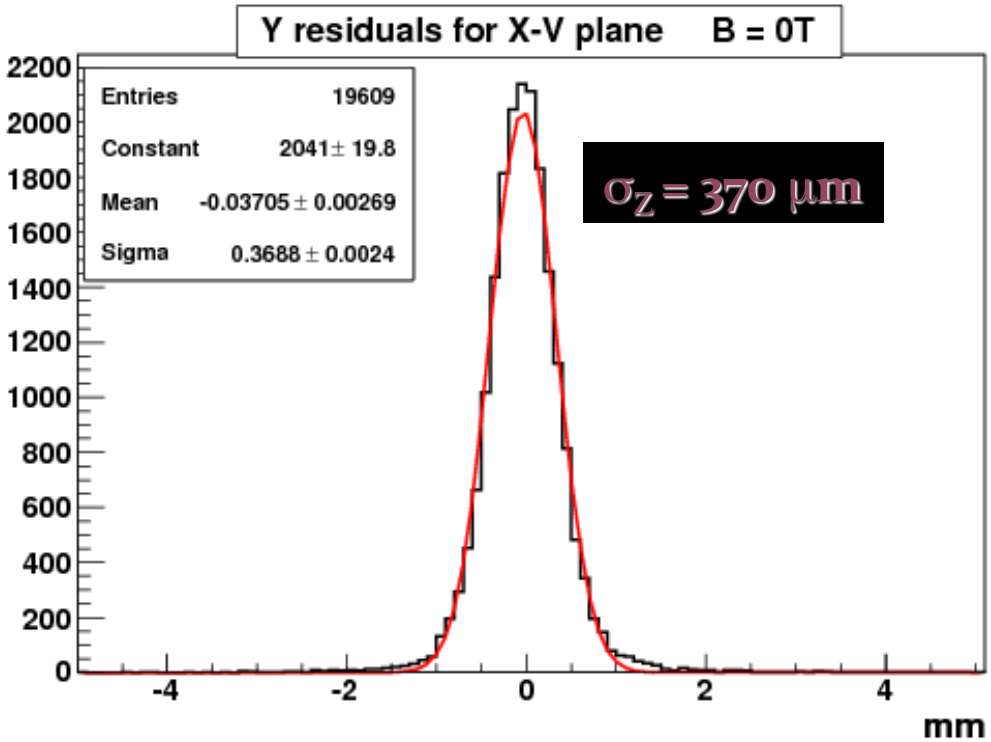
Spatial resolution: X-view (r-φ)

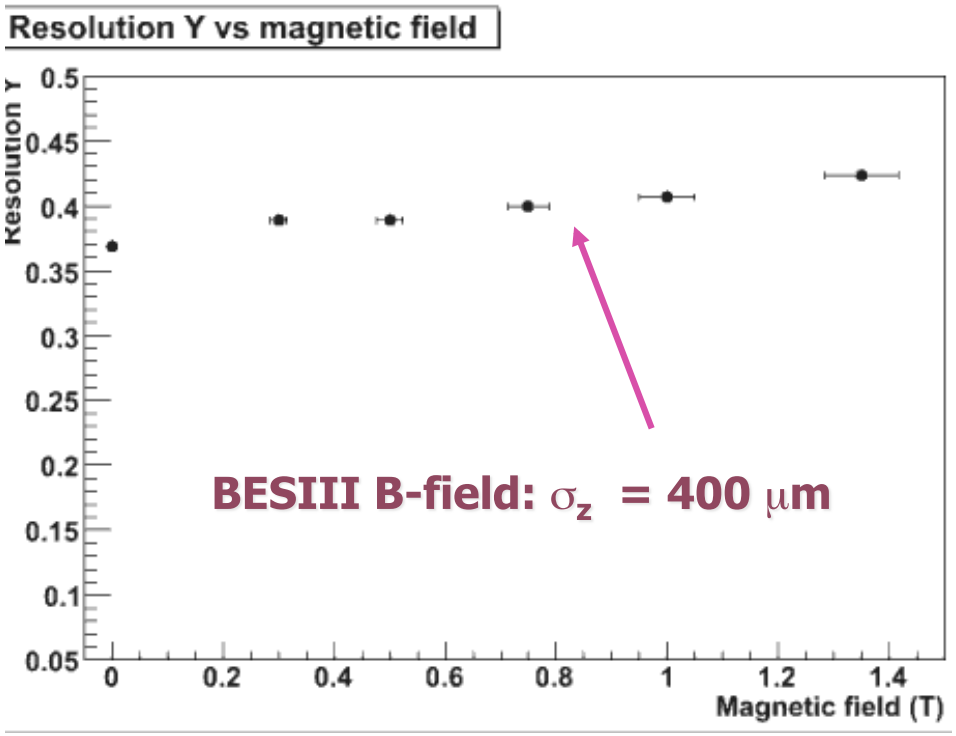


Spatial resolution : Z-coordinate

The Z coordinate is determined from the crossing of X (r-φ) and V views

(Better z resolution , if lower pitch or analog readout)





How to profit to reduce the effect of the magnetic field ?

- 2 stereo wiews (like the present Inner Tracker) ?

- Starting with the anode in the first layer:

  one foil only -> stereo angle ~ 47^0