

MVD space request & Impact on BWE EMC

MVD space requests

Impact on BWE EMC

Work In Progress

MVD (& STT) vs BWE EMC

- MVD Services – need more space in R
- STT Cabling – may need more space in Z (not a firm request yet!)
- Consequences on BWE EMC
- Consequences of “reduced” MVD
- → Report to CB to make informed decision on how to proceed
- *Current deadline by CM in ~~March~~ June 2017*

MVD Space requests

- An increase of the outer services diameter
- (a) **from 310mm to 340mm (+15mm in radius)**
 - very tight packing of the cables
 - possibly generating noise and crosstalk issues
 - No safety factor
- Therefore, more „realistic“ scenario, increase
- (b) **from 310mm to 360mm (+25mm in radius)**
 - leaves room for solutions of possible installation issues

MVD: Some additional notes

- N.B. 1:

The design and the FEM analysis of the central tracker (STT+MVD) support were done without the additional weight of the MVD services (80-90 kg hanging around the beam pipe);

new FEM analyses are therefore required and may mandate possibly variations of the geometry.

- N.B. 2

The possibility of a faster installation of the routing can be achieved with the three circular patch panels; these would disentangle the cables along the beam pipe from those coming from the racks.

These disks also require additional radial space in order to be connected properly.

- N.B. 3

The GBT boards are powered directly from the racks and not with DC-DCs, for which there is no space in the service region.

This solution requires thicker cables, in order to avoid a very large voltage drop

MVD: How to proceed

To make sure that the MVD space request is unavoidable and final engineering efforts are required to address these space issues and provide alternative / new solutions to this problem.

- Define work-packages
 - Update drawings with latest details and final electrical components
 - Revisit service requirements
 - Mechanical issues
 - Electrical possibilities
- Estimate man-power
- Prioritize issues

Impact on BWE EMC

- In parallel to the MVD efforts
- The Impact on BWE EMC should be quantified:
 - (a) Acceptance changes when leaving out crystals? - Luigi
 - (b) Which physics processes are affected & to which extend? – Alaa
 - List affected physics channels
 - Physics simulations required
 - (c) What changes to the actual detector? – David
 - (d) Removal of innermost layer sufficient for space request? - David

BWE EMC Impact – work in progress (Luigi, David)

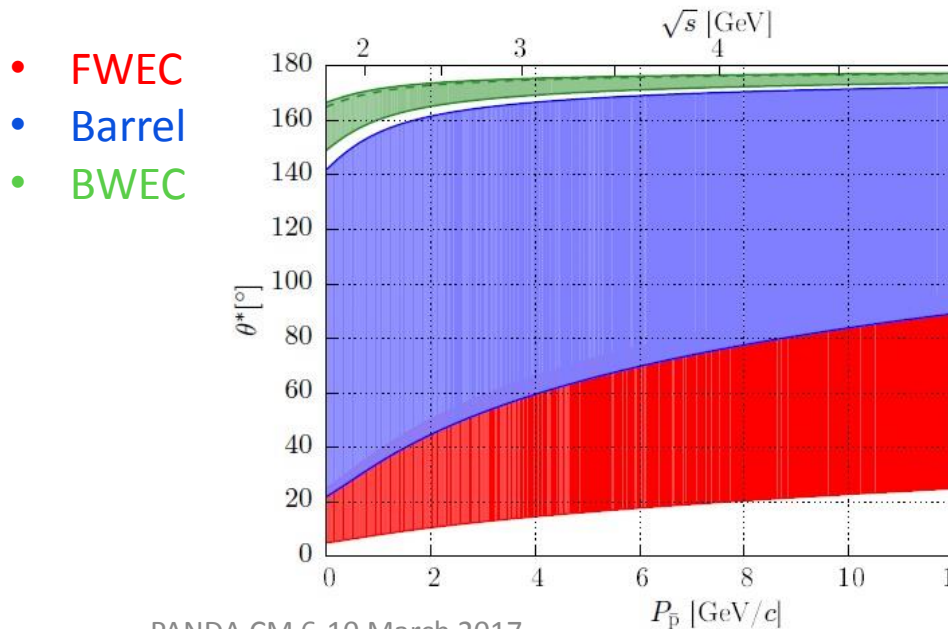
Numerical values for the limits of θ in the lab frame (from David):

	θ_{\min}	θ_{\max}	$\tilde{\theta}_{\max}$
FWEC	5.0°	25.0°	--
Barrel	22.0°	142.0°	--
BWEC	149.1°	166.6°	165.0°

where $\tilde{\theta}_{\max}$ is the value without the innermost layer of crystals.

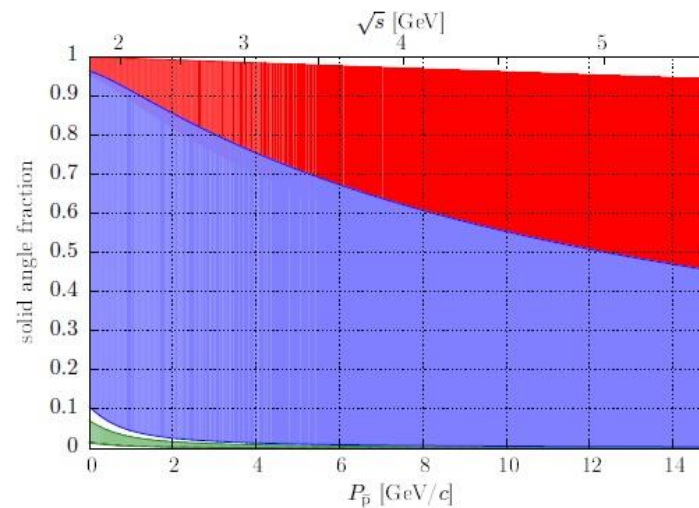
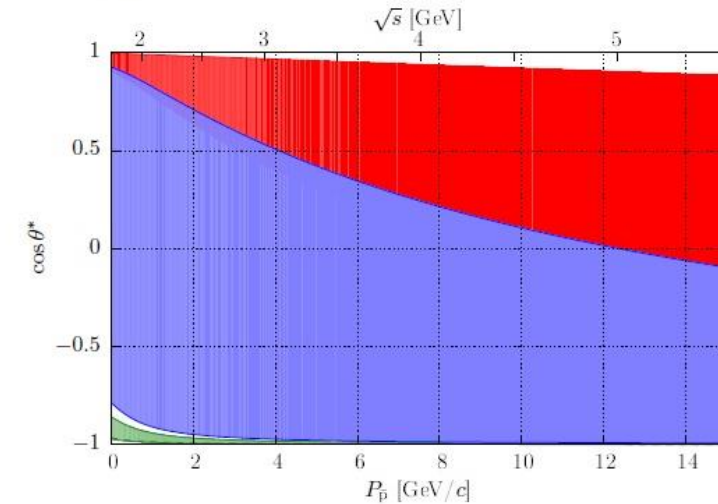
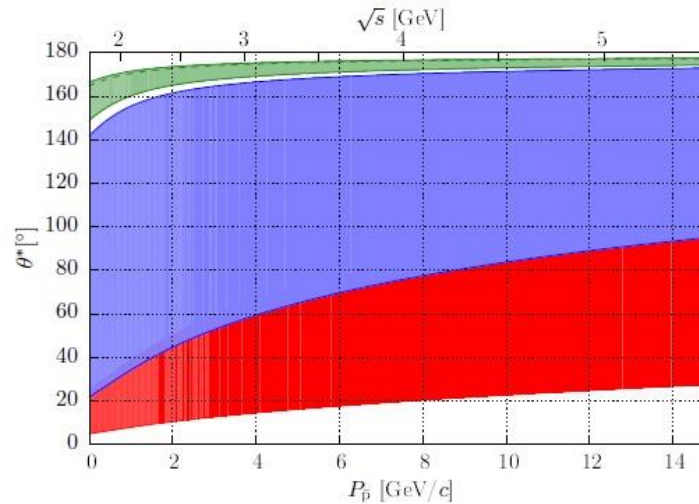
Plotting $\theta^*(\theta; P_{\bar{p}})$ from eq. (1) for the θ values in the table above:

- ▶ Colours: FWEC \Rightarrow red, barrel \Rightarrow blue, BWEC \Rightarrow green.
- ▶ Dashed line corresponds to $\tilde{\theta}_{\max}$

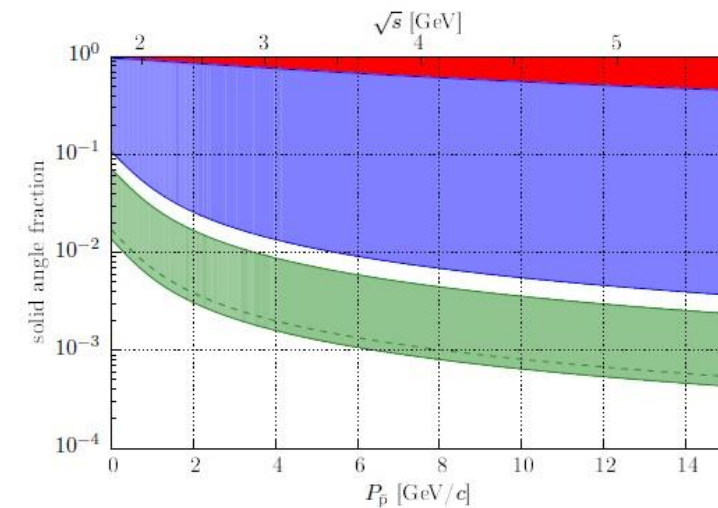


PANDA CM 6-10 March 2017

Original Z position: $\theta_{\min} = 149.1^\circ$, $\theta_{\max} = 166.6^\circ$, $\tilde{\theta}_{\max} = 165.0^\circ$



A. Belias - GSI

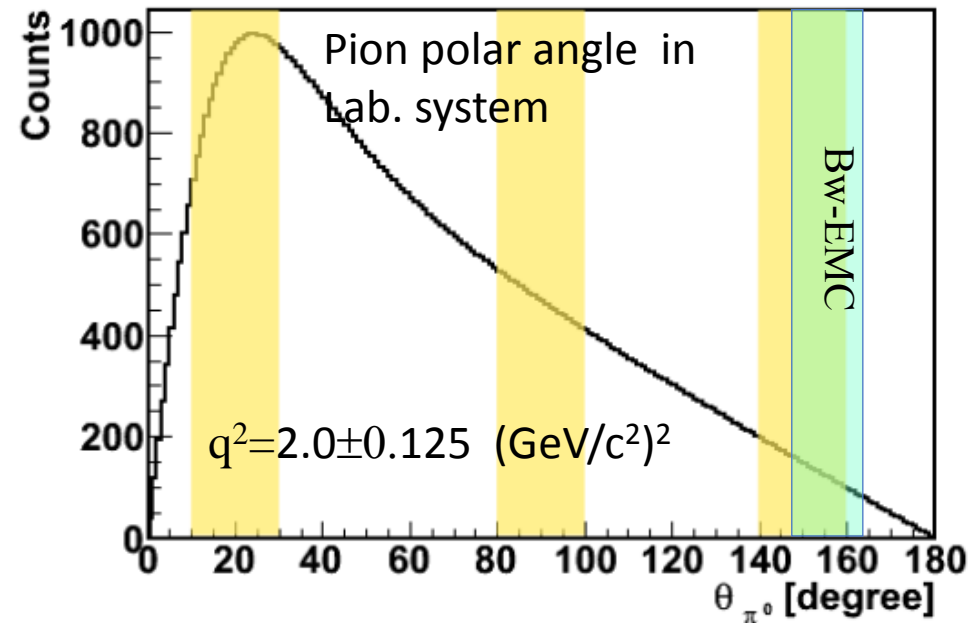
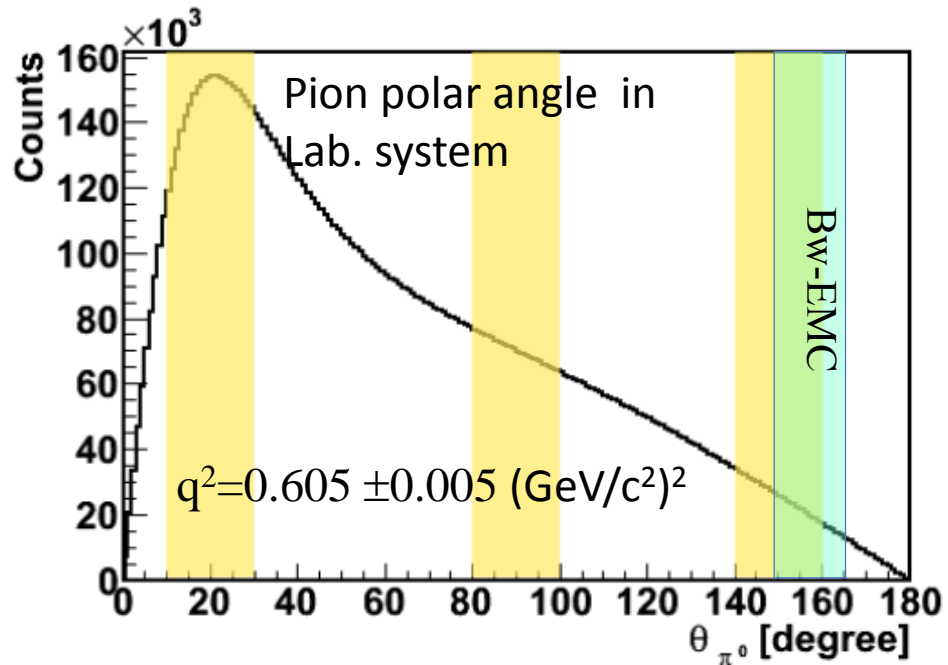


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BWE EMC Impact on Physics - work in progress (Alaa)

Some electromagnetic physics/channels that can be affected by the acceptance reduction of the BW-EMC:

Time-Like electromagnetic form factors FFs in the unphysical region: $\bar{p}p \rightarrow e^+ e^- p^0$



Transition Distribution Amplitudes (TDAs) with meson production in $p\bar{p}$ annihilation:

$$\bar{p}p \rightarrow g^* p^0 \rightarrow e^+ e^- p^0$$

$$\bar{p}p \rightarrow J/\psi p^0 \rightarrow e^+ e^- p^0$$

Work In Progress

To make sure that the MVD space request is unavoidable and final engineering efforts are required to address these space issues and provide alternative / new solutions to this problem.

- Define work-packages
- Estimate man-power
- Prioritize issues



Identify woman-/man-power in PANDA

Assess impact of BWE EMC reduction on:

- BWE EMC acceptance
- Physics channels