

# Update on measurement of Bose-Einstein Correlations

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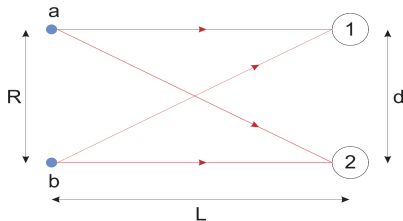
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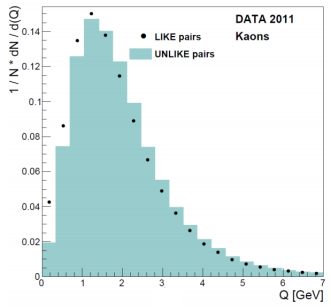
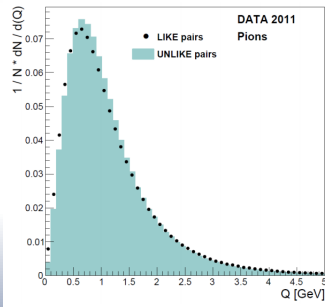
# Reminder

- HBT interferometry can be used to study the diameters of source.
- For indistinguishable particles the phenomena is known as Bose-Einstein Correlations (BEC).
- BEC correlations occur as enhancement of same particles in the low  $Q$  region.
- We already observed the effects.



# Results in 2011 data

Enhancement at low  $Q^2$  region. We selected  $\mathcal{O}(10^8)$   $\pi$  pairs, and  $\mathcal{O}(10^6)$   $K$  pairs.

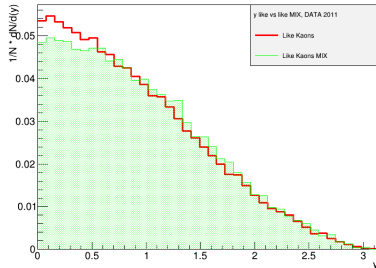
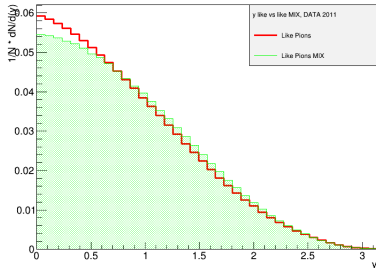


# Results in 2011 data

We can rewrite  $Q$  in form:

$$Q = \sqrt{-2q_{\perp 1}q_{\perp 2}[\cosh(y_1 - y_2) - \cos(\phi_1 - \phi_2)]} \quad (1)$$

,where  $y_i$  are the pseudo-rapidity,  $\phi_i$  are azimuthal angles. We see BEC

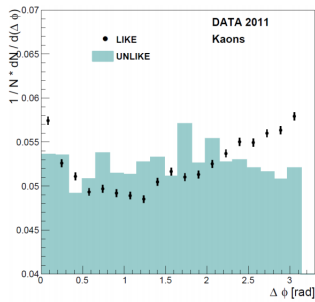
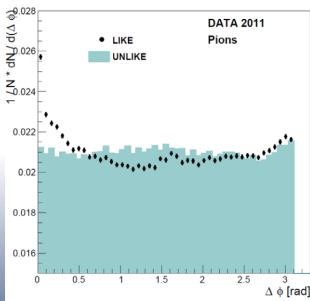


# Results in 2011 data

We can rewrite  $Q$  in form:

$$Q = \sqrt{-2q_{\perp 1}q_{\perp 2}[\cosh(y_1 - y_2) - \cos(\phi_1 - \phi_2)]} \quad (2)$$

,where  $y_i$  are the pseudo-rapidity,  $\phi_i$  are azimuthal angles. We see BEC



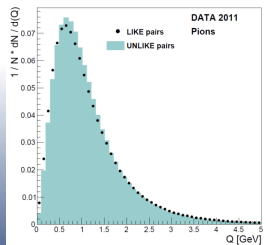
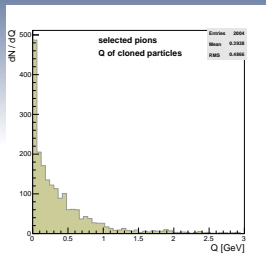


## Accessing the systematics

- One of the main systematics that keep us awake in the night are contributions from clone tracks.
- Potentially very dangerous because one expects them to peak on low  $Q$  region only for same sign particles, like BEC.
- We used MC11 minBias MC sample, and tool from Chris Jones to study this effect.

Fraction of clones:

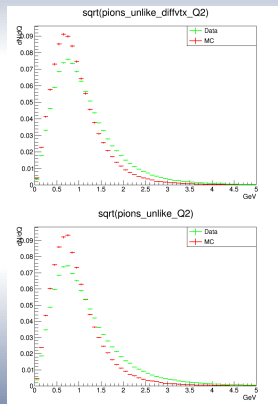
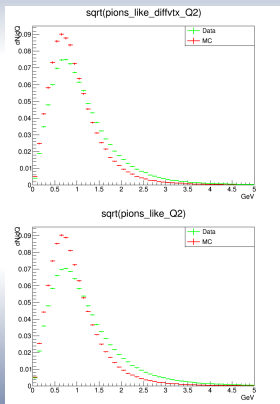
- pions:  $(0.319 \pm 0.023)\%$
- kaons:  $(0.023 \pm 0.015)\%$
- kaons:  $(0.055 \pm 0.021)\%$





# MC/Data comparison1

We compared the same sample with data.





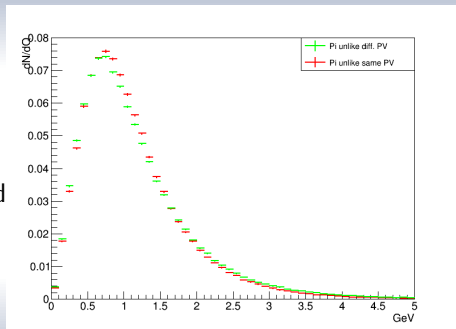
## MC/Data comparison

- We observed a big discrepancy between DATA and MC.
- If we want to use this as reference sample we need to reweigh.
- Do to limited statistics it's still suboptimal sample.
- Could we ask for production of minBias siom08 7TeV?

# Coulomb effect

Fraction of clones:

- Using data we tried to verify the Coulomb effect in our sample.
- Using unlike pairs from the same and different PV.
- Effect is visible but small.





## MC/Data comparison

- We discussed with Vanya, and we will use double charm production stripping line for correlations in charm.
- Line is being currently re striped, to take also the dicharm mass.
- Alice published paper with first measurement of 3-body correlations (1310.7808).
- This is a search a bit different to ours. We don't study the centrality and the halo is smaller in pp collisions.
- But the fact remains they saw effects that could not be explained by any model.



## Conclusions

- We started accessing some of the systematics.
- For now clones do not work to scary.
- Coulomb also is smaller than BEC.
- MC clearly doesn't agree with Data, will try reweighing.