Mass Calibration

Marcin Chrzaszcz

$\mathrm{B}^0 \to \mathrm{K}^* \mu^- \mu^+$ meeting, CERN
28 March 2018

Mass Calibration - why?

⇛ In the fit for rare mode $\mathrm{B}^0_\mathrm{d} \to \mathrm{K}^* \mu\mu$ we cannot leave the mass shape floating as we do for $\mathrm{B}^0_\mathrm{d} \to \mathrm{K}^* \mathrm{J}/\psi$

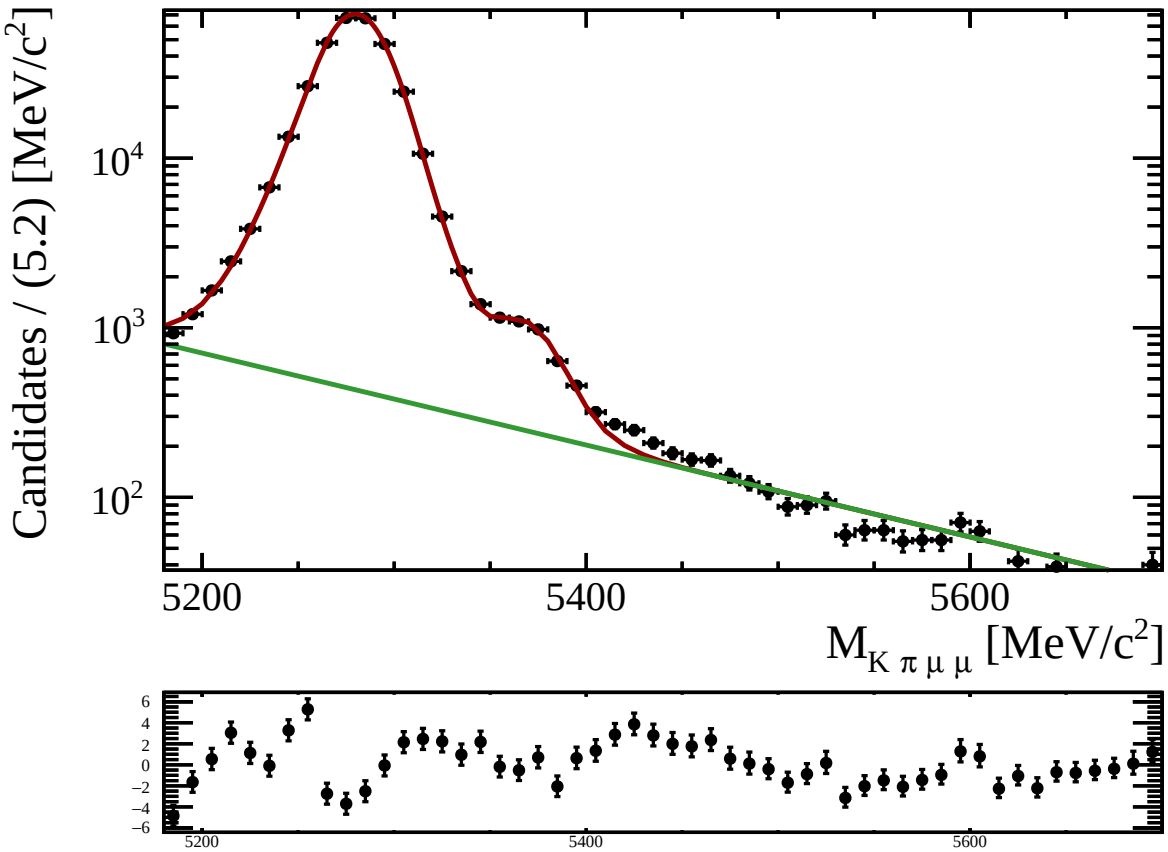
⇛ To many free parameters!

⇛ We need to obtain the mass-shape from data: $\mathrm{B}^0_\mathrm{d} \to \mathrm{K}^* \mathrm{J}/\psi$

⇛ Than account for difference due kinematics.

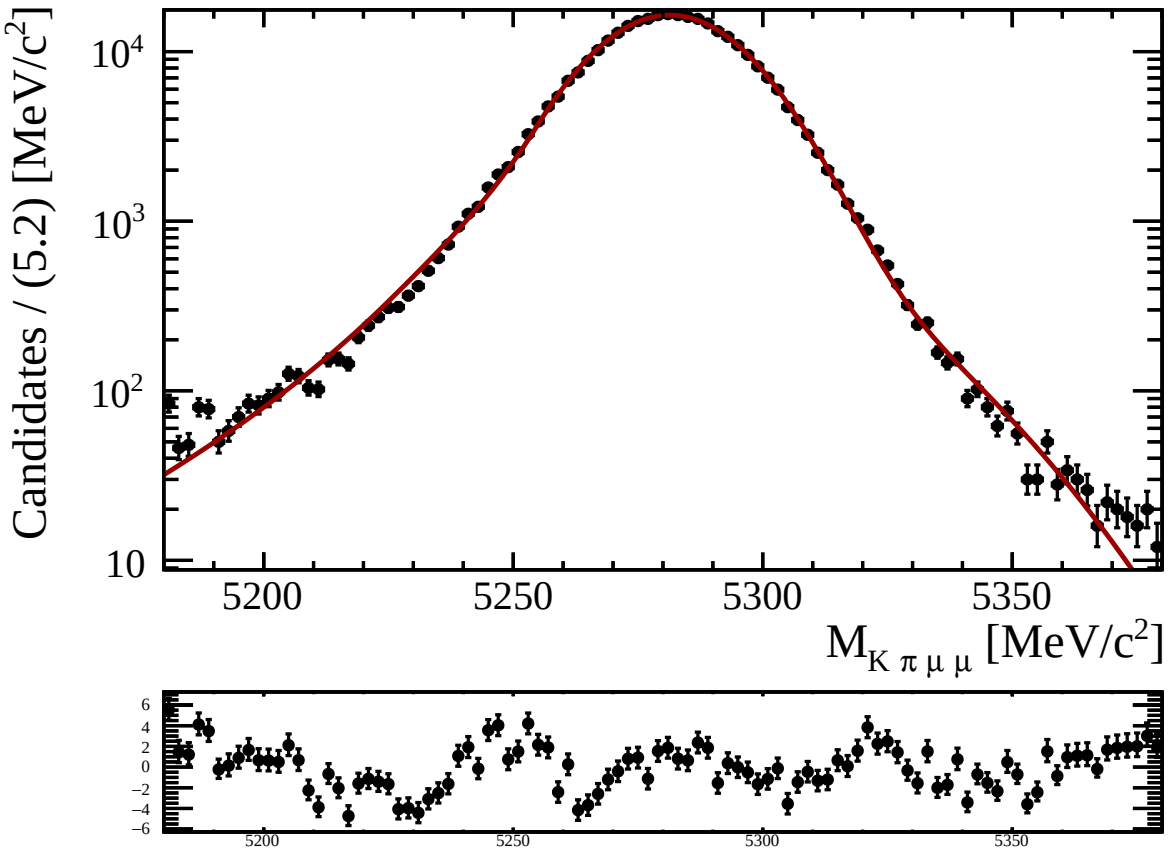
Mass Calibration -Procedure

- Perform fit (2CB)to data with $\mathrm{B}^0_\mathrm{d} \rightarrow \mathrm{K}^* \mathrm{J}/\psi$
  - After Preselection+BDT cut.



Mass Calibration -Procedure 2

- Perform fit to MC with $\mathrm{B}^0_\mathrm{d} \to \mathrm{K}^*\mu\mu$ `FLATQ2` in J/ψ mass window.
  - After Preselection+BDT cut.



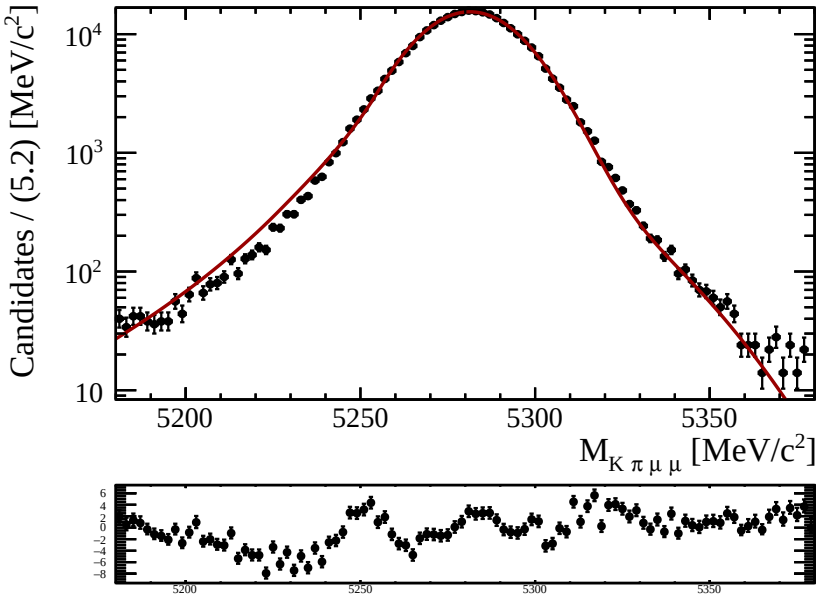
Mass Calibration -Procedure 3

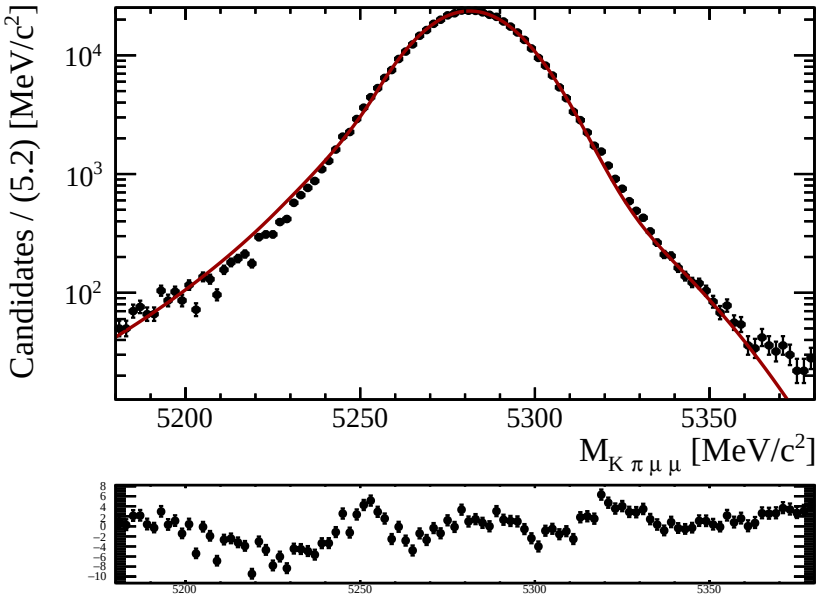
- We fix now all the parameters besides the widths of CB.
- We parametrize the width:

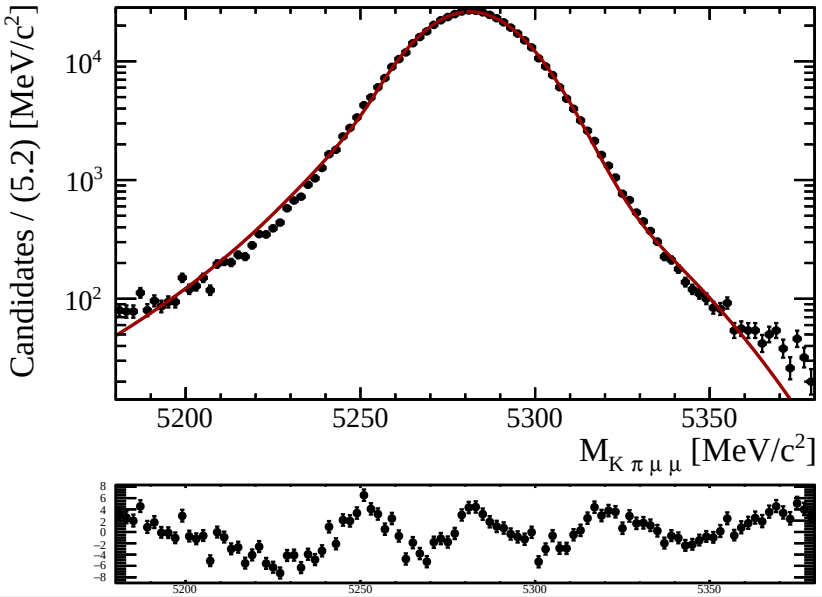
$$\sigma_{q^2}^{\mathrm{MC}} = \sigma_{\mathrm{J}/\psi}^{\mathrm{MC}} \times S_{q^2} \tag{1}$$

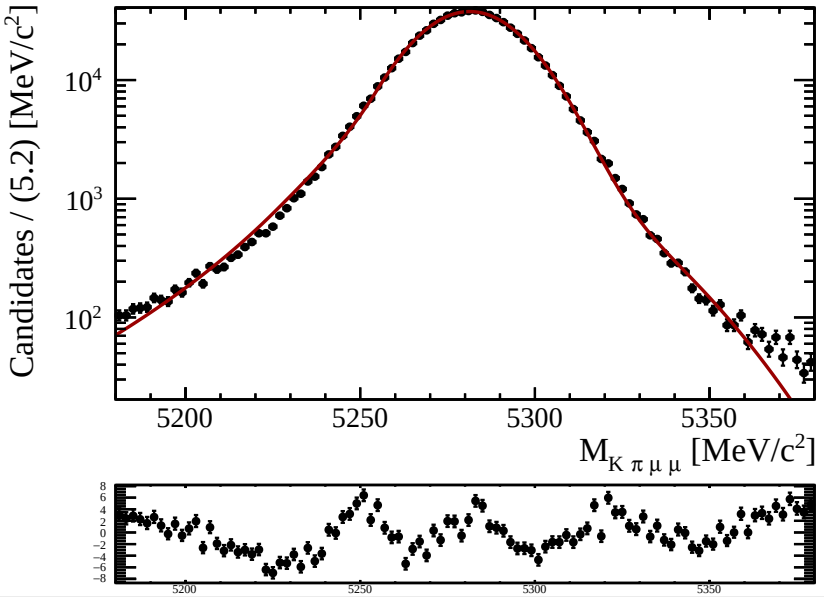
- Only free parameters is the S_{q^2}.
- To obtain the data prediction for given q^2 the S_{q^2} is applied to signal pdf from $\mathrm{B}_{\mathrm{d}}^{0} \to \mathrm{K}^{*}\mu\mu$.

Fits to MC

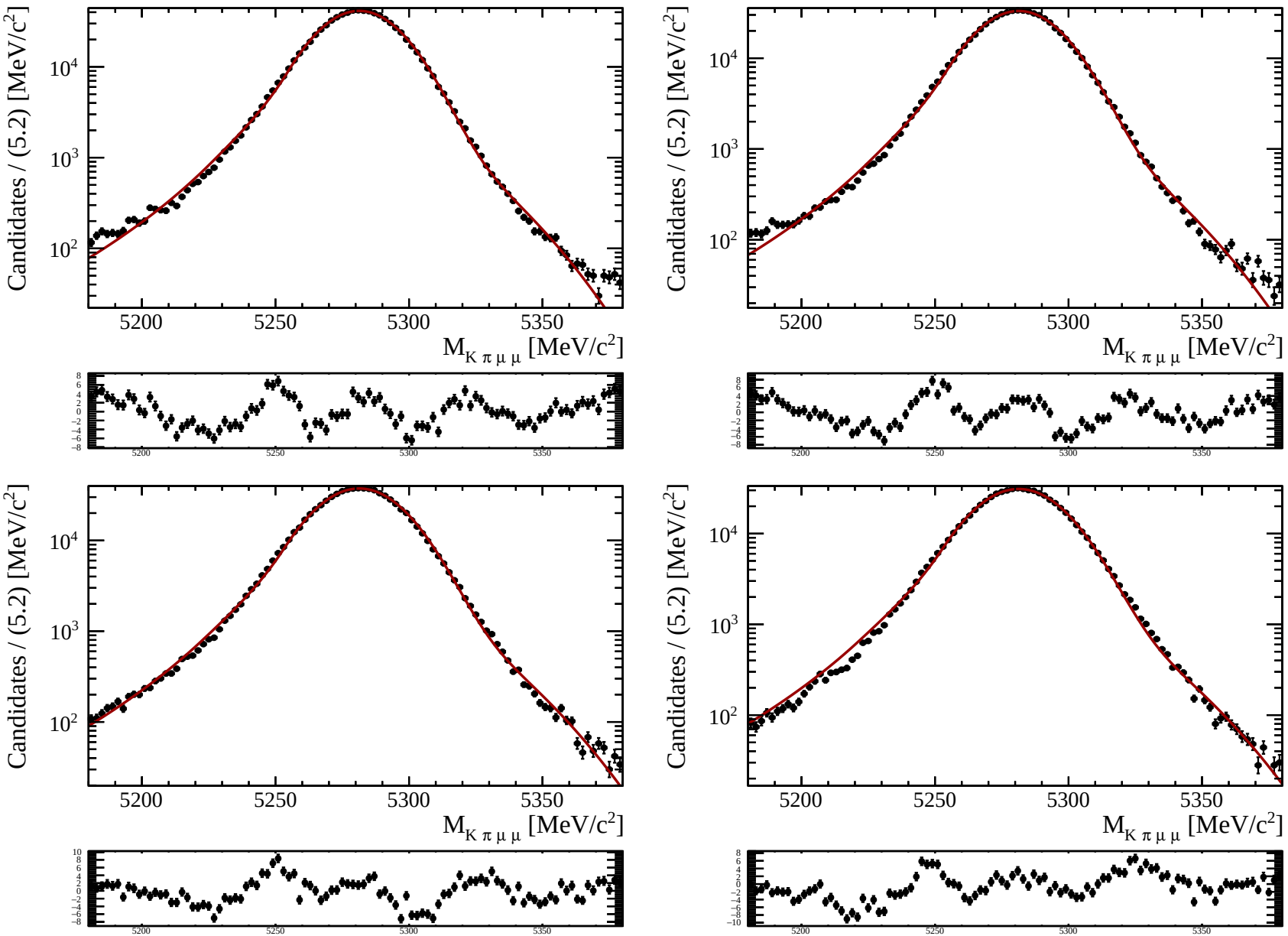

Candidates / (5.2) [MeV/c²]
M_K π μ μ [MeV/c²]


Candidates / (5.2) [MeV/c²]
M_K π μ μ [MeV/c²]

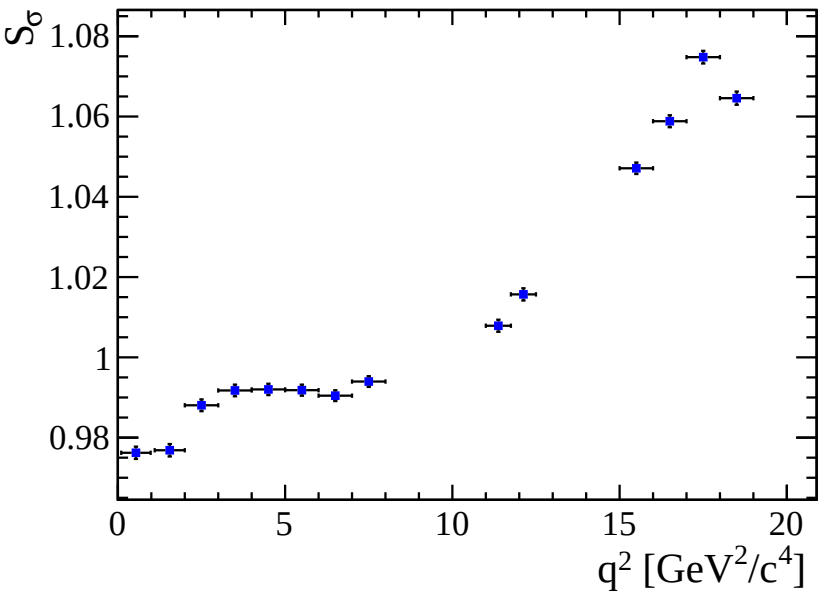

Candidates / (5.2) [MeV/c²]
M_K π μ μ [MeV/c²]

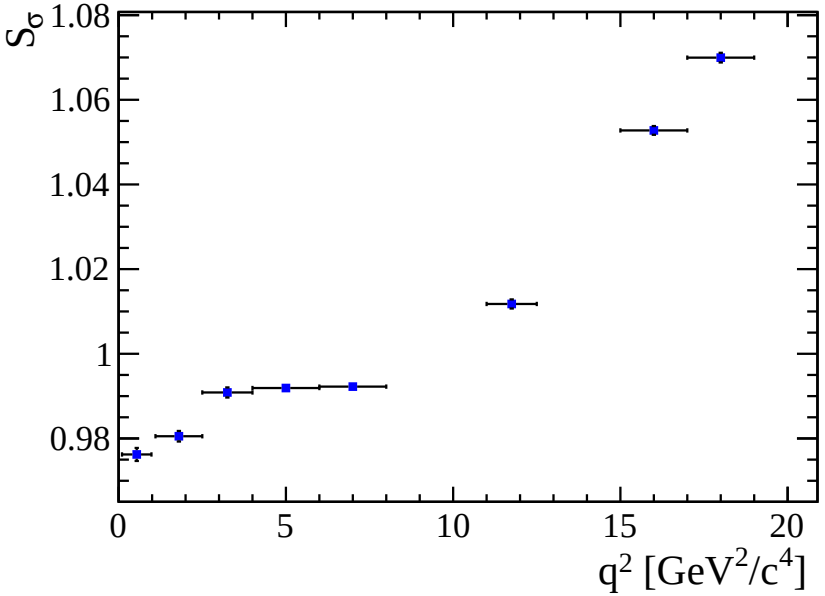

Candidates / (5.2) [MeV/c²]
M_K π μ μ [MeV/c²]

Fits to MC



Scaling factor -results

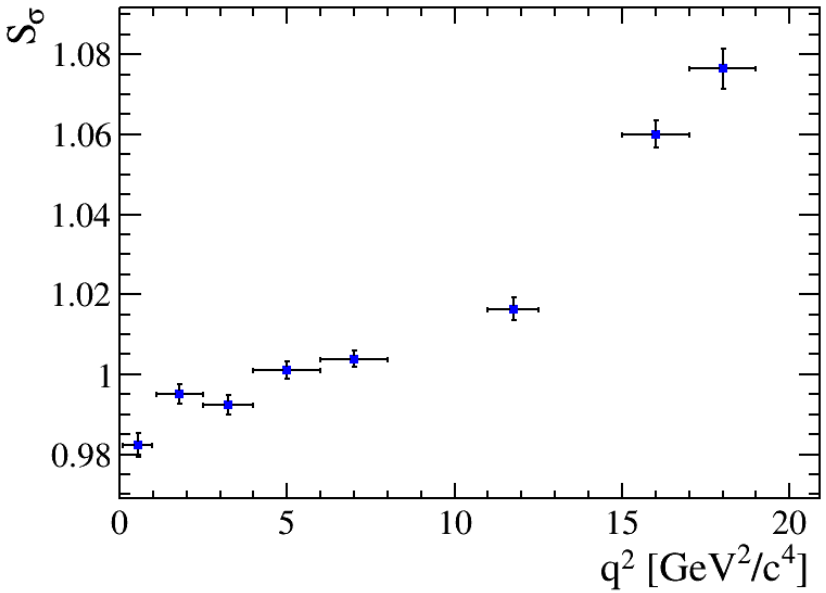


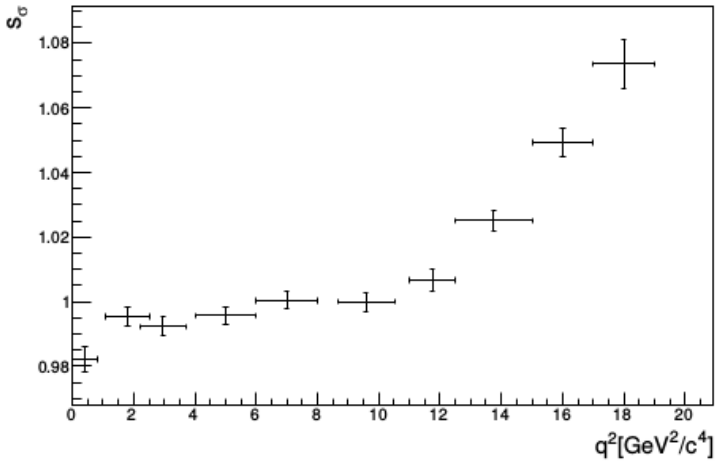


Scaling factor -crosscheck

⇛ This is the same procedure as was in Run1 analysis.

⇛ Let's repeat everything on Run1 S21 ntuples:





⇛ Quite compatible ;)

Backup