

The Role of Radiative Corrections in Hadronic Production

or

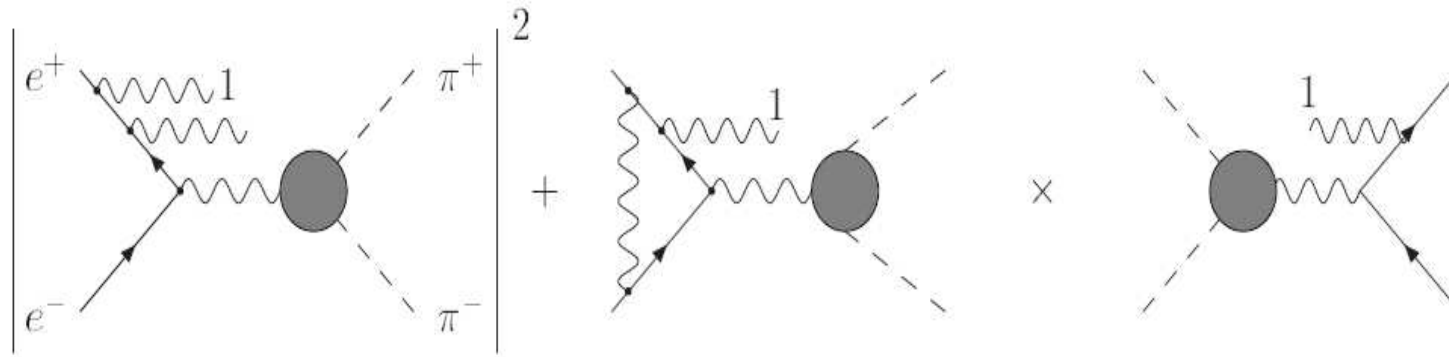
the missing radiative corrections
in PHOKHARA generator

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Mainz, April 2014

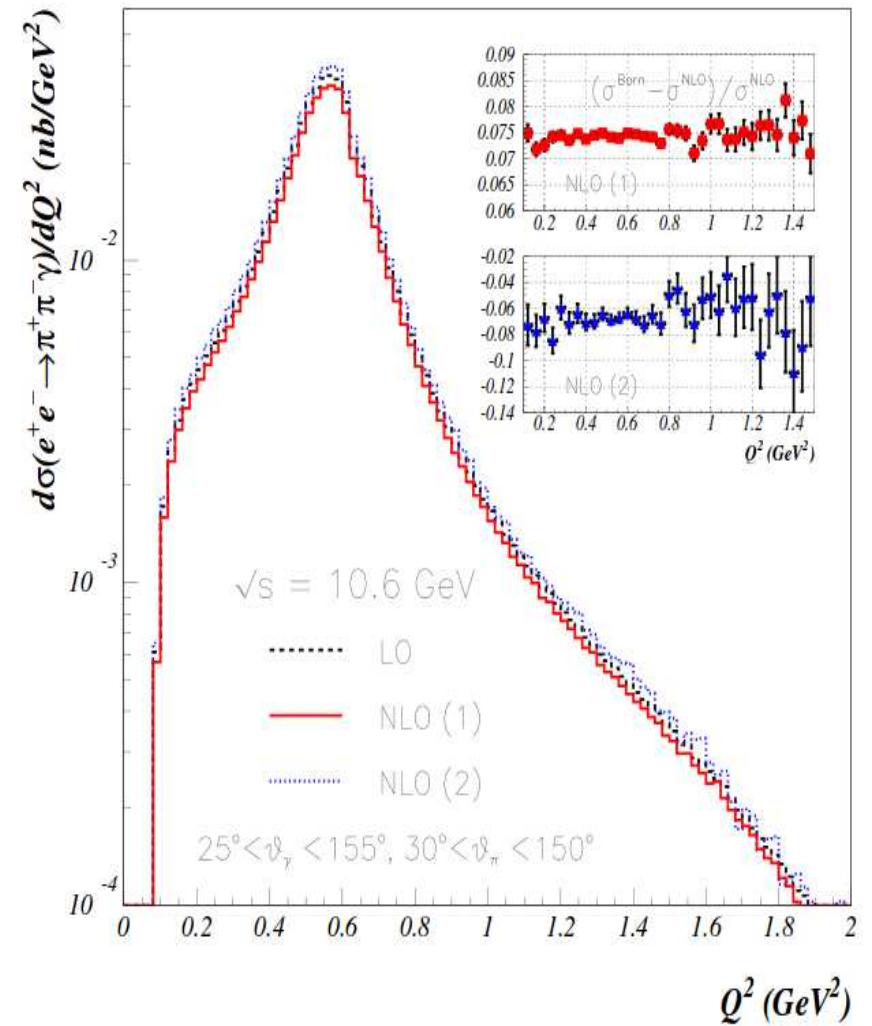
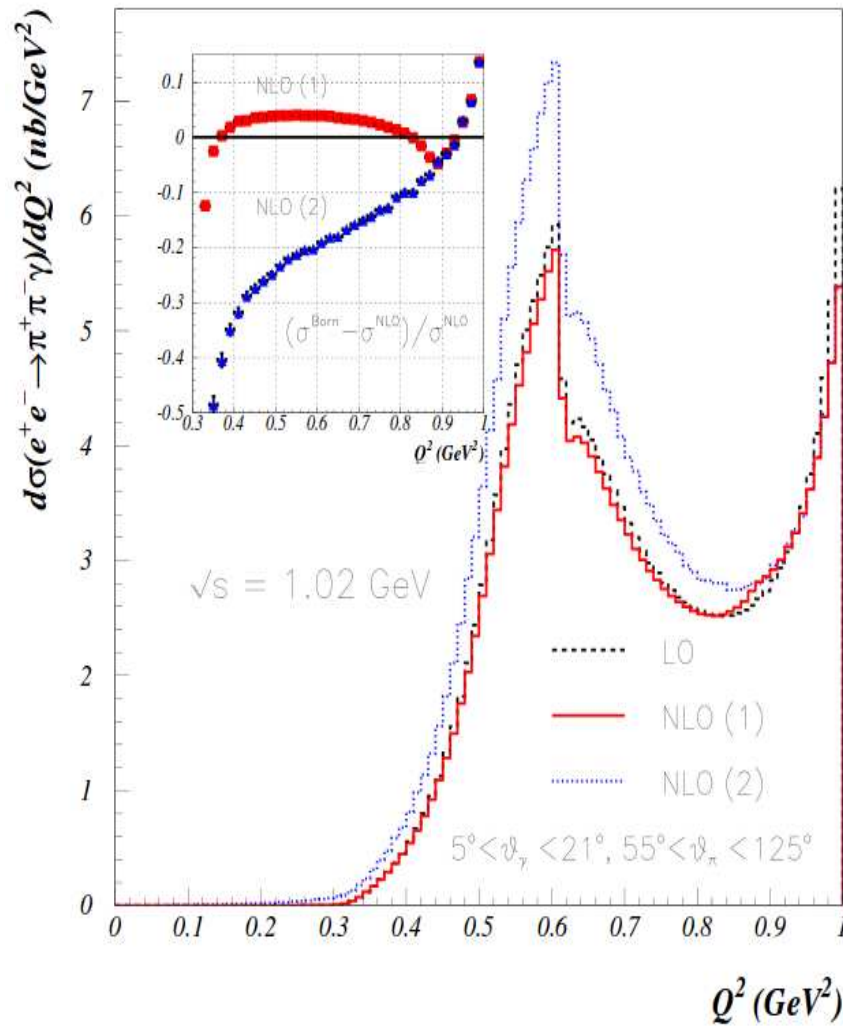
NLO-ISR

Included for all modes, universal



NLO-ISR

How big are the corrections: $NLO(1) : M_{\pi\pi\gamma}^2 > 0.9$



NLO-ISR vs. SF

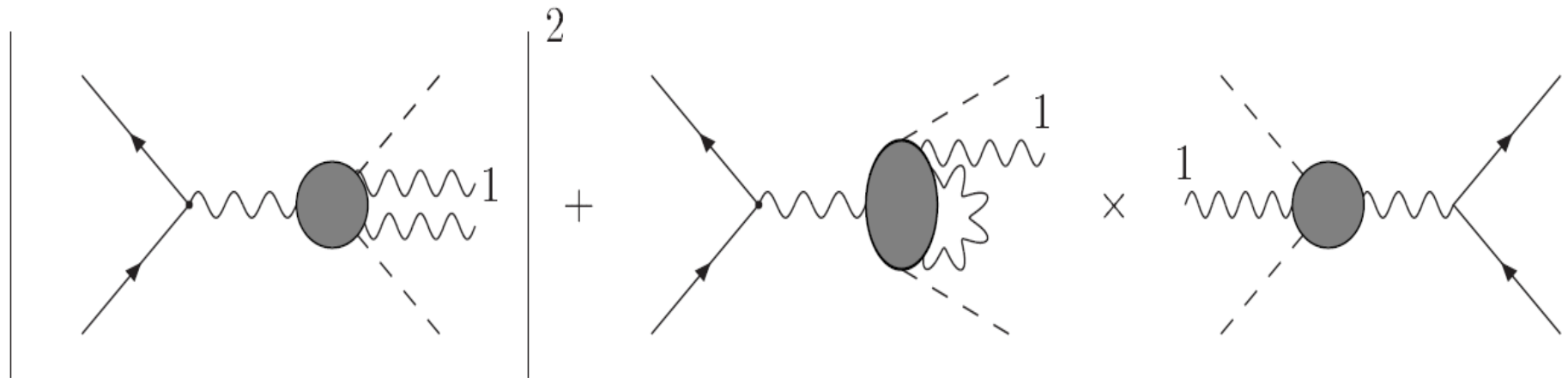
Structure functions to be used carefully

	$\sqrt{s} = 1.02 \text{ GeV}$	4 GeV	10.6 GeV
Born	2.1361 (4)	0.12979 (3)	0.011350 (3)
SF	2.0192 (4)	0.12439 (5)	0.010526 (3)
NLO (1)	2.0332 (5)	0.12526 (5)	0.010565 (4)
NLO (2)	2.4126 (7)	0.14891 (9)	0.012158 (9)

NLO-FSR

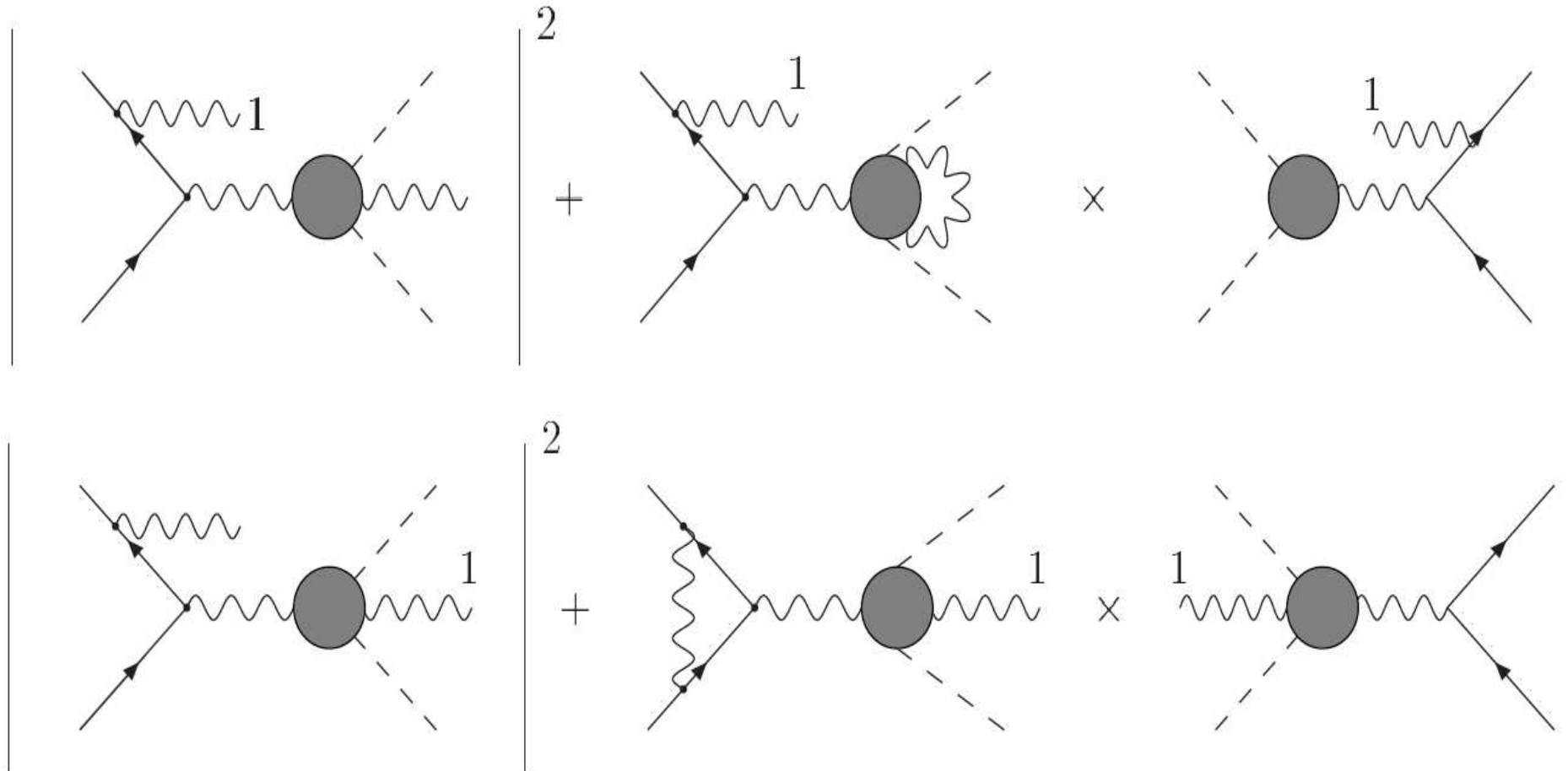
Included only for muons

negligible for ISR configurations



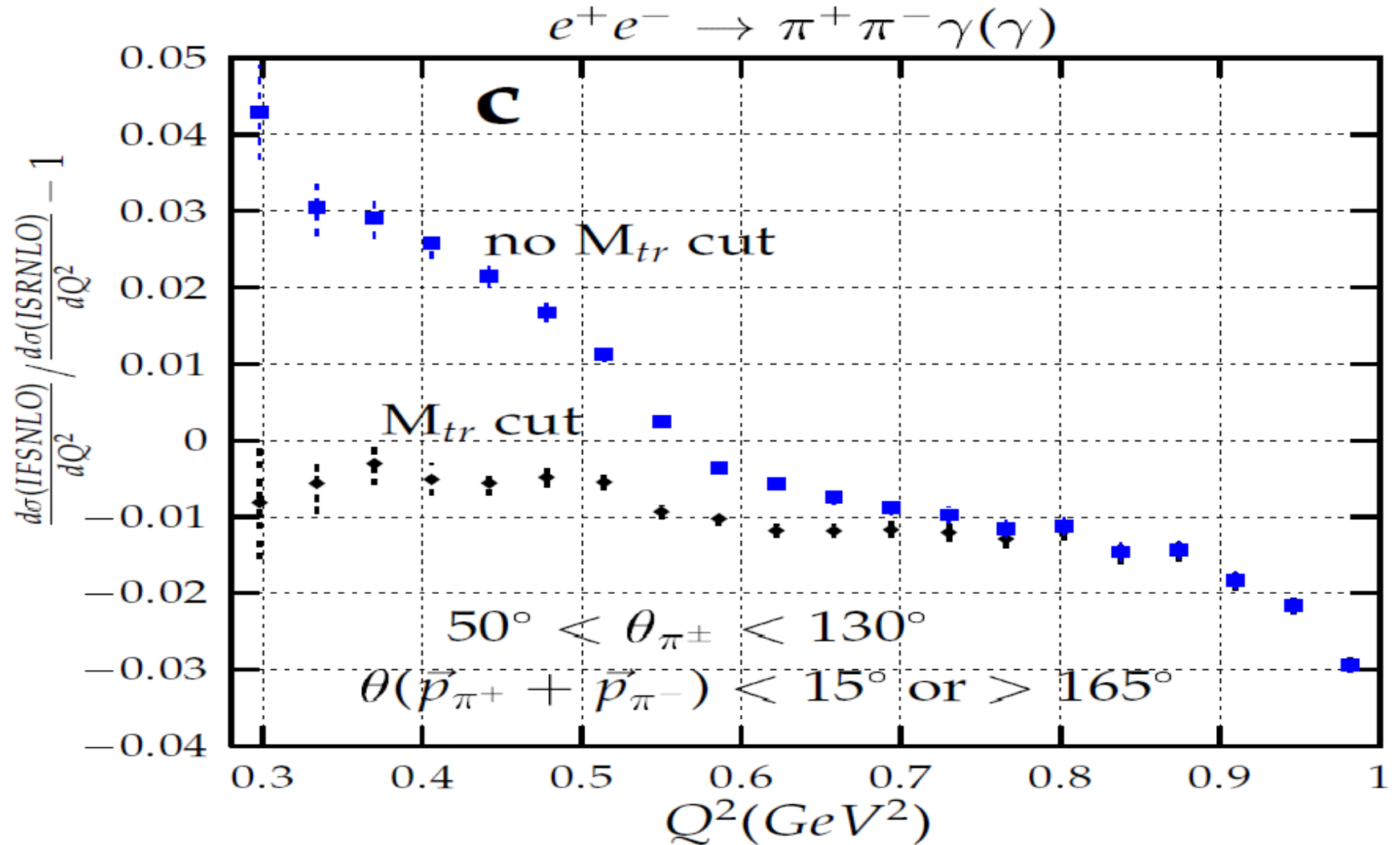
NLO-IFS

Included for muons and pions



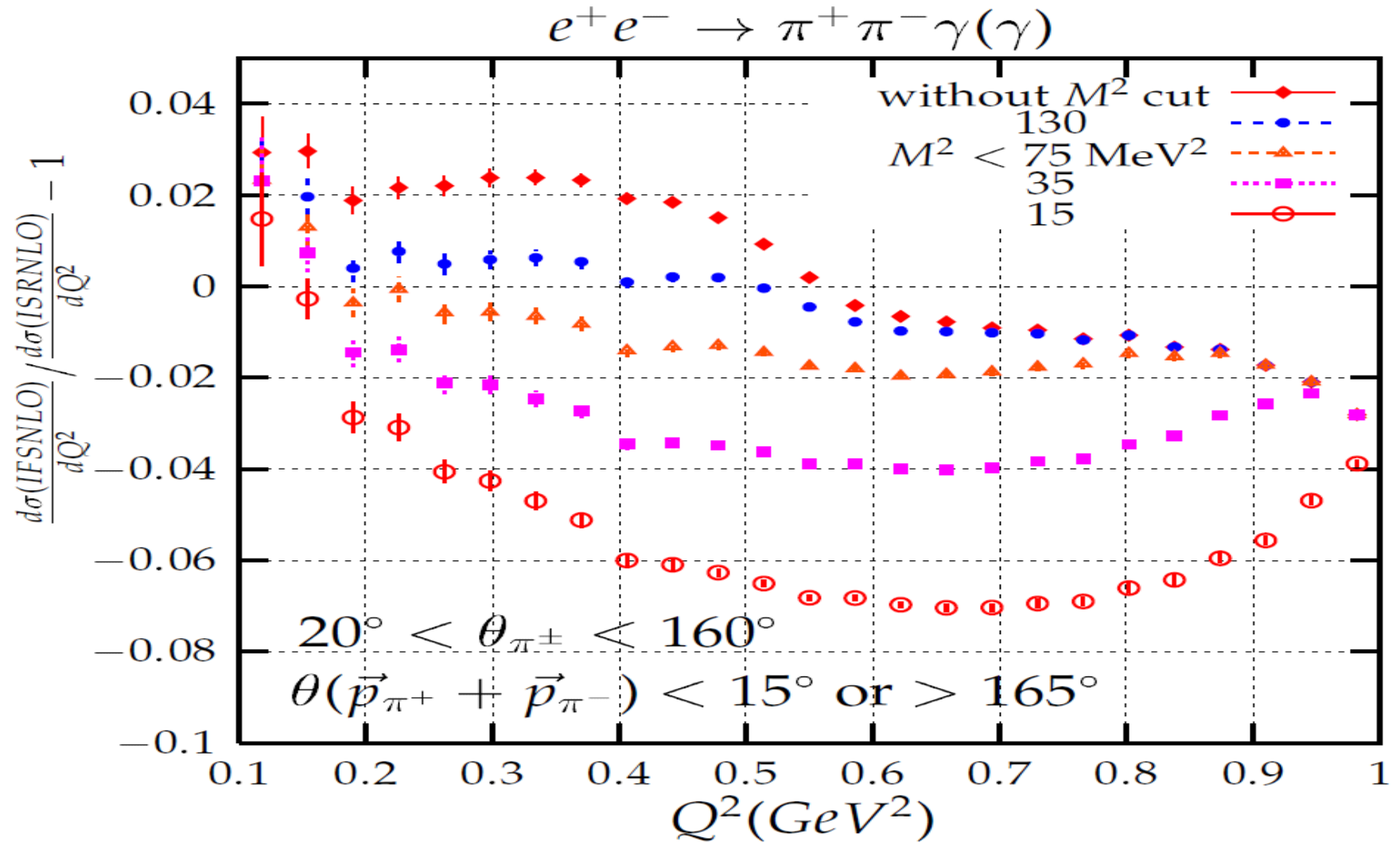
NLO-ISR-FSR

How big are the corrections



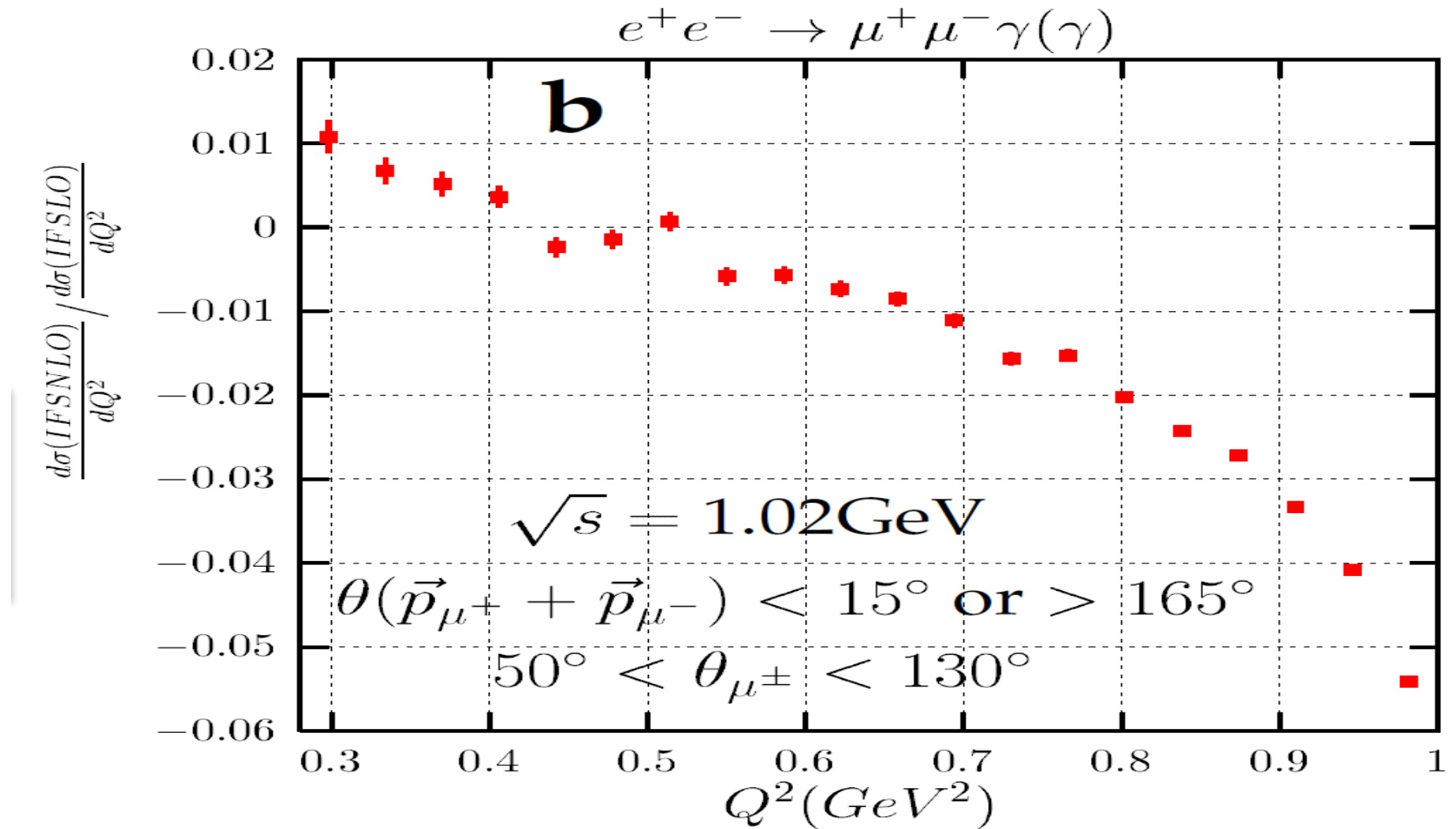
NLO-ISR-FSR

How big are the corrections



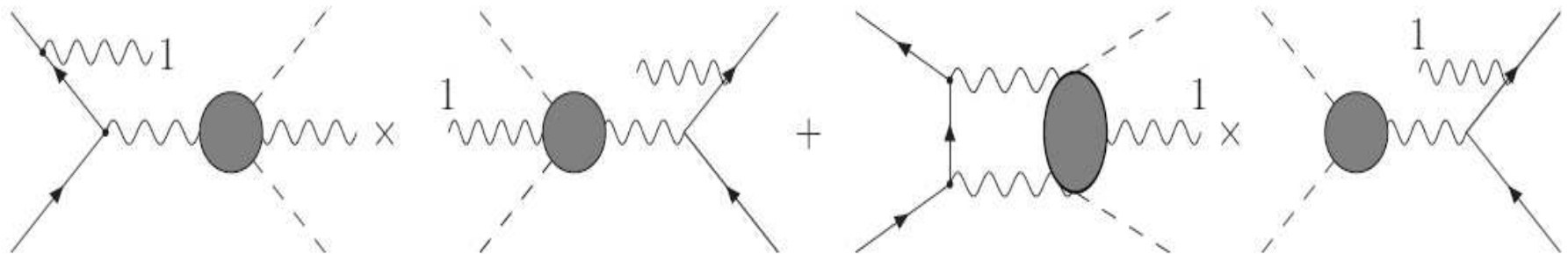
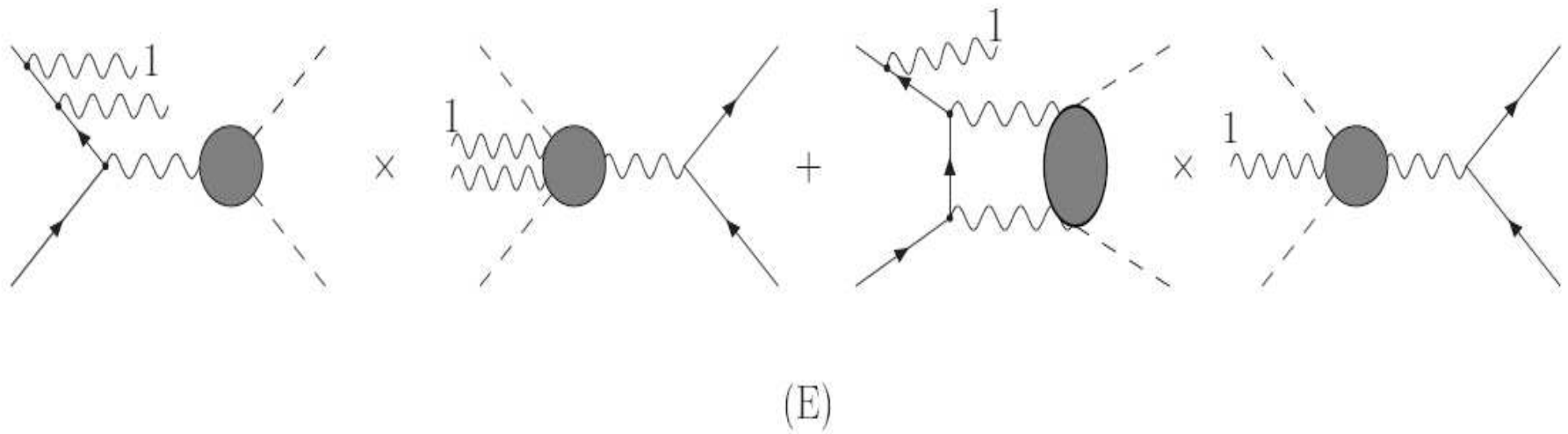
NLO-ISR-FSR

How big are the corrections

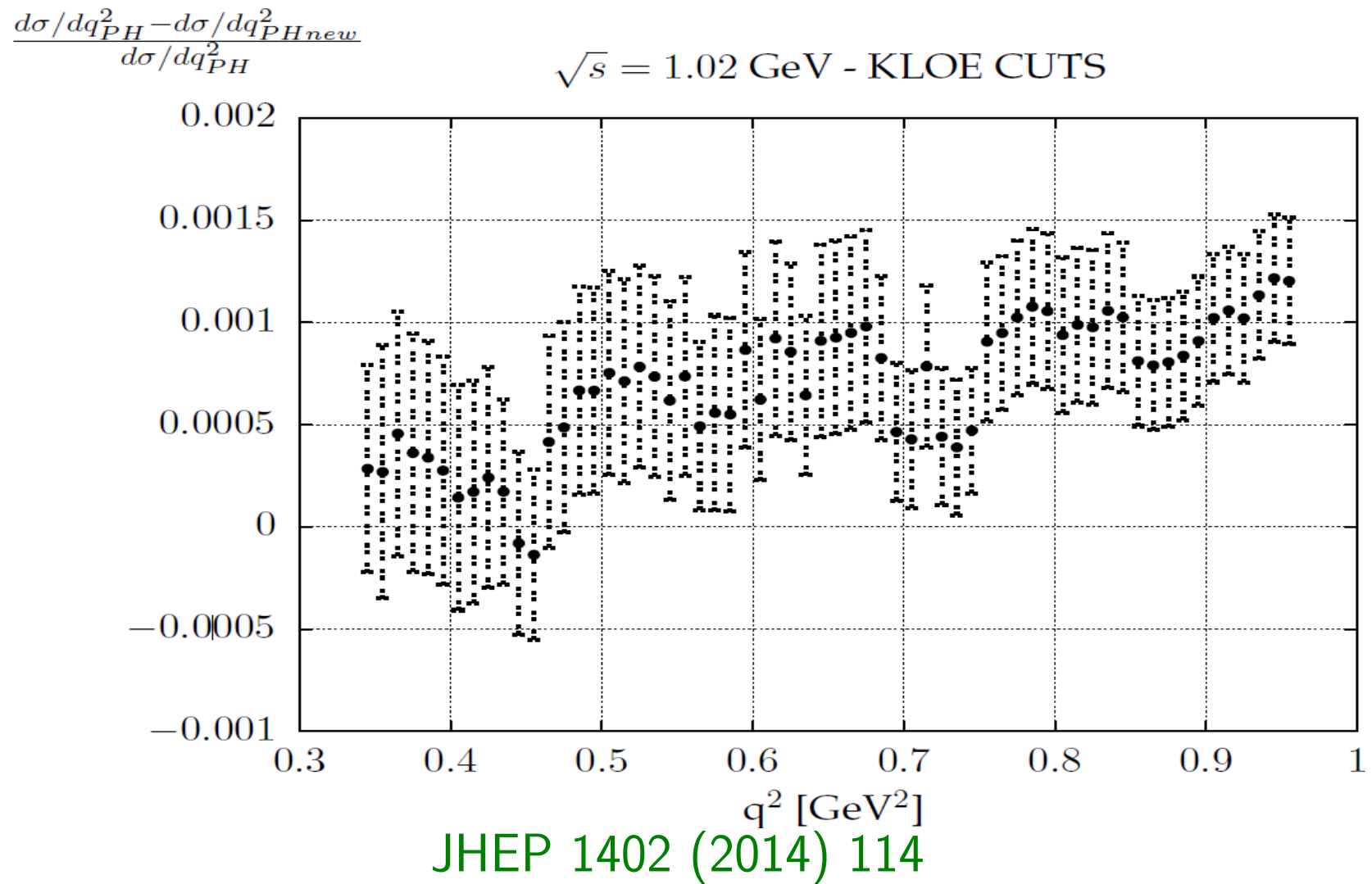


PENTABOXES

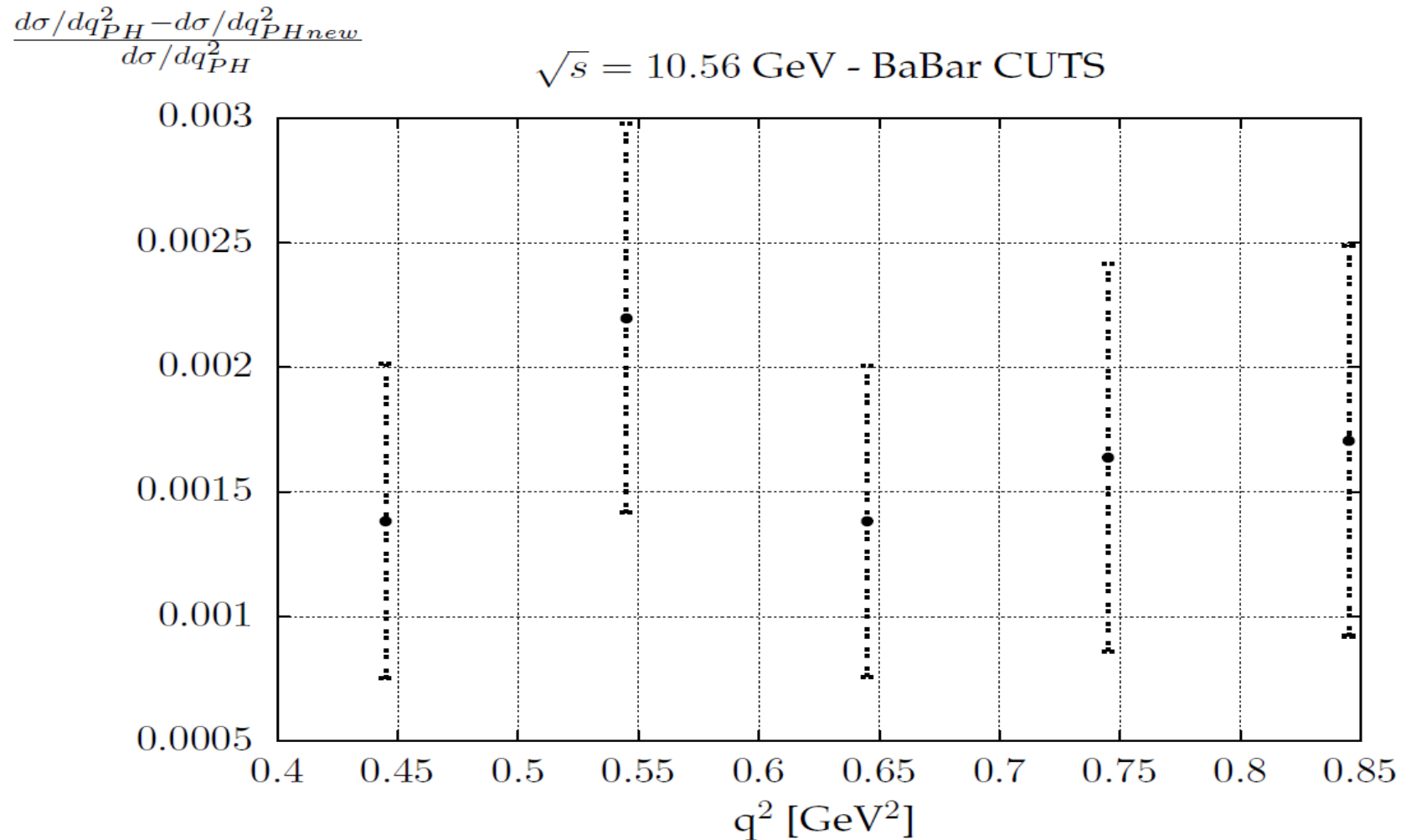
For muons only



Size of the new corrections



Size of the new corrections

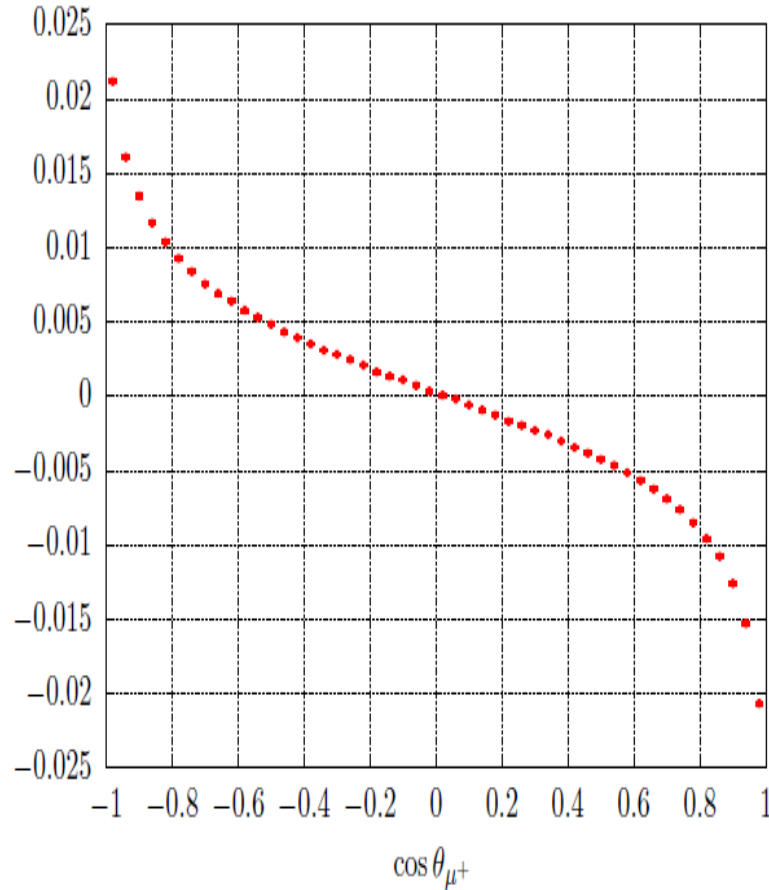


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Size of the pentaboxes

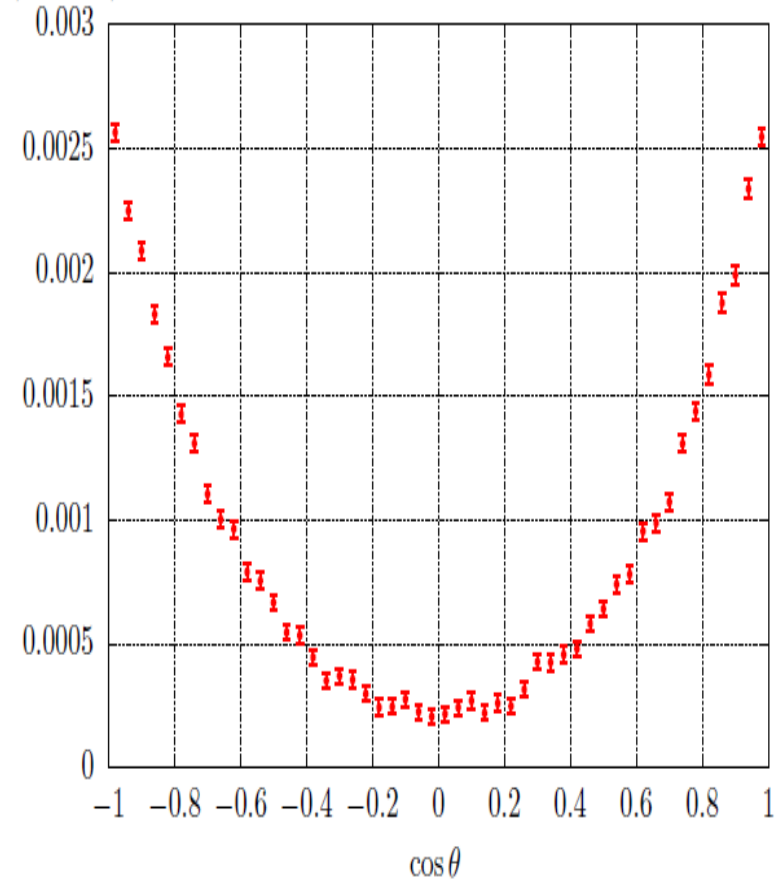
$$\frac{d\sigma_{pb}}{d\cos\theta_{\mu^+}} / \frac{d\sigma_B}{d\cos\theta_{\mu^+}}$$

$$\sqrt{s} = 1.02 \text{ GeV}$$



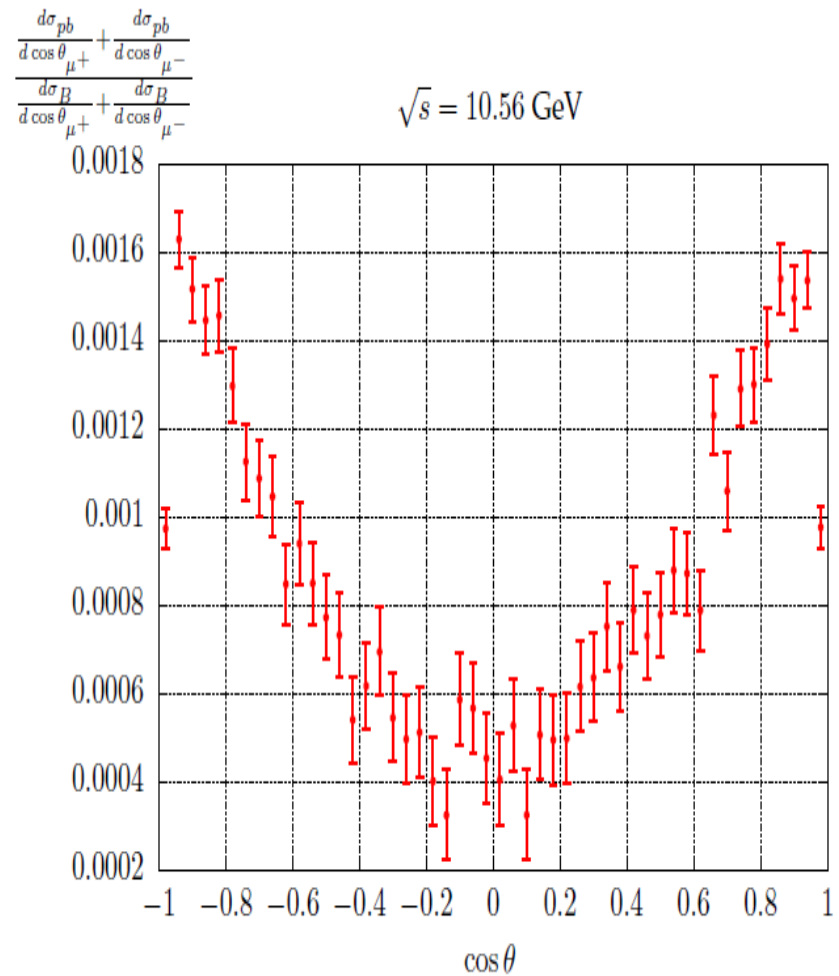
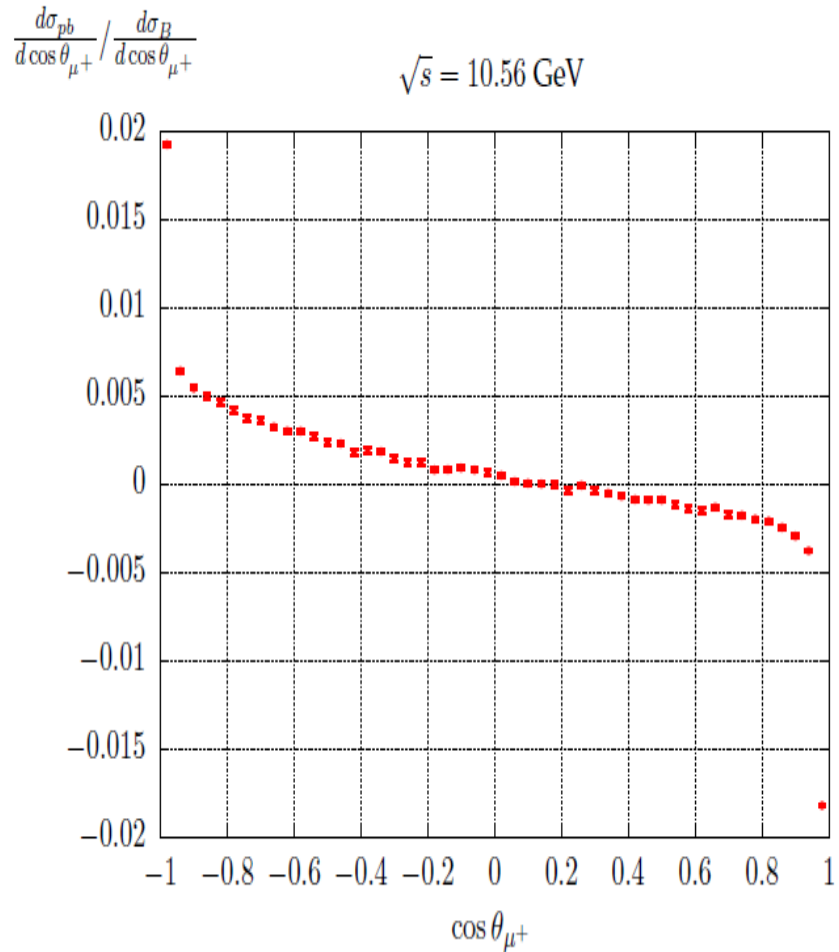
$$\frac{\frac{d\sigma_{pb}}{d\cos\theta_{\mu^+}} + \frac{d\sigma_{pb}}{d\cos\theta_{\mu^-}}}{\frac{d\sigma_B}{d\cos\theta_{\mu^+}} + \frac{d\sigma_B}{d\cos\theta_{\mu^-}}}$$

$$\sqrt{s} = 1.02 \text{ GeV}$$



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Size of the pentaboxes



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To be done in PHOKHARA and EKHARA

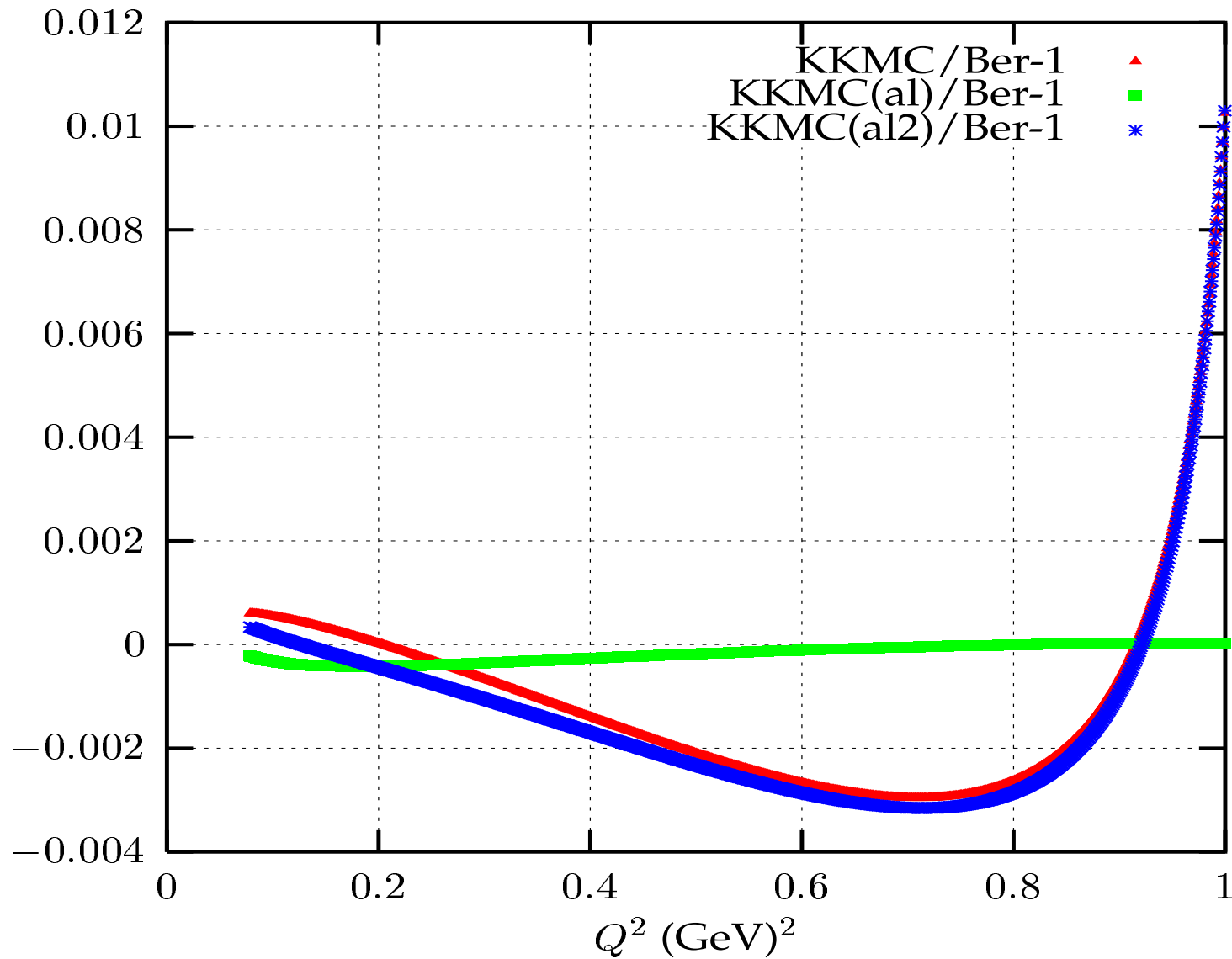
⇒ PH: improve efficiency in muon mode

⇒ PH: get the complete NLO for pions

⇒ PH: add NNLO corrections for ISR

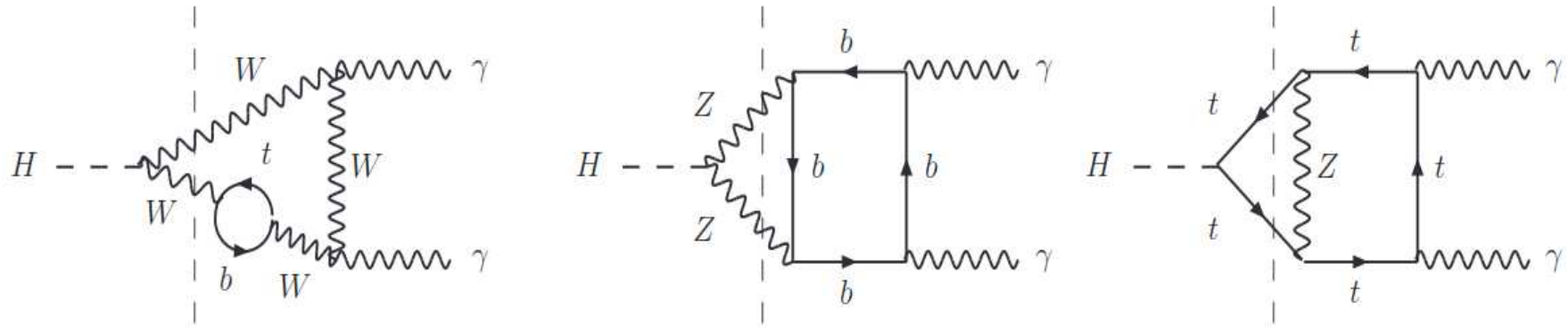
⇒ EK: add NLO corrections

PHOKHARA the missing ISR corrections



Threshold effects

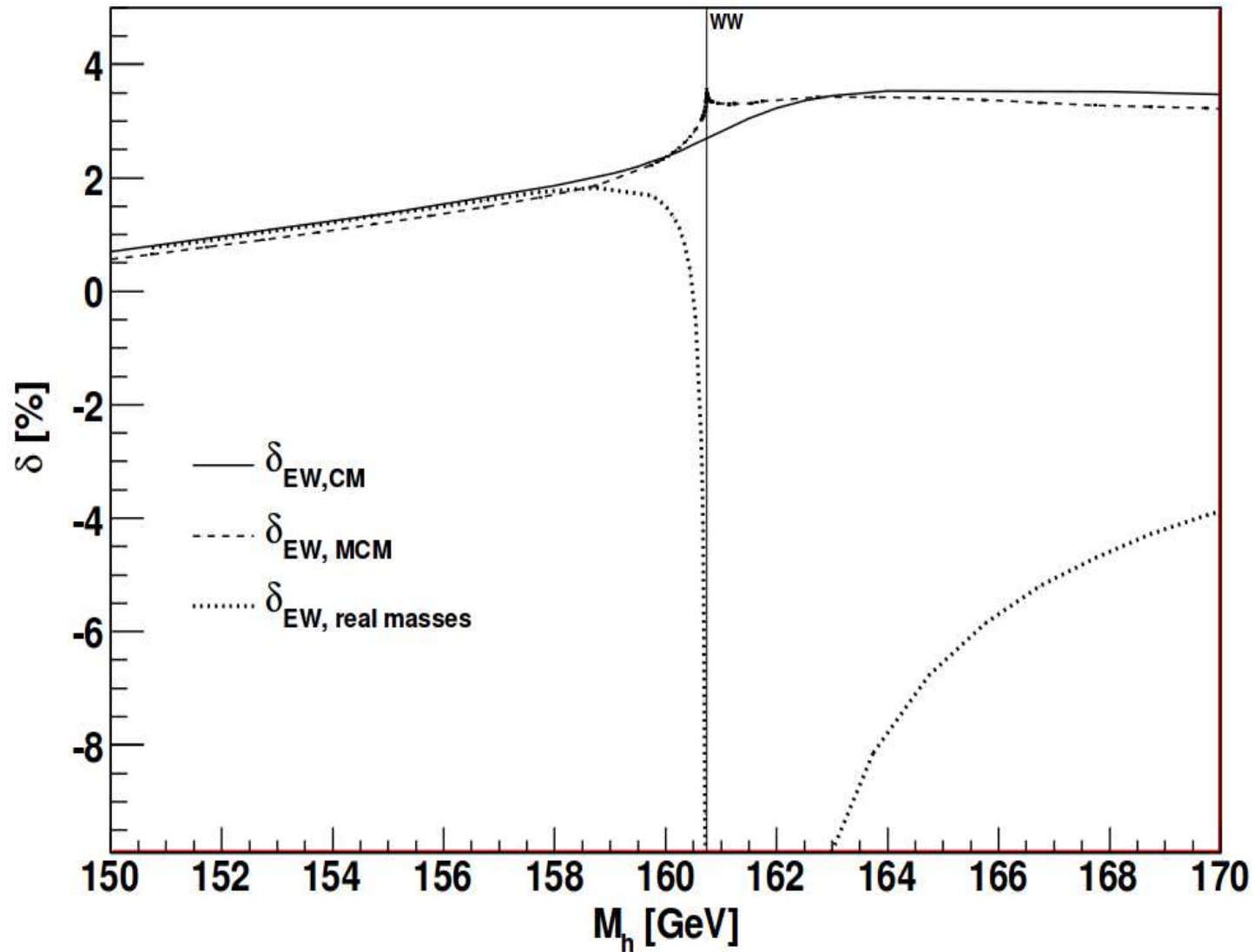
S.Actis et al., Phys.Lett. B669 (2008) 62-68



J. Layssac et al., Phys.Lett. B418 (1998) 134-140

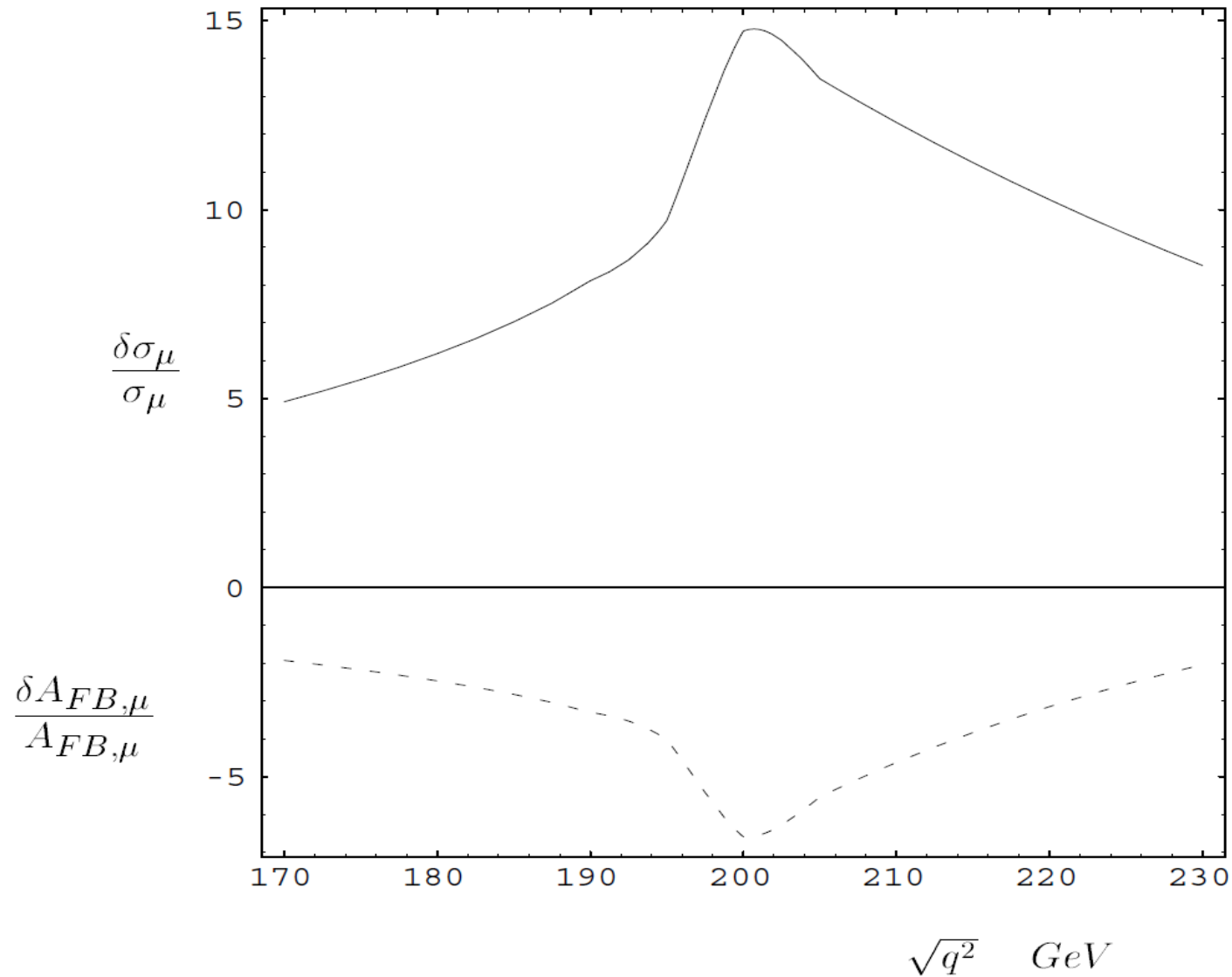


Threshold effects



S.Actis et al., Phys.Lett. B669 (2008) 62-68

Threshold effects



J. Layssac et al., Phys.Lett. B418 (1998) 134-140

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Summary

Its heavy,

but . . .

