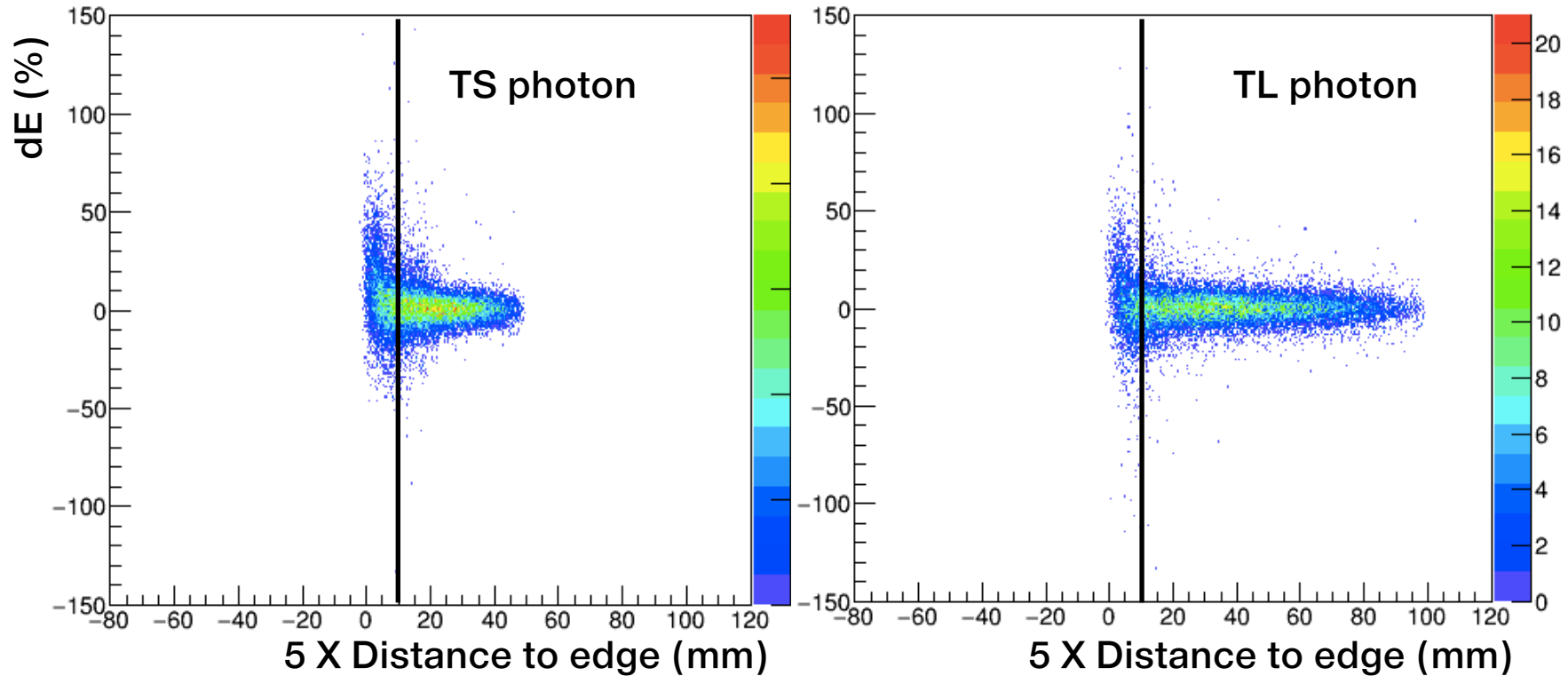


Cause of the underestimated π^0 peak position at two photon invariant mass

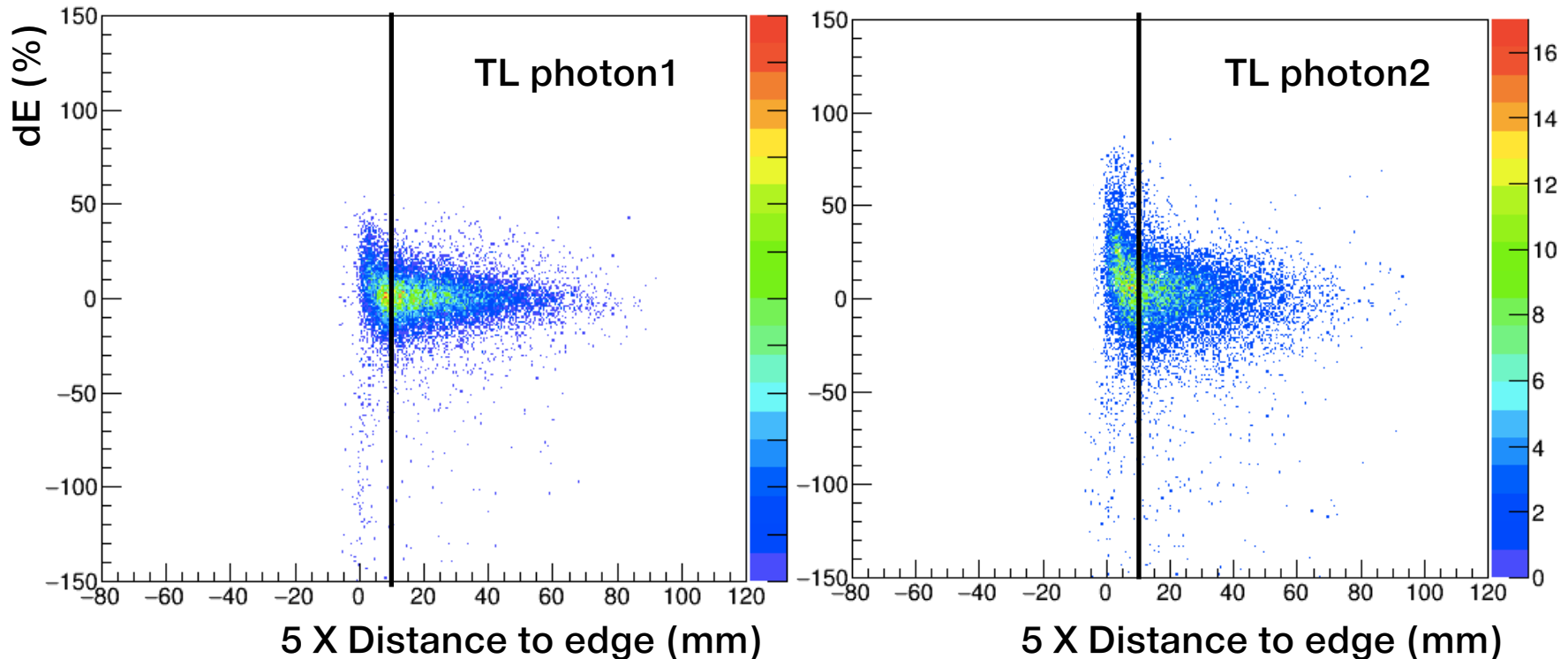
18 Jul. 2019
Minho Kim

Edge effect of Type-I π^0



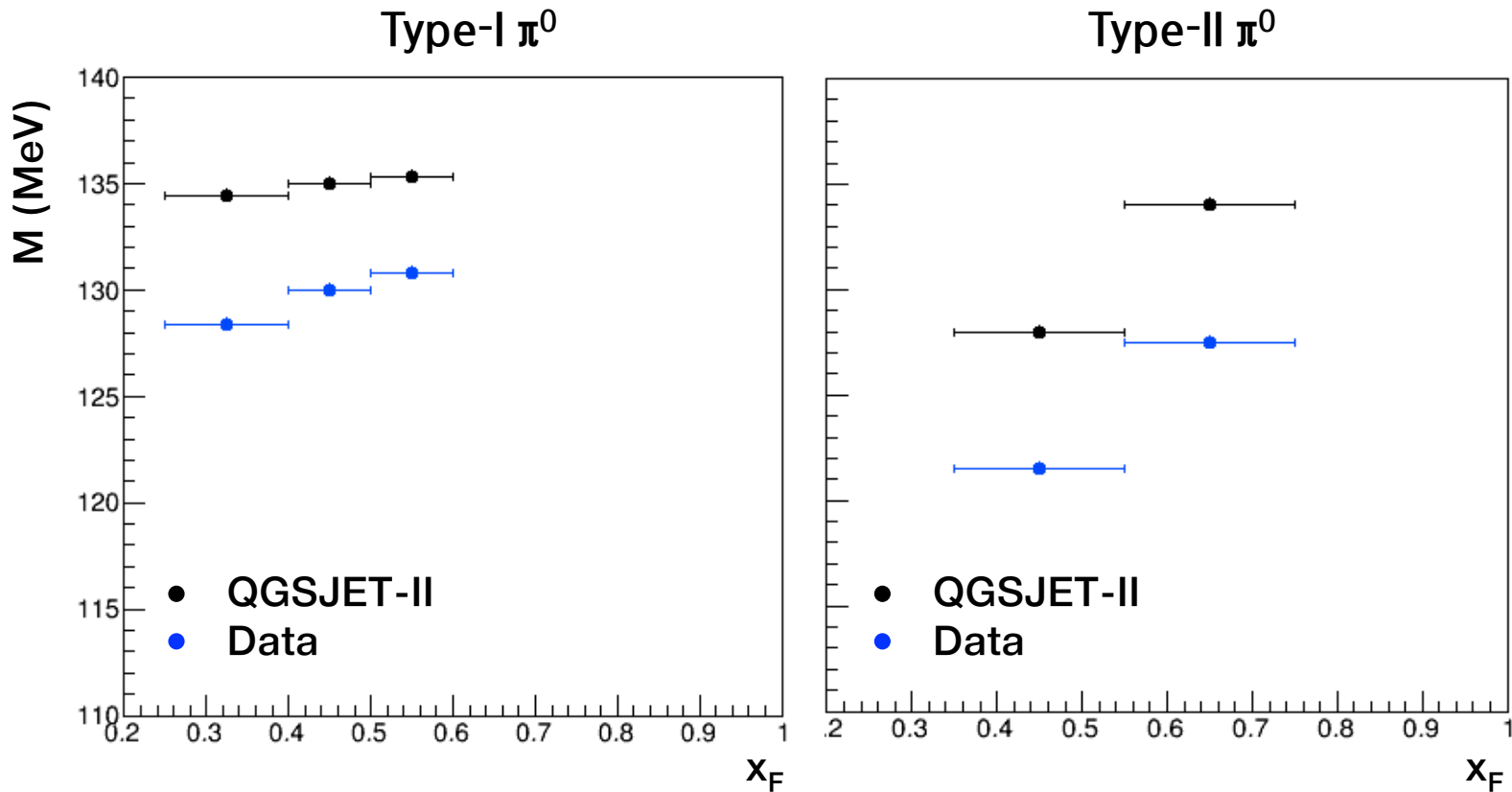
- 2 mm edge cut (10 mm at plot) would be OK for Type-I case.

Edge effect of Type-I π^0



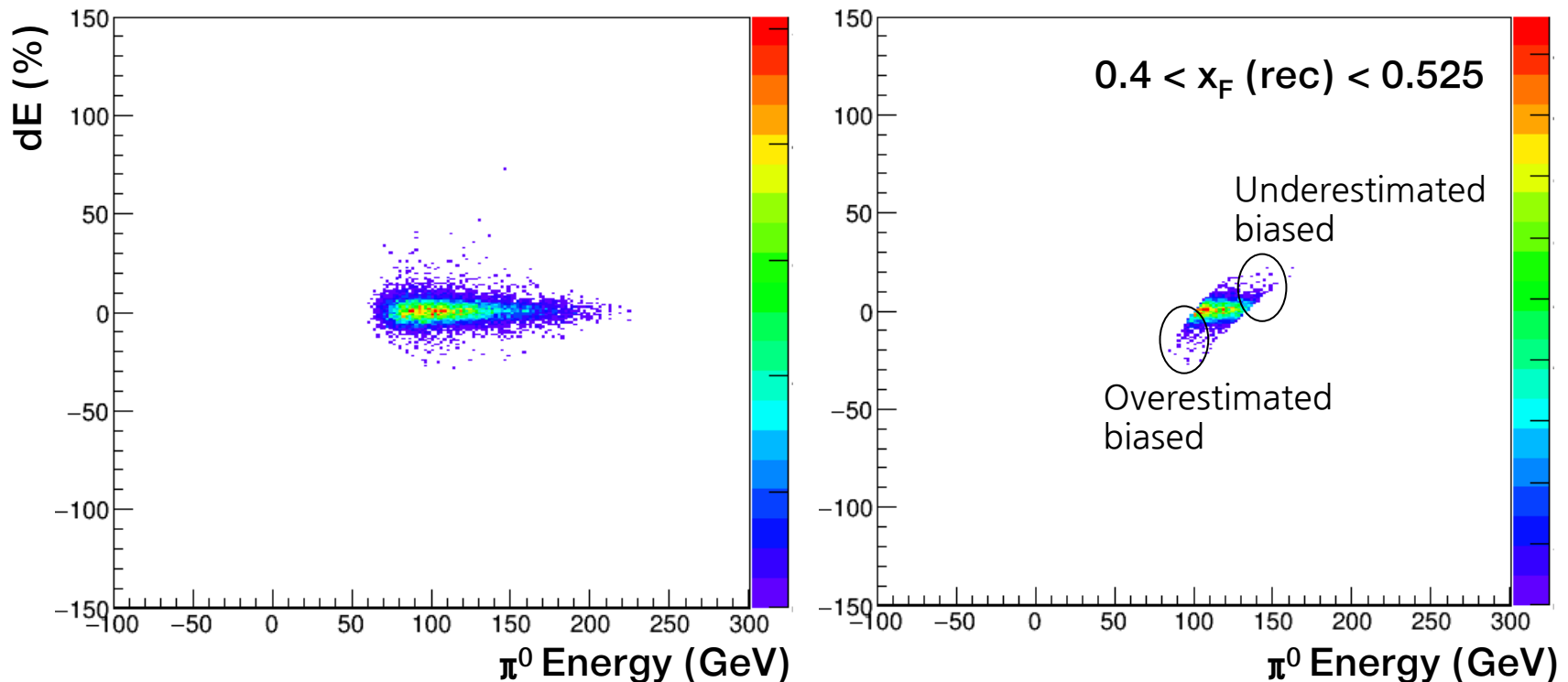
- 2 mm edge cut (10 mm at plot) would be OK for Type-I case.
- 2 mm edge cut (10 mm at plot) would be OK for Type-II case as well.

π^0 peak position as a function of x_F



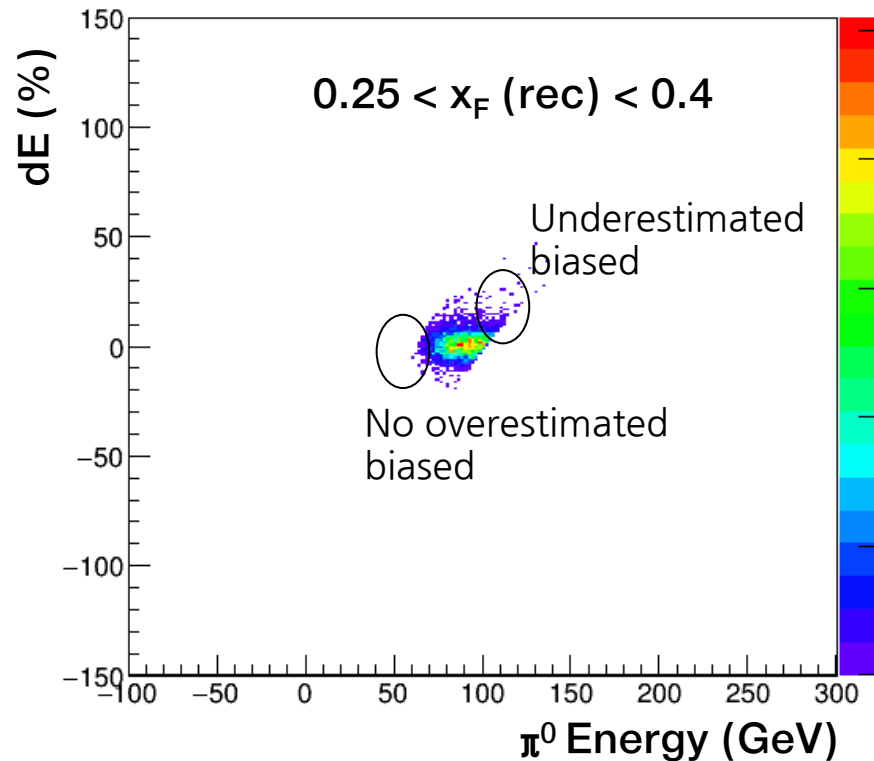
- x_F dependence of the π^0 peak position is also shown in QGSJET-II.
- One can guess underestimated π^0 peak position should be because of the underestimated energy.
- The cause of the underestimated energy can be studied by simulation.

E vs dE plots of Type-I π^0



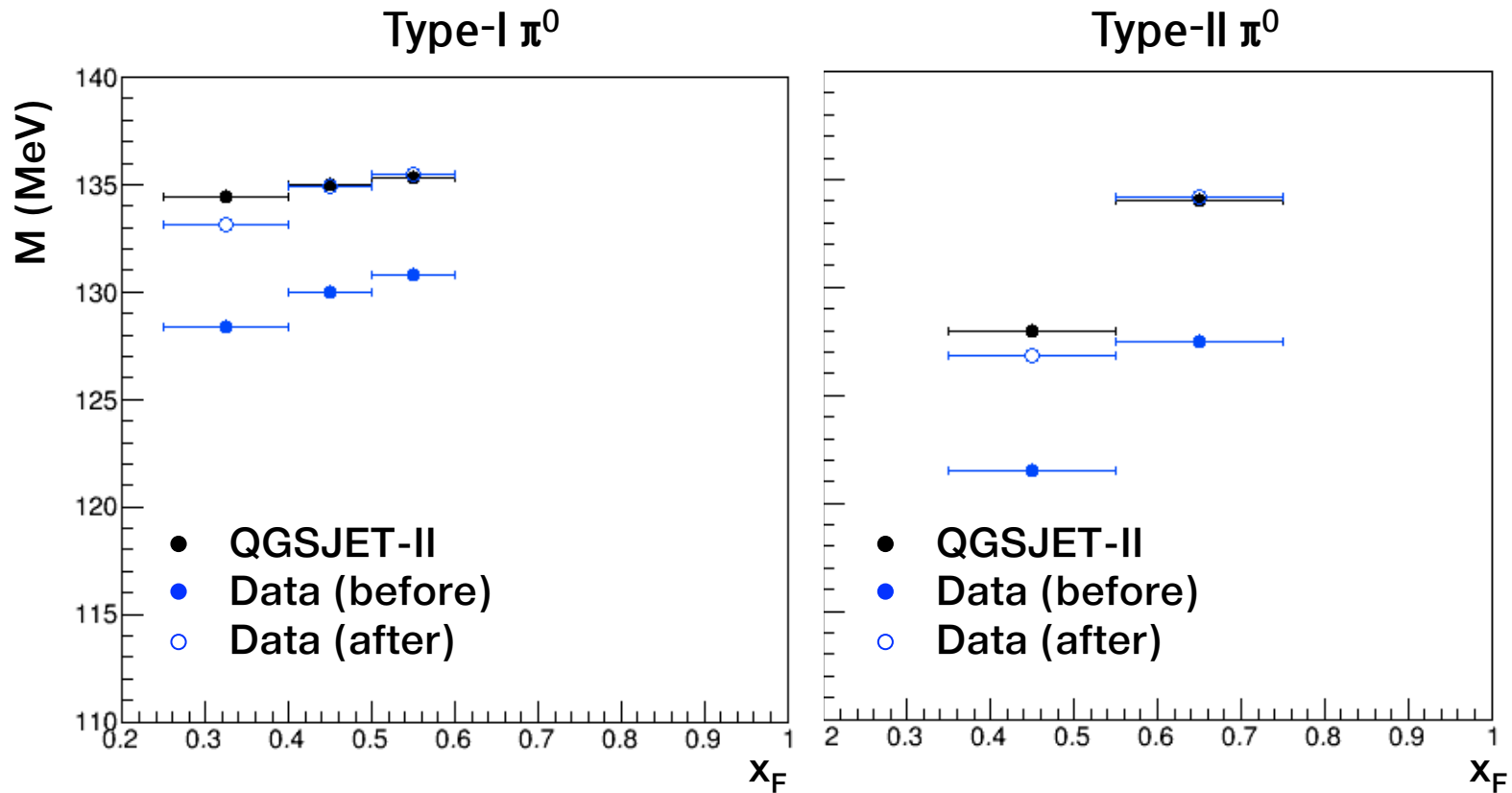
- No critically underestimated energy area for all energy range.
- If the event sample is chosen by reconstructed x_F , there should be both biased underestimated and overestimated energy region due to energy resolution.

E vs dE plots of Type-I π^0



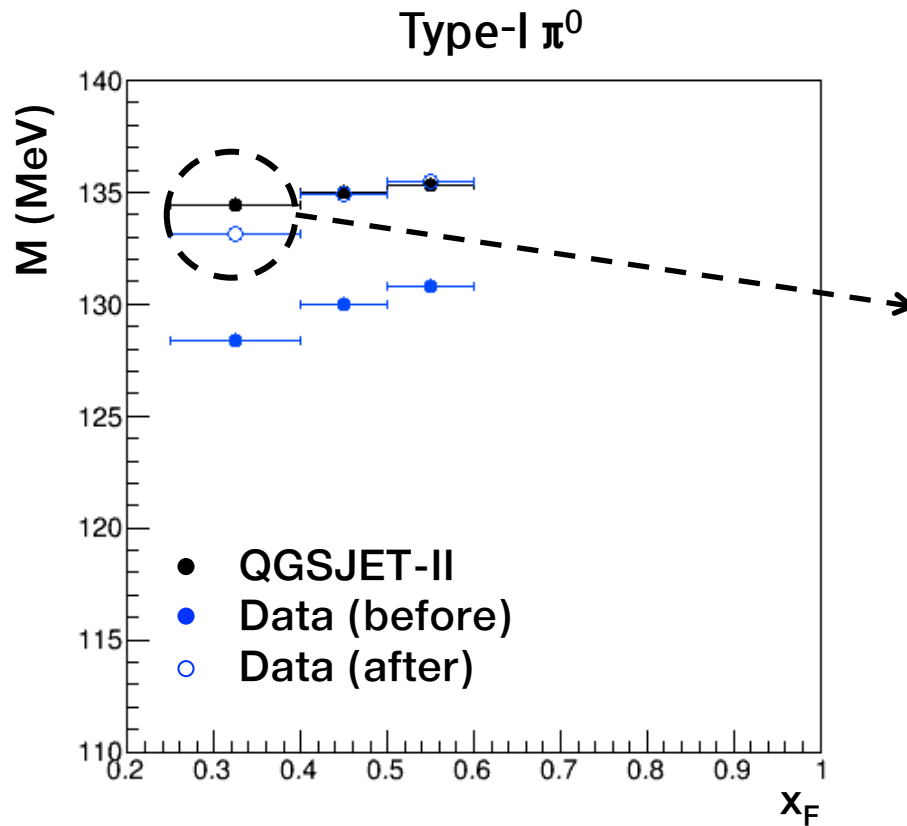
- However, the event sample is chosen with lower x_F range, underestimated energy get dominant because relatively there is no lower energy area to be overestimated.
- Therefore, decrease of π^0 peak position depending on x_F is not due to the underestimated energy but unavoidable issue by energy resolution.

π^0 peak position as a function of x_F

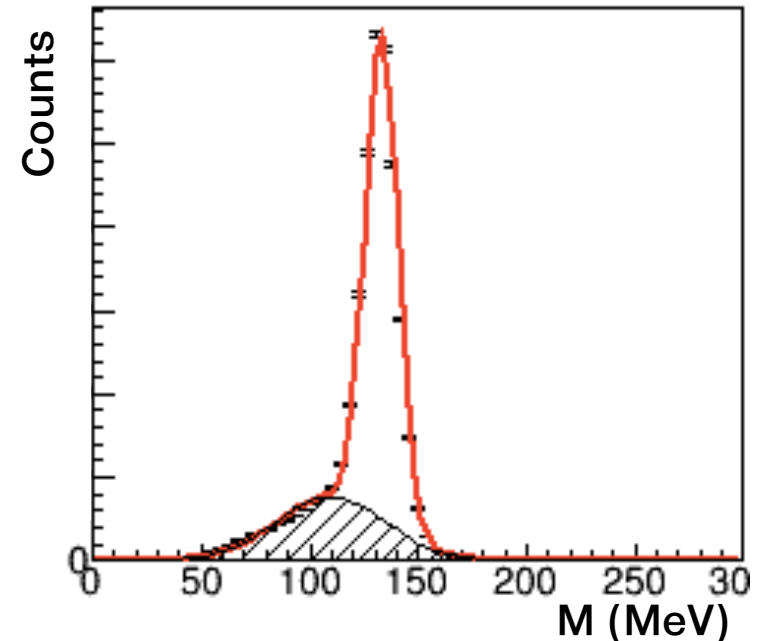


- Because the difference of the π^0 peak position depending on the x_F is comparable between simulation and data, the rest difference between them might be attenuation correction.
- After the attenuation correction was calculated and done for TL first using Type-II π^0 , the other correction was done for TS using Type-I π^0 .

Fitting effect



The best fit position is 133.1, but if the peak position is fixed to 134.5 on purpose,



- The difference between data and simulation is the difference between best fitting positions. Different background shape will make different fitting result.
- The peak position might be overlapped if error bar is included considering the χ^2/ndf .