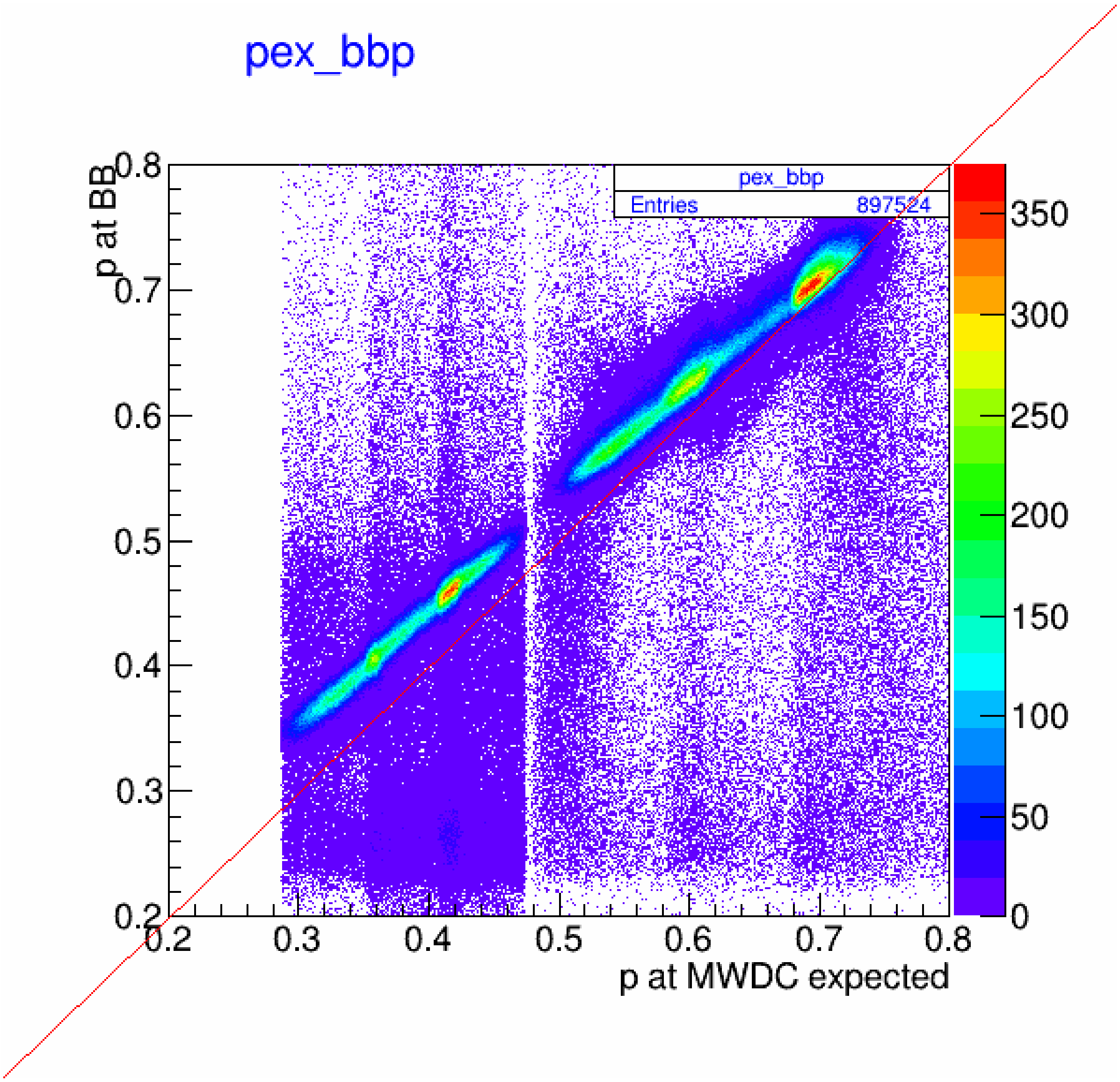
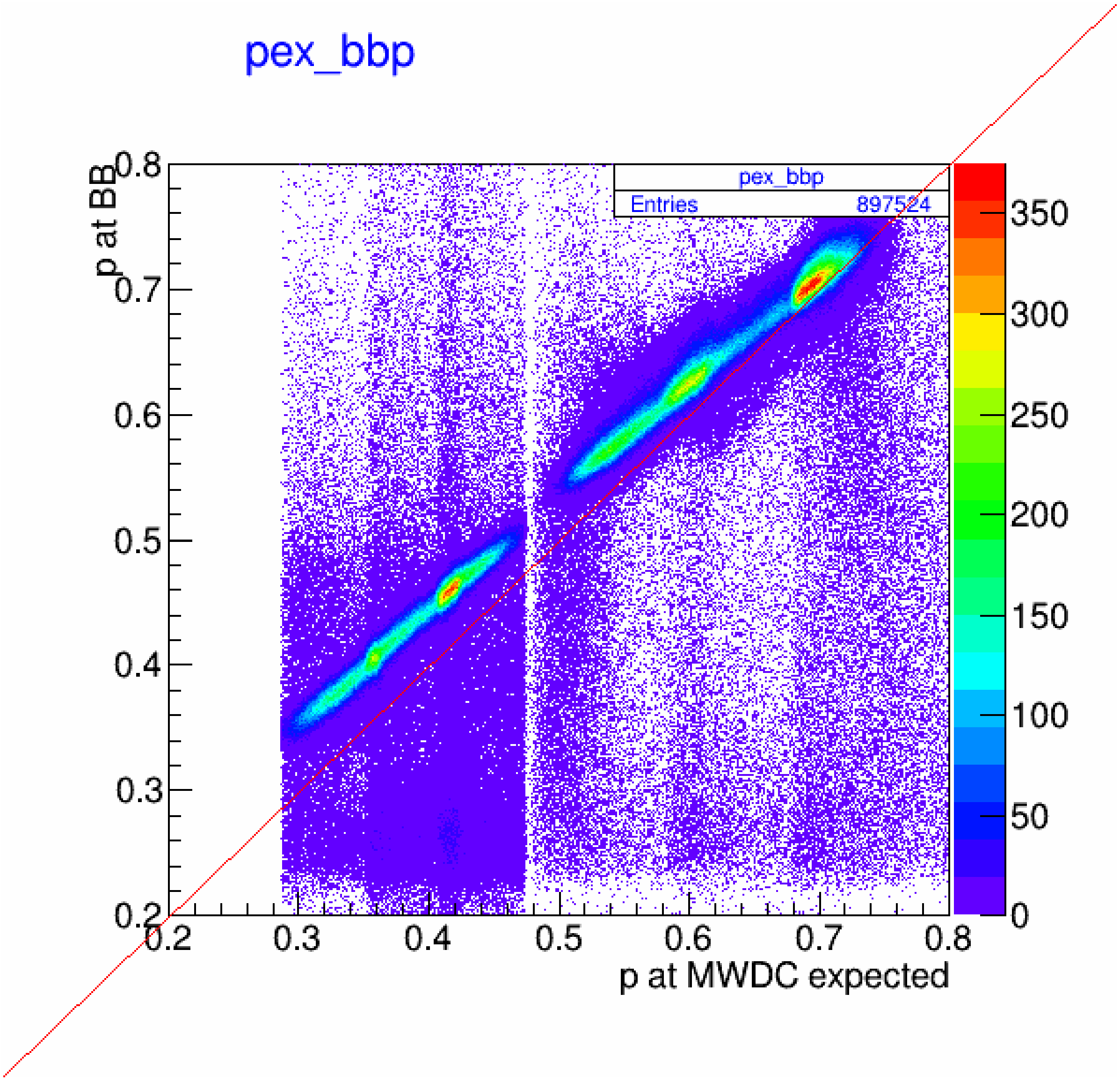
The method obtaining momentum at the target and the x_bj ratio.

I. The momentum at the Bigbite are from Analytical model.
II. Using the elastic data from hydrogen we can make a correction to the analytical model at the MWDC.
III. The simulation of the energy lose though target then translate the momentum at MWDC to the reaction point.





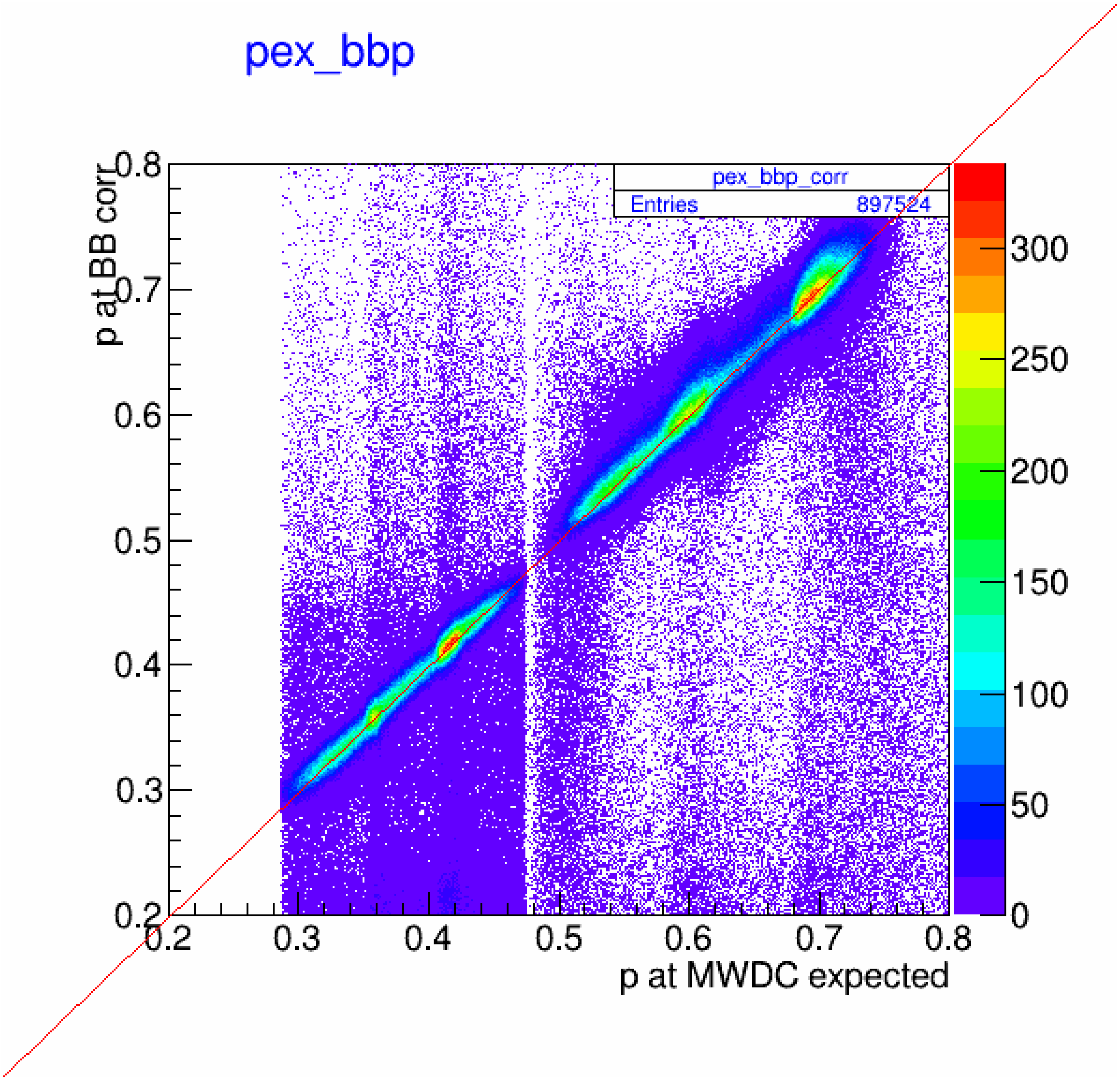
F1: the expected momentum at the MWDC from q vs the analytical model optic momentum.

1. Using the hydrogen elastic data calculating the momentum expected at MWDC from |q|. Using the simulation momentum (p_start) at the target then calculate the energy loss though target/chamber/Up to MWDC and get momentum at the MWDC (p_MWDC_0).

2. Now using the |q| ==p_start and look up the p_expected_from_q from the set of (p_MWDC_0). This is the data in the x-axis.

3. The data in the y-axis is the analytical model from BB-optic.

4. It is clear that it need some translation.



F2: the expected momentum at the MWDC from q vs the corrected momentum to the analytical model optic momentum.

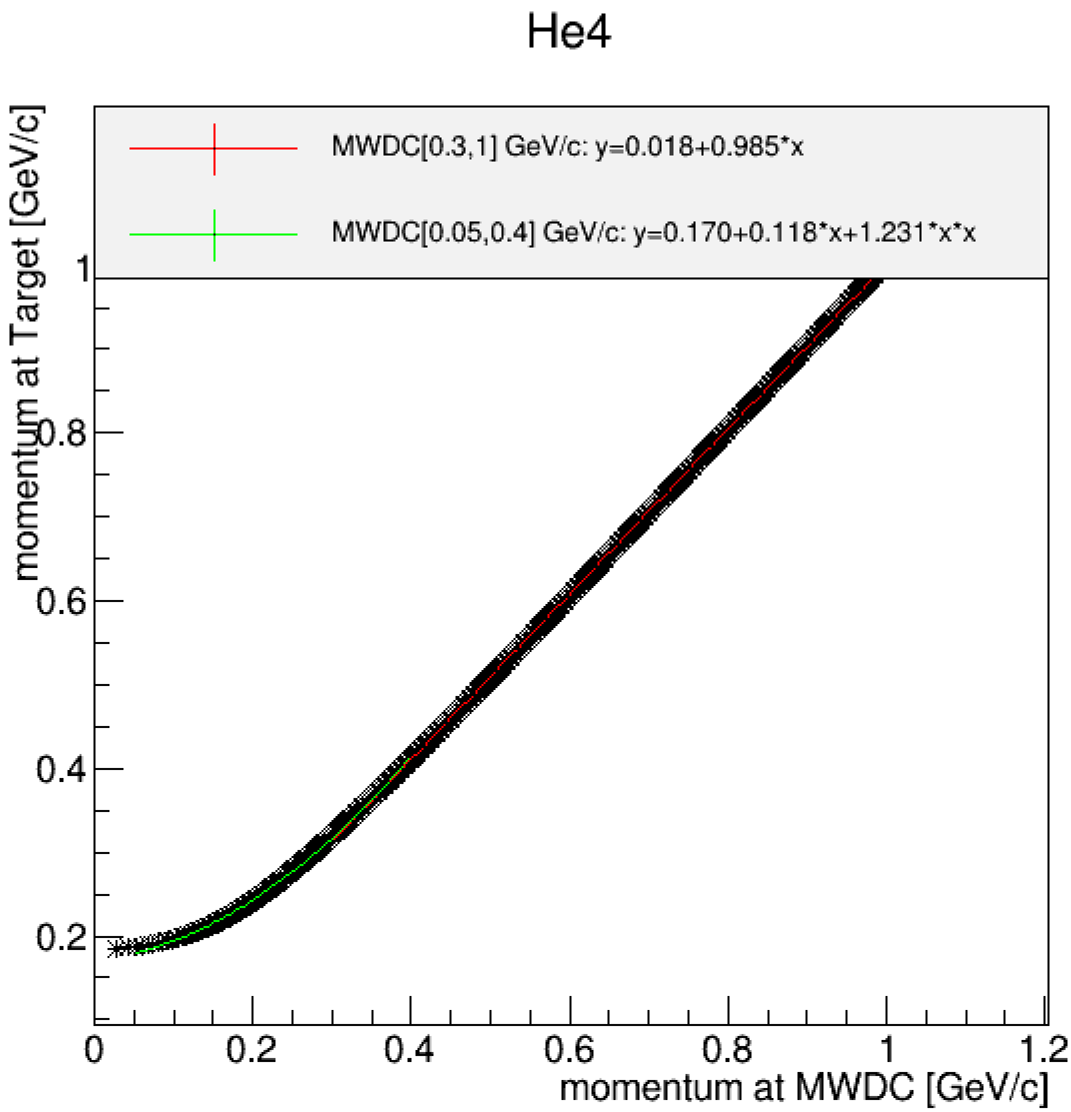
5. The result of fitting correction. The corrected momentum are 2nd order polynomial to the analytical model.

p_corr at MWDC = a0+a1*p_ana+a2*p_ana*p_ana

where {a0,a1,a2} ={-0.034,0.877,0.226};

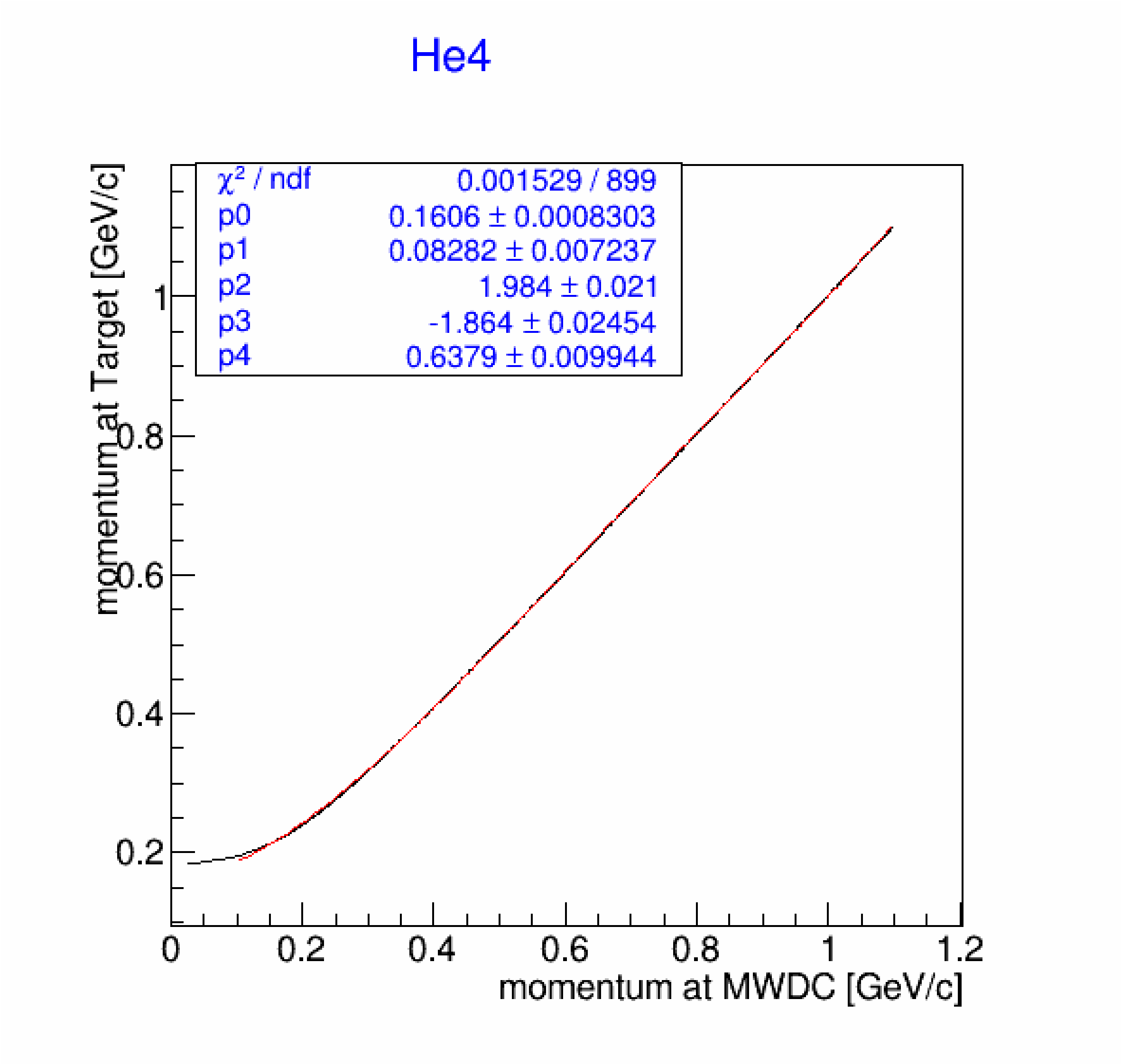
The translate the expected momentum at the MWDC to the target. This is difference from target to target. This is from simulation data.

Previous translation:
The translation are in two section:
1. linear: from [0.36 to 1]
2. 2nd order polynomial: from [0.05 to 0.36]



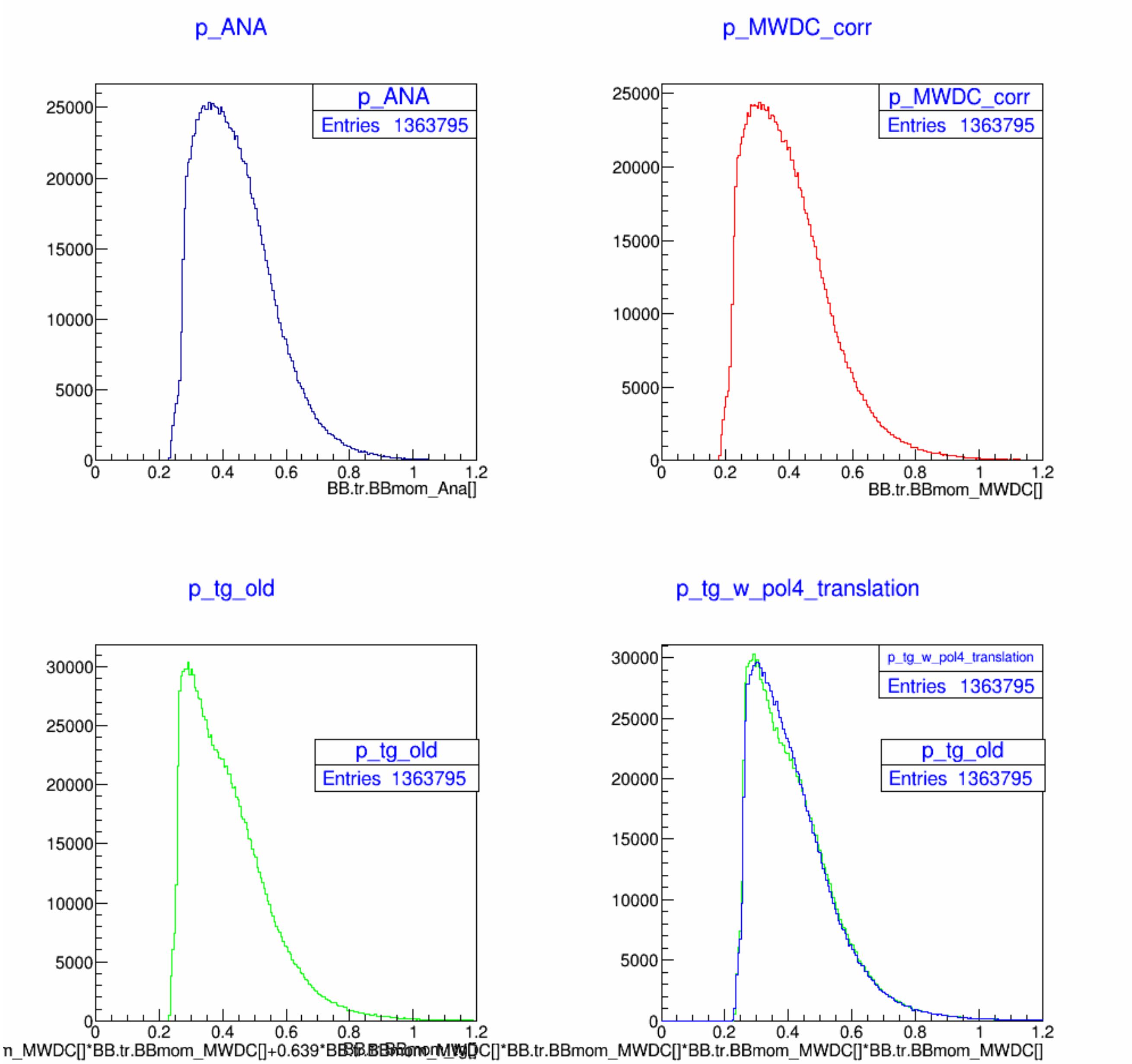
F3. He4 translation.

But it turn out to be that it make the momentum at the target have “dip”. So we try with a single function fit with pol4.



F4: He4 translation from p_MWDC to p_target with pol4 fit

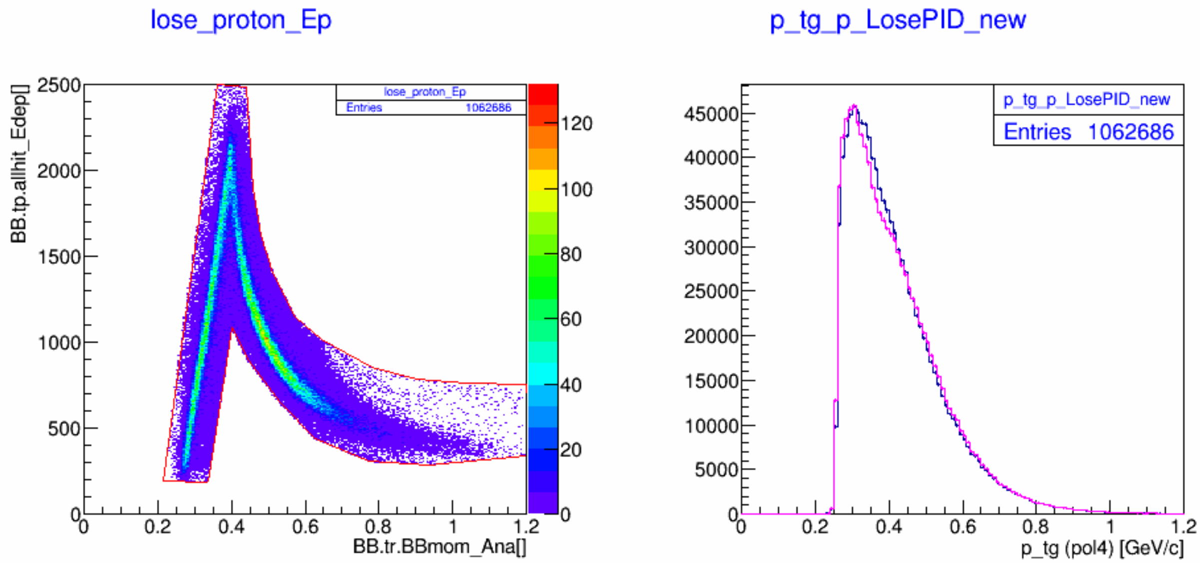
which give the result in smother p_target.



F5: He4: the momentum translation from p_Analytical (dark blue)->p_MWDC correction (red)->p_target old version (green), p_target new version (light blue)
The new translation from p_MWDC to p_target with pol4 (lower right conner in blue) compare to the old translation in green.

The shape of p target is much smother.

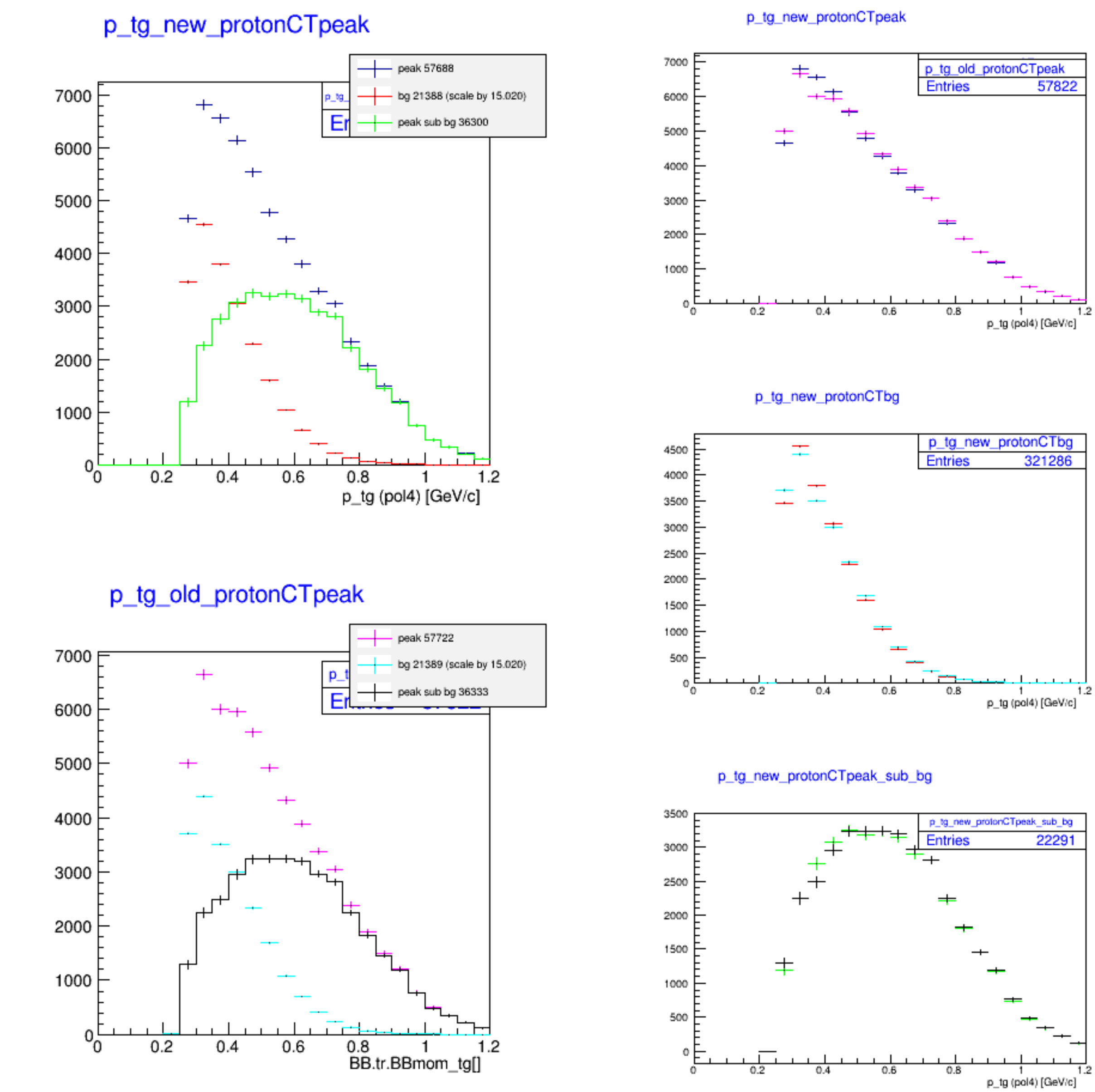
The data are with acceptance cut e-PID and track in BB without p-PID and CT



F6: With additional lose p-PID

The new translation from p_MWDC to p_target with pol4 (in blue) compare to the old translation in pink.

The shape from the new translation still better.



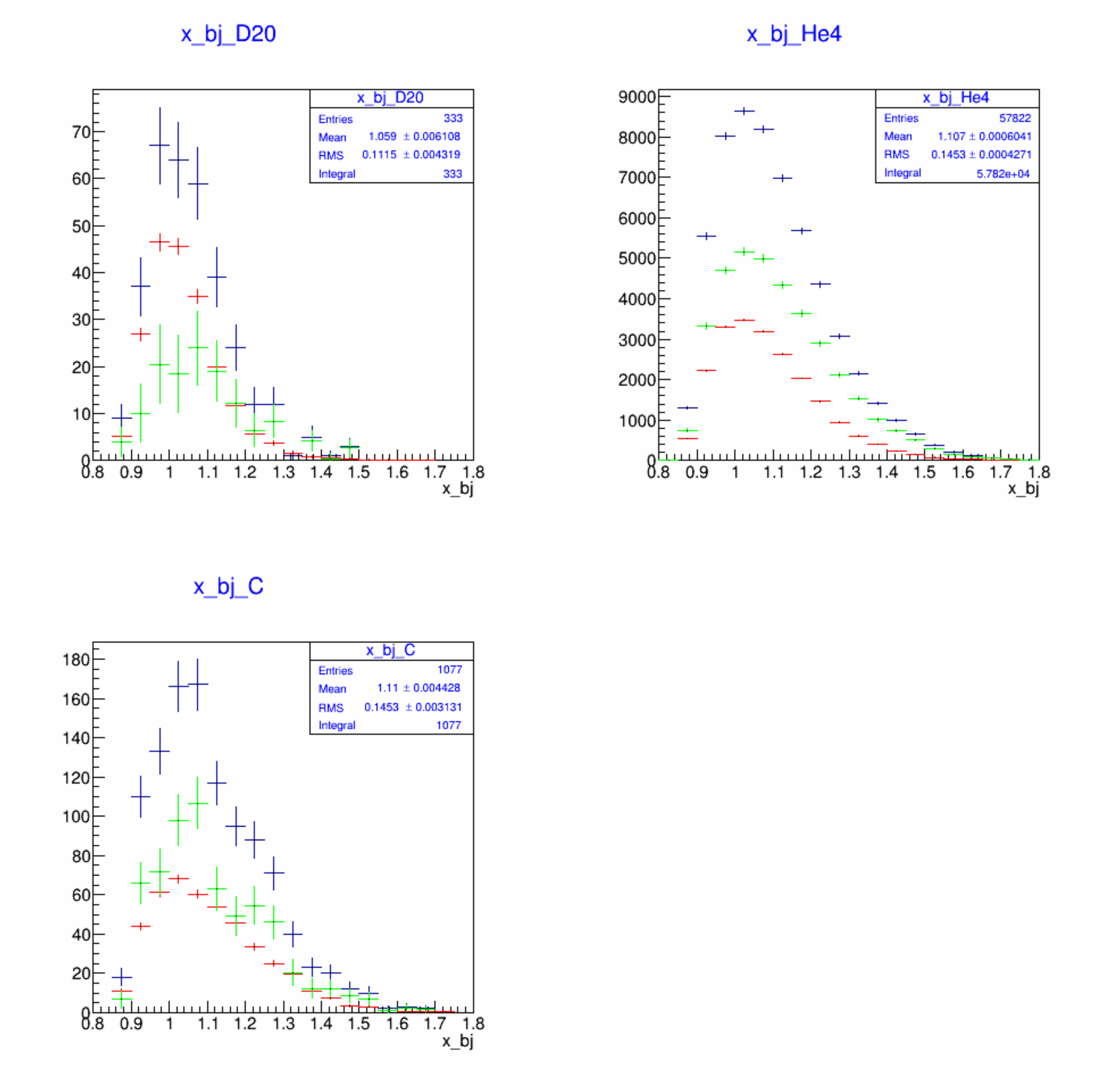
F 7: He4 kin 12 data
Now within the CT cut and lose proton PID (the final cut)
blue/pink = CT peak
red/sky-blue = CT background distribution
green/black = CT peak Sub Background.

P target translation from p_MWDC.
Top Left: p_target with pol4 translation
*[0.1606+0.0823*p_mwdc+1.986*p_mwdc^2-1.867*p_mwdc^3+0.639*p_mwdc^4]*
Bottom Left: p_target with two pol2 (0.05-0.36) and with linear (0.36 to 1.2)
Top Right: overlap of p_target in CT old/new
Middle Right: overlap of p_target in CT_Background old/new
Bottom Right: overlap of p_target in CT sub Bg old/new

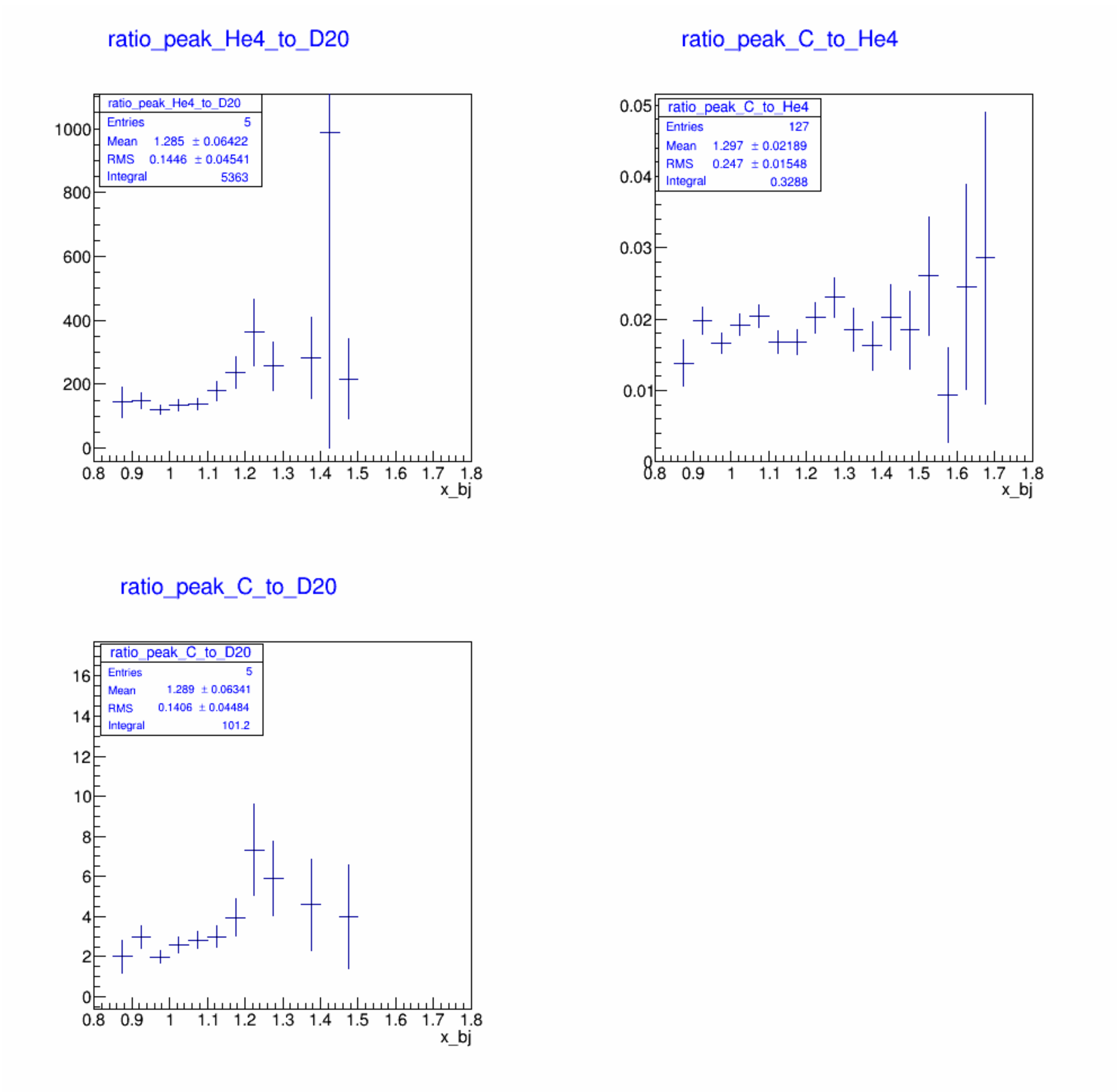
Not much change in the CT sub bg distribution but at the lower momentum. The same applied to LD2 and C12. With the translation for each target energy lose.

The other idea about the ratio of x_bj is actually not effect from whether how we translate the momentum (unless we make it one of the cut).

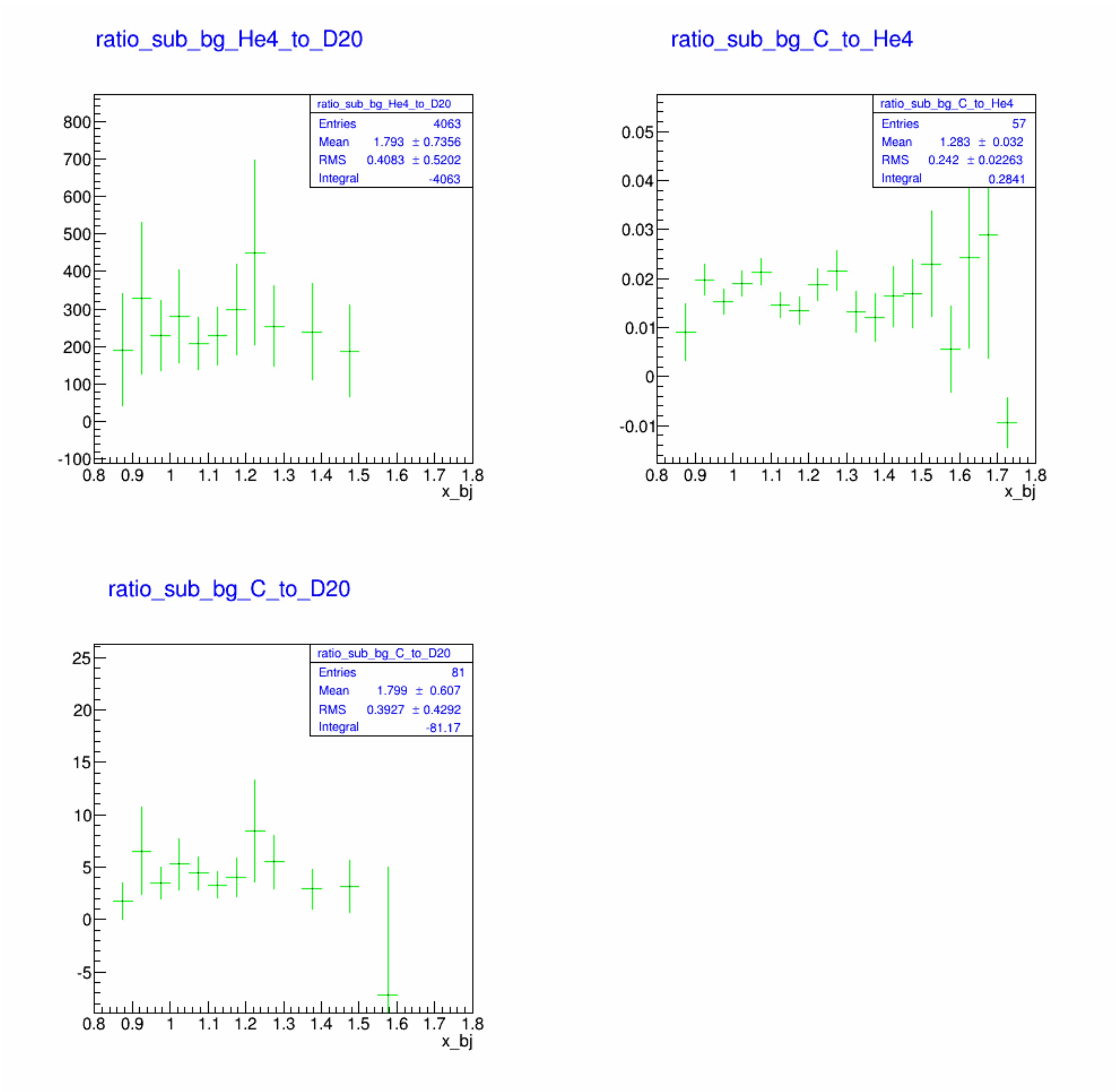
The raw x_bj distribution are as follow for kin 12 and also the ratio.



F8: the x_bj distribution for semi-inclusive

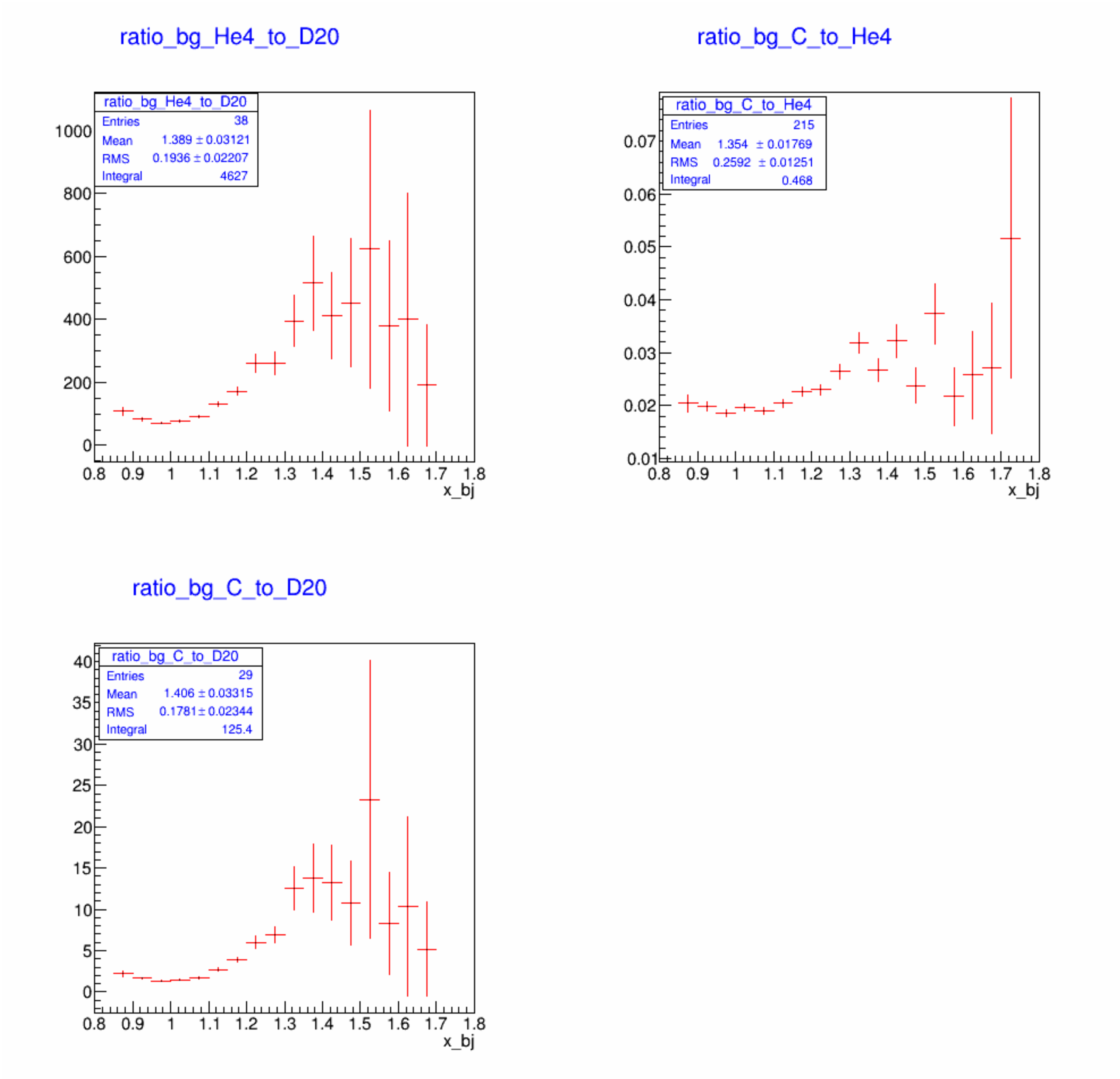


F9: The ratio of the x_bj of the CT peak (without background subtraction)



F10: The ratio of the x_bj of the CT peak with background subtraction

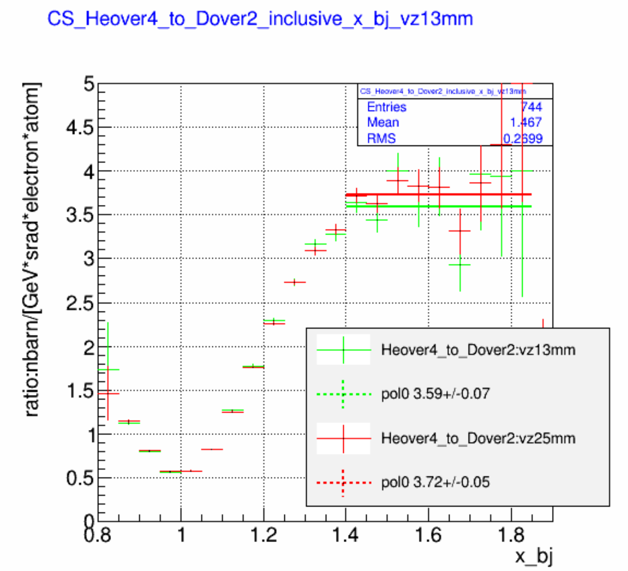
This show the flat ratio for all target over the region of 0.9 to 1.3.



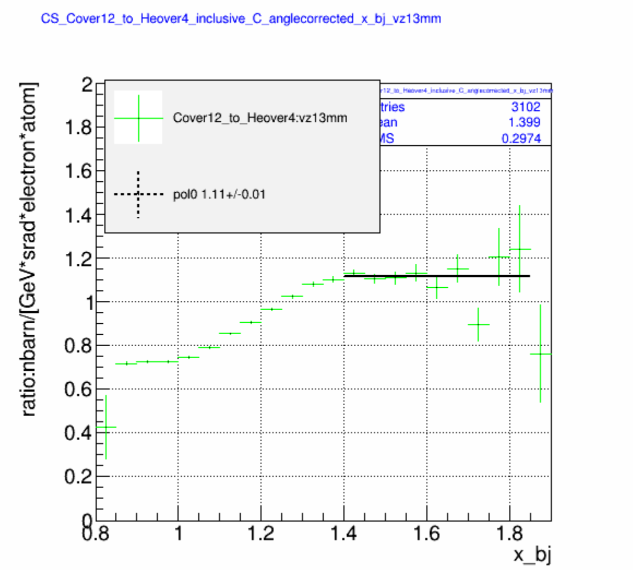
F10: The ratio of the x_bj of the background.

This show the same behavior to the inclusive ratio.

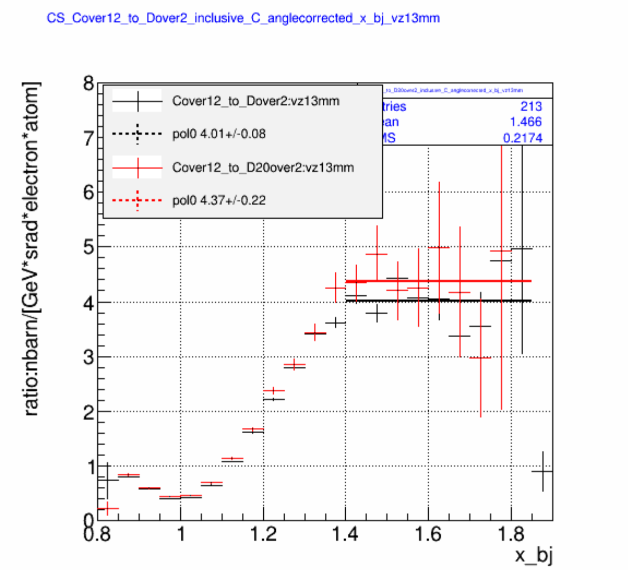
Inclusive data for x_bj ratio.



R1*:He/4 to D/2 (10cm-length)
give a2 pol0 3.59+/-0.07 (fit only)
pol0 3.72+/-0.05
compare to a2(He) at 3.60+/- 0.1*
{N. Fomin et al, physi. Rev. Lett 108, 092502(2012)} with Q2 = 2.7-6.4



R3*:
C/12 to He/4
give flat region at pol0 1.11+/-0.01



R4*:
C/12 to D/2
give a2 pol0 4.01+/-0.08 : black: 10cm
pol0 4.37+/-0.22 : red: 20cm
compare to a2(C) at 4.75*