W Mass Measurement in CEPC

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EW Meeting

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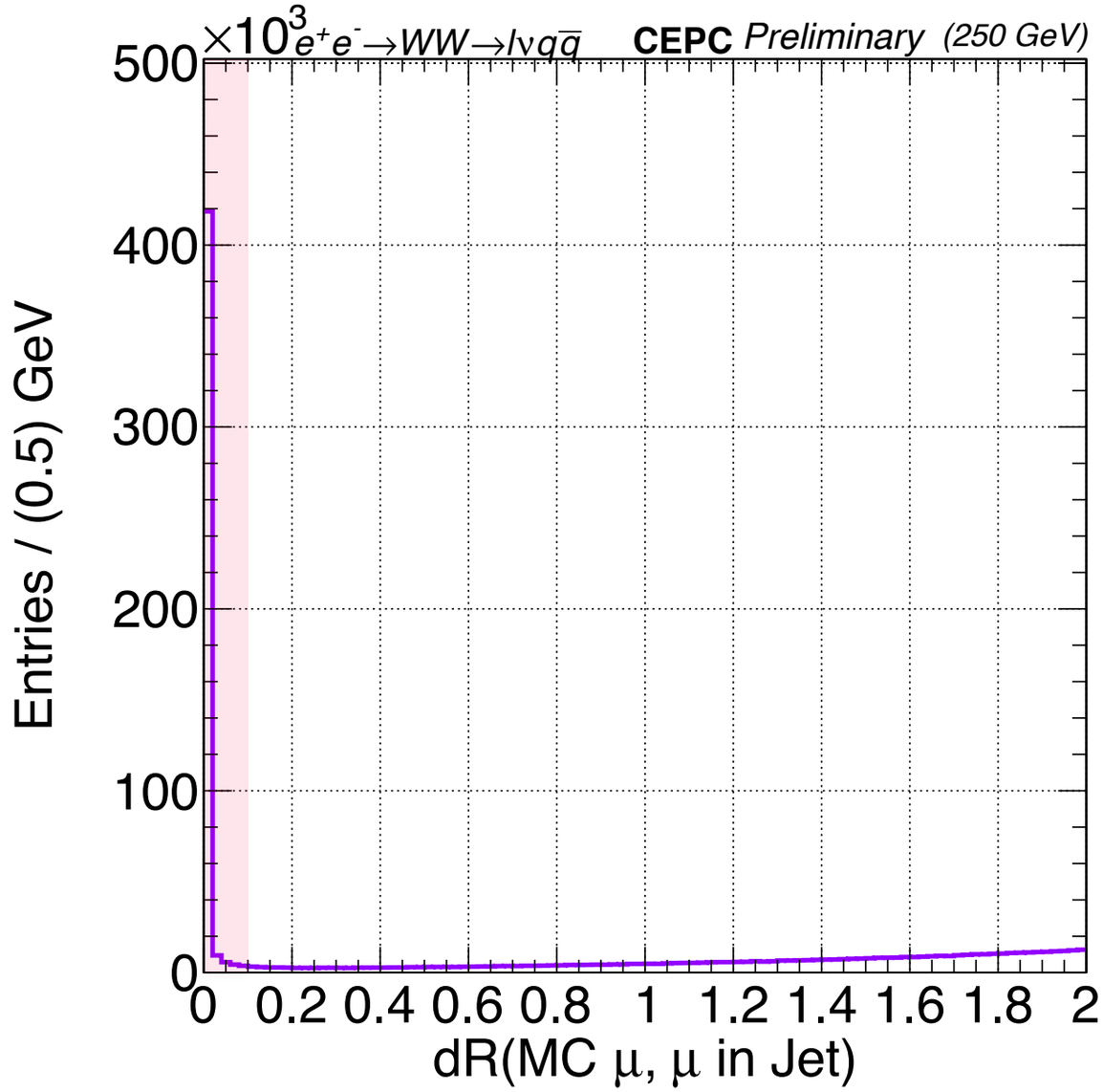
Outline

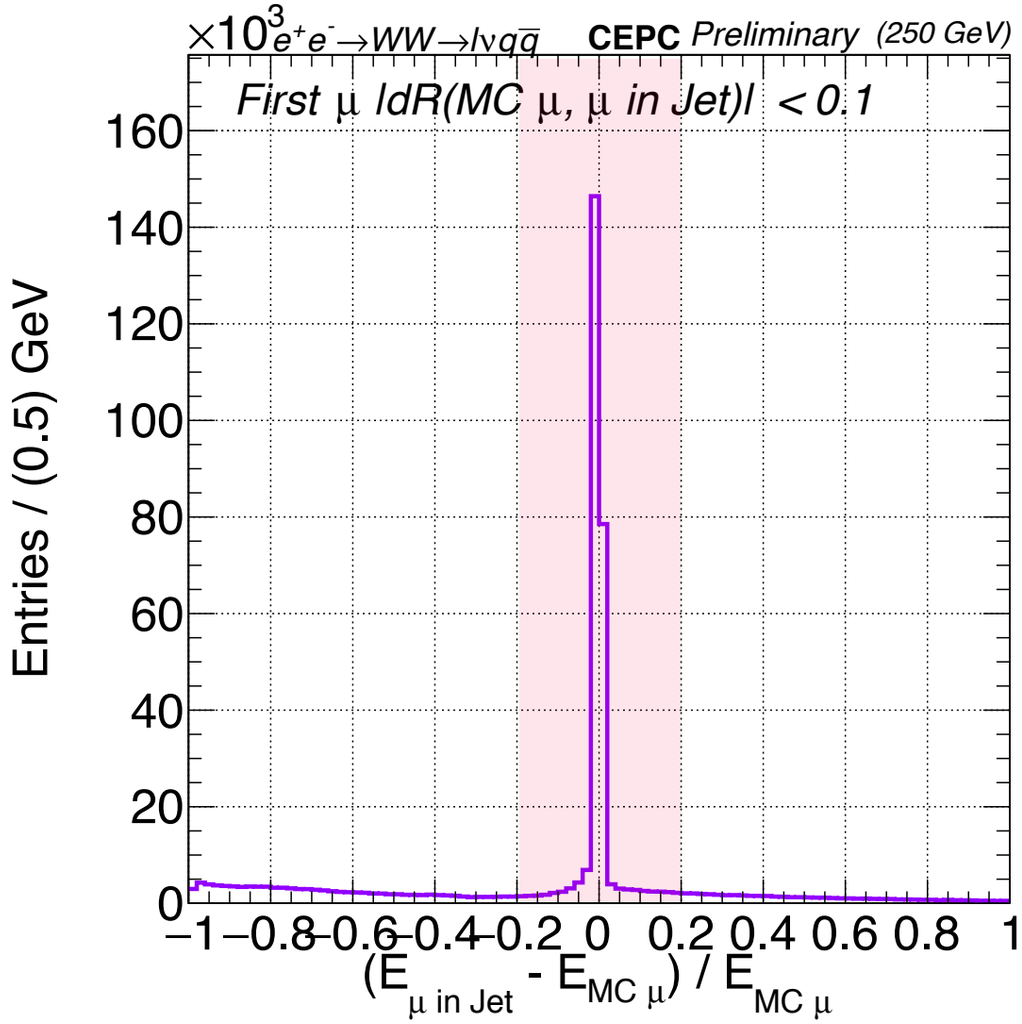
- **Use MC matching to remove the prompt muon.**
- **V4 problems**

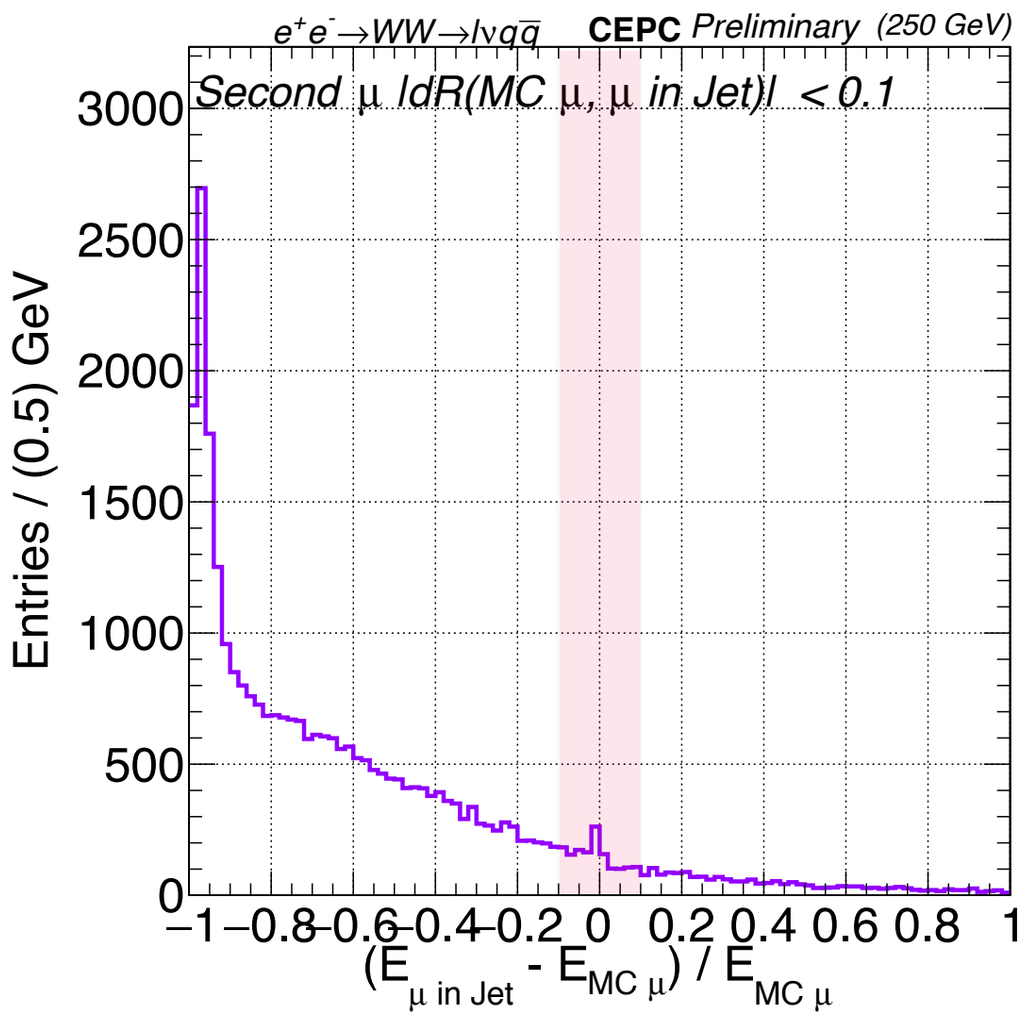
dR(MC μ, μ in jet)



■ **dR between "muon in the jet" and MC true muon less than 0.1(from the plot) is identified as the prompt muon candidate.**

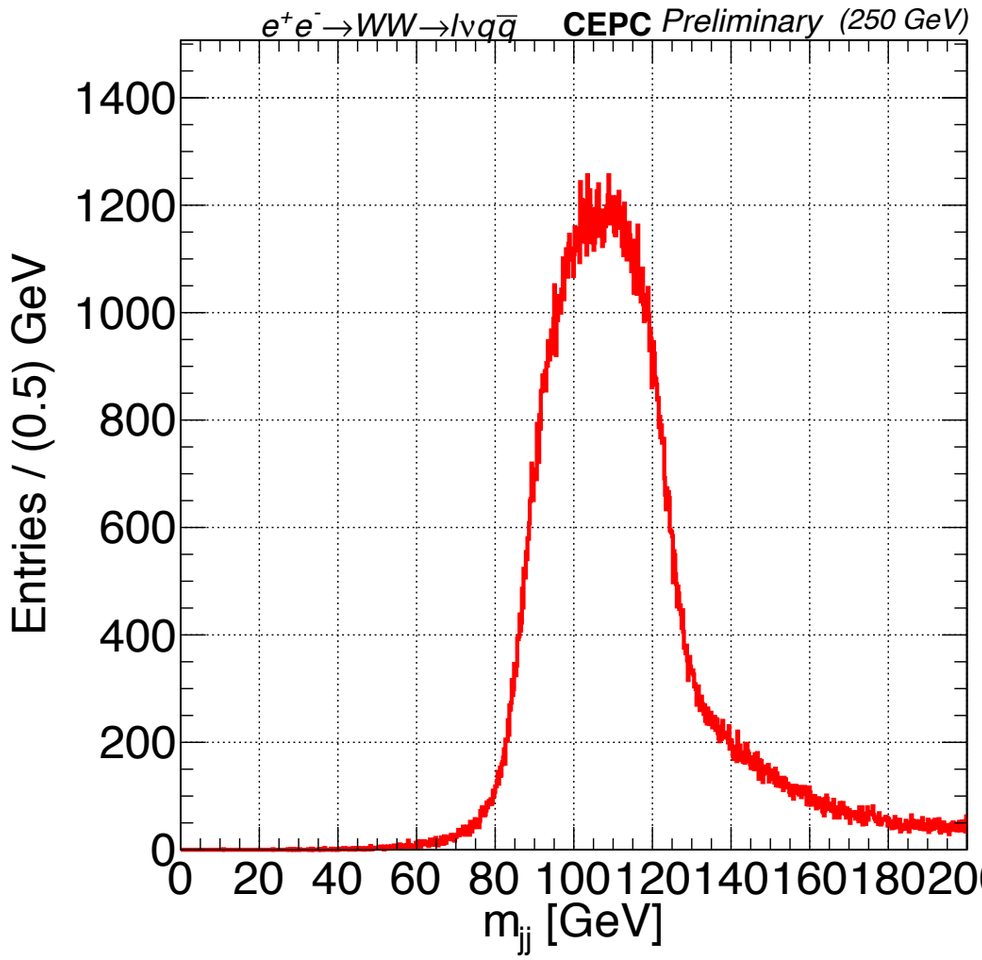
dE(MC μ, μ in jet)/E(MC μ)





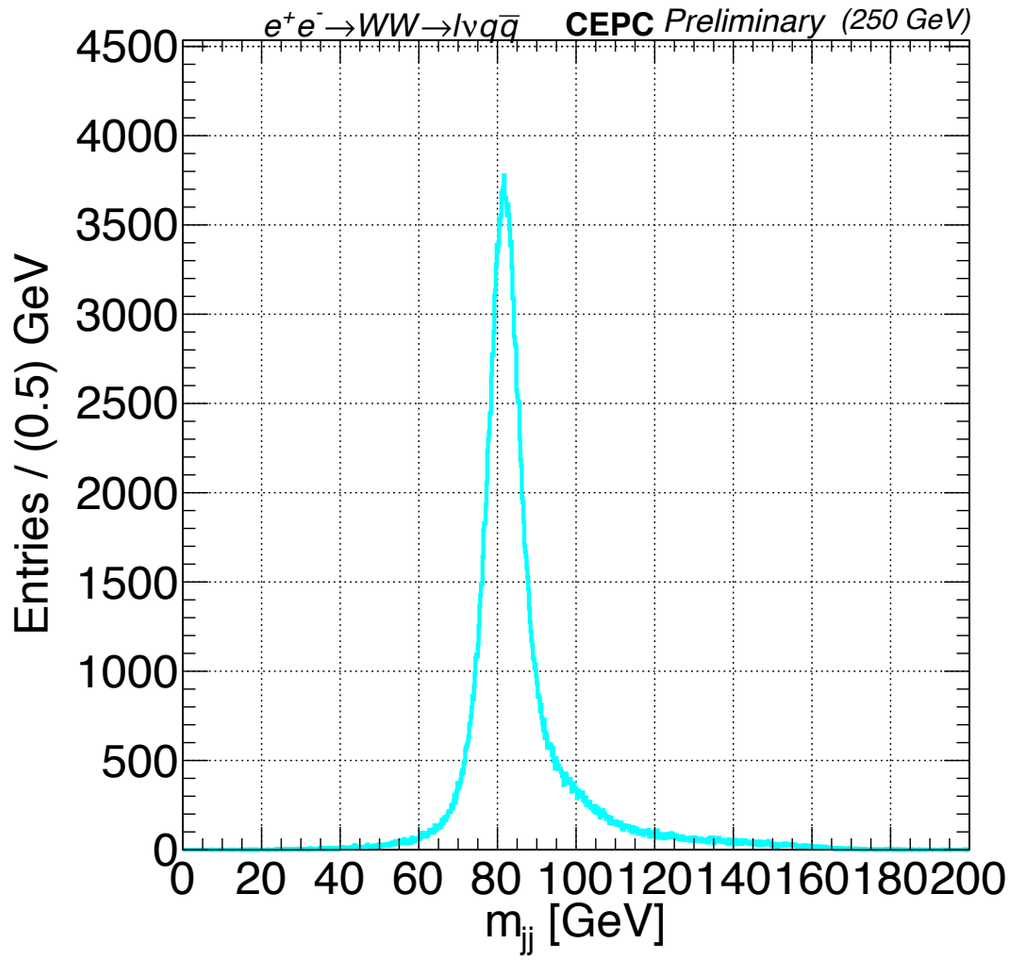
- **The second close muon in the jet may be less than 0.1.**
- **The closest muon is required |dE|/E < 0.2(from the plot), and the second on is required 0.1(from the plot).**
- **I will choose the energy closest one**

After Matching μ



The event has a matched muon. This muon must come from another W.

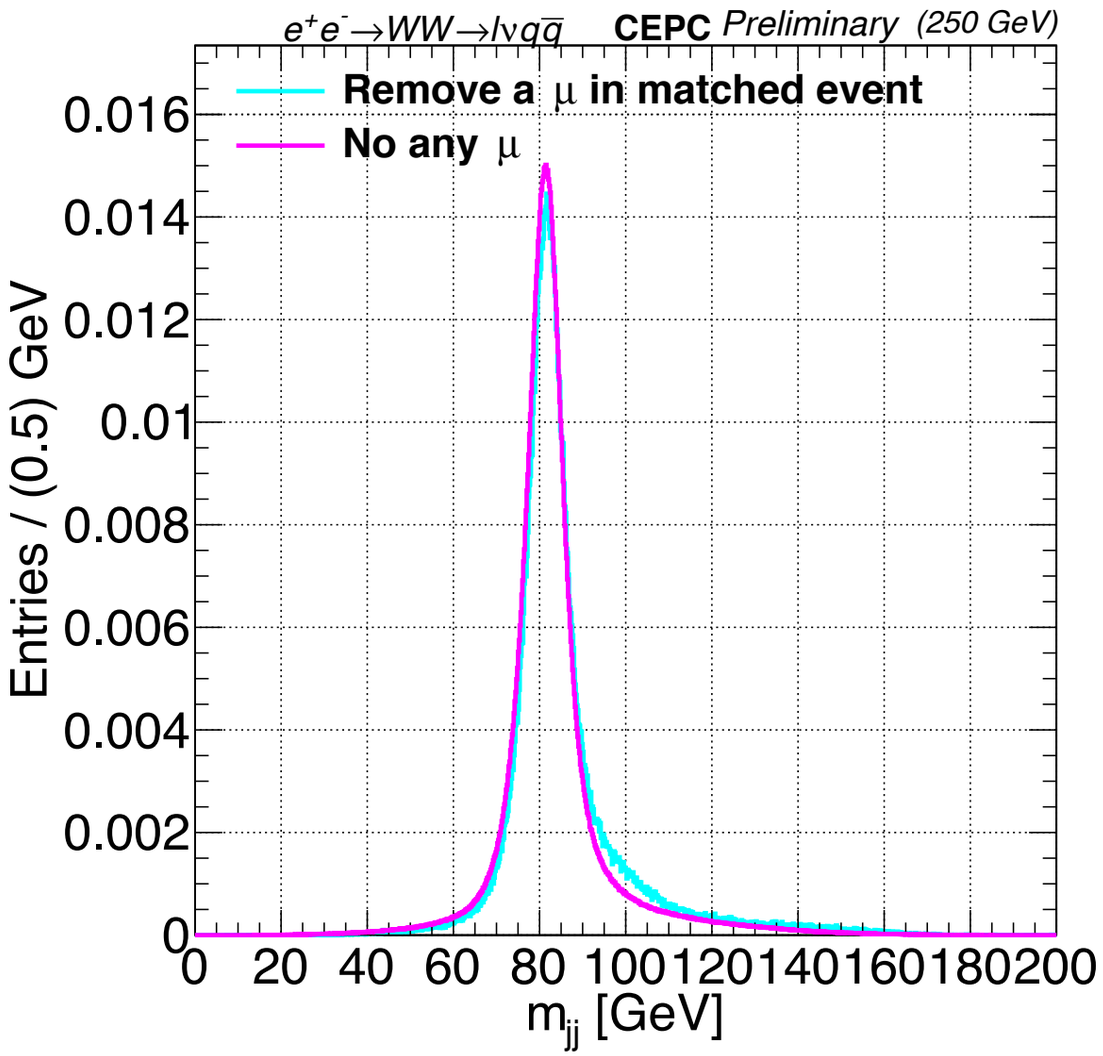
Same events



The event has a matched muon.
After I kicked off this match muon.(by subtracting its four-vector)

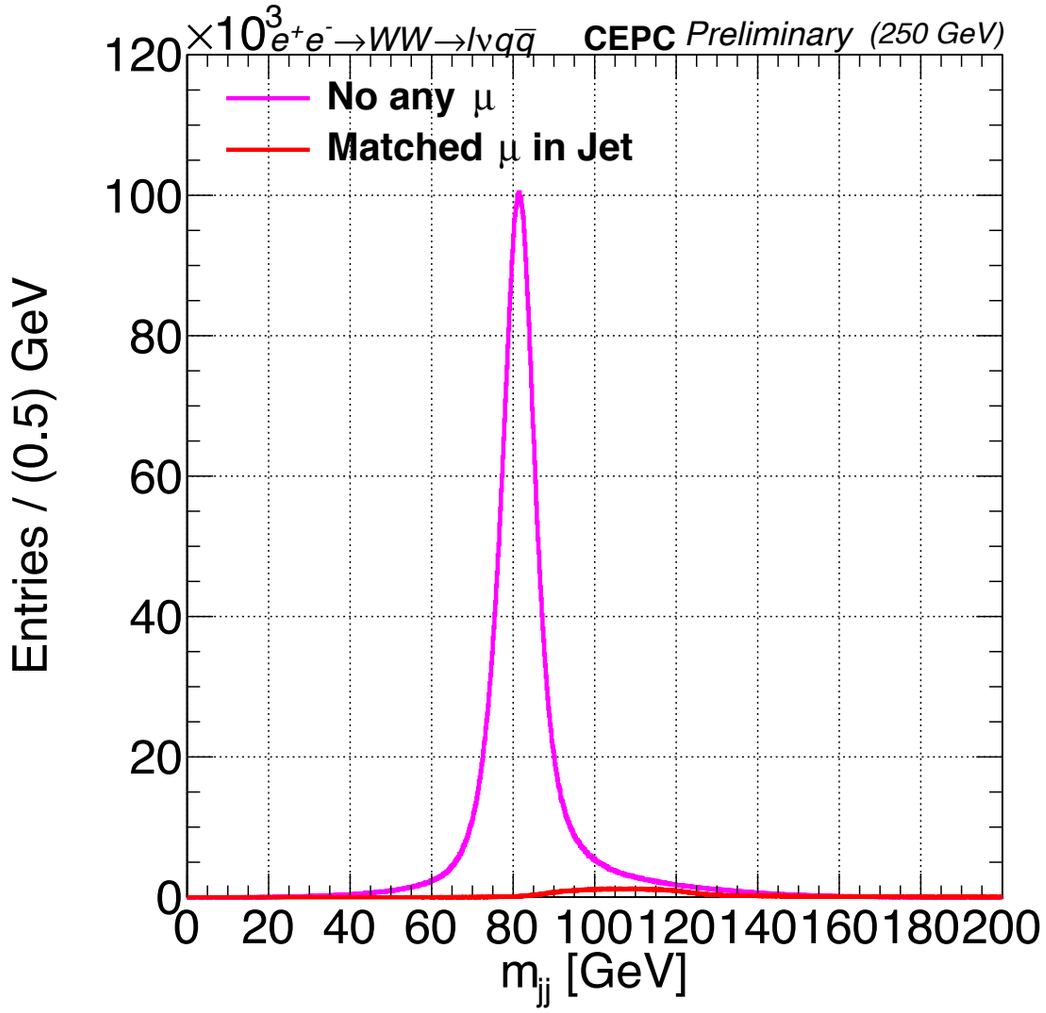
■ **After vetoing a muon in polluted event, dijet invariant mass can be recovered.**

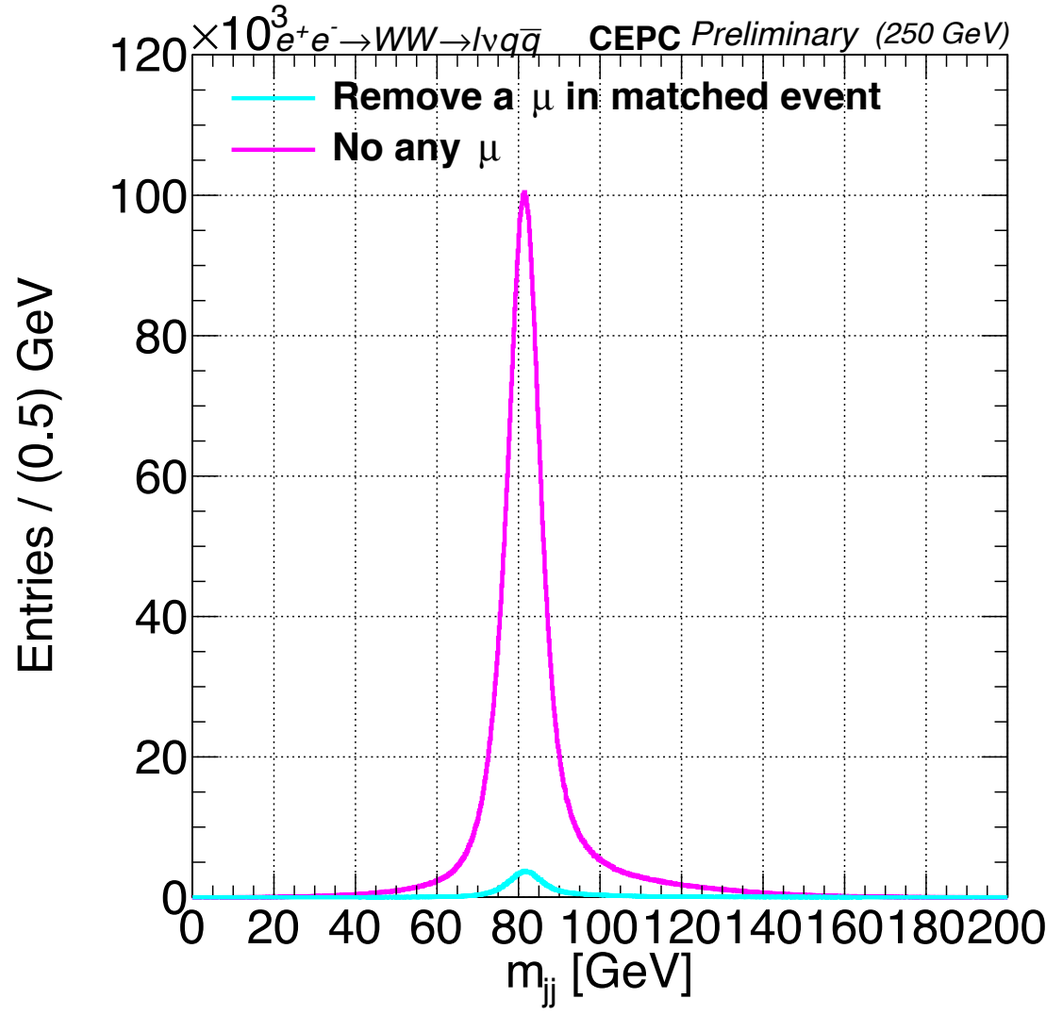
After Matching μ



- **"No any μ" means two jets don't contain any muon in these events.**
- **"Remove a μ in matched event" means the blue plot in S5.**
- **Cleaned one has higher shoulder and shifting peak.**

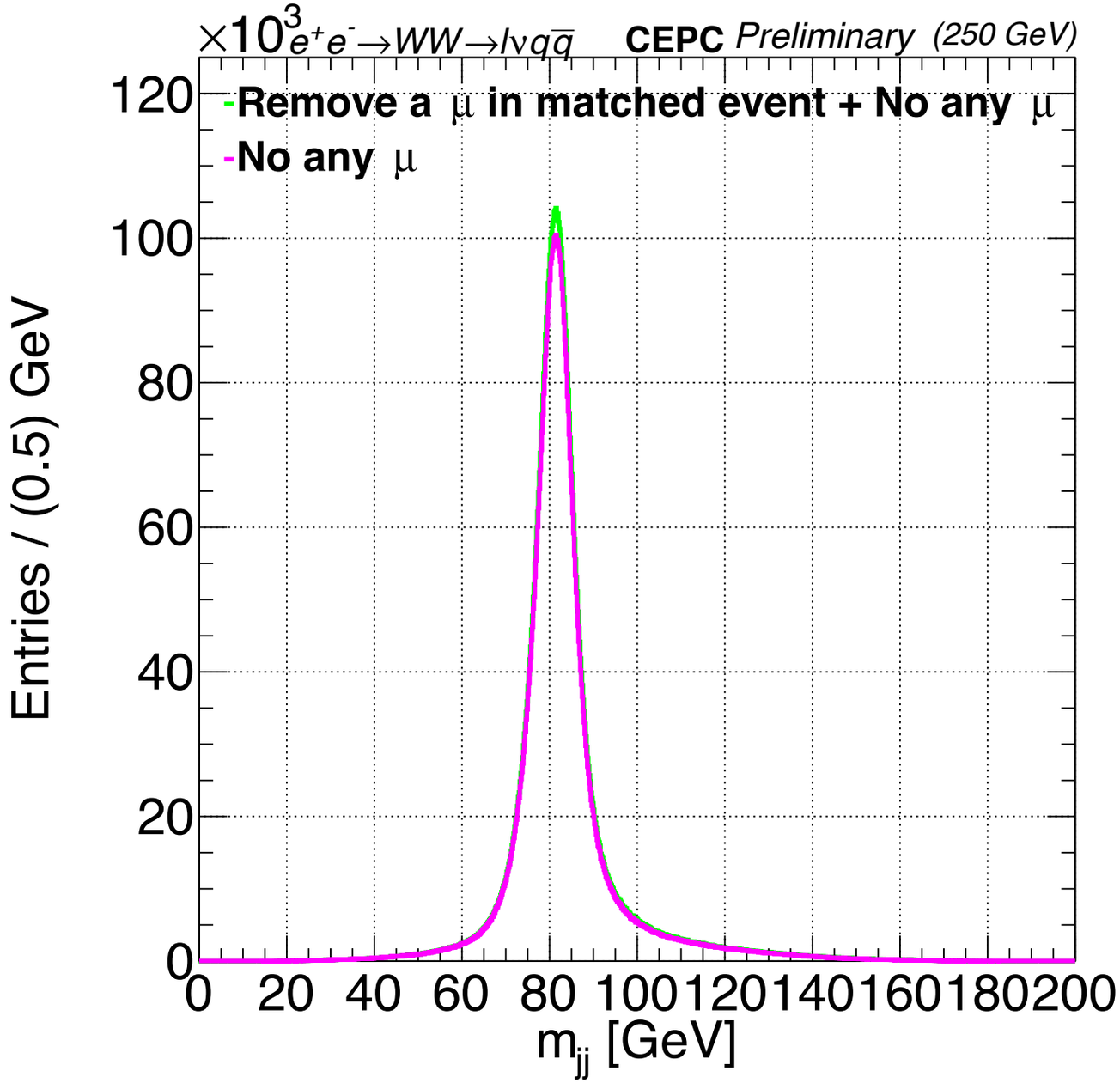
After Matching μ





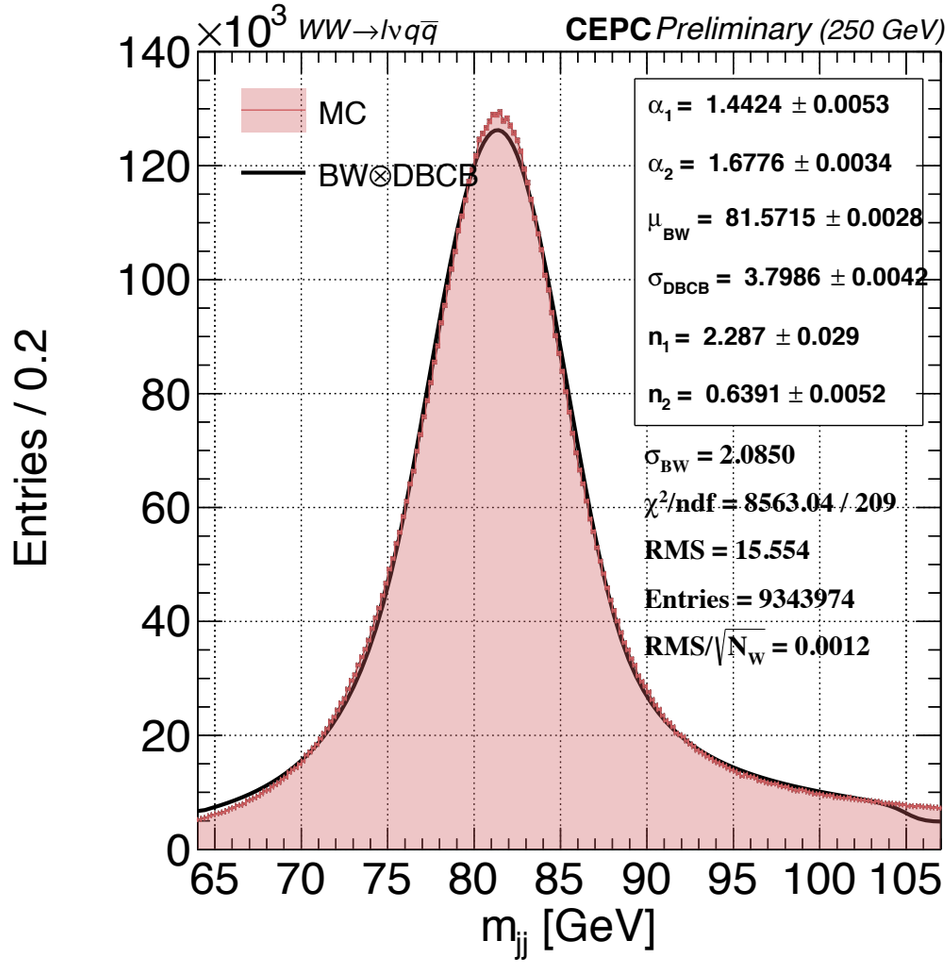
■ **We knew the polluted event only occupy 1% in total event, but it can cause the shoulder in the dijet mass distribution.**

Final plot

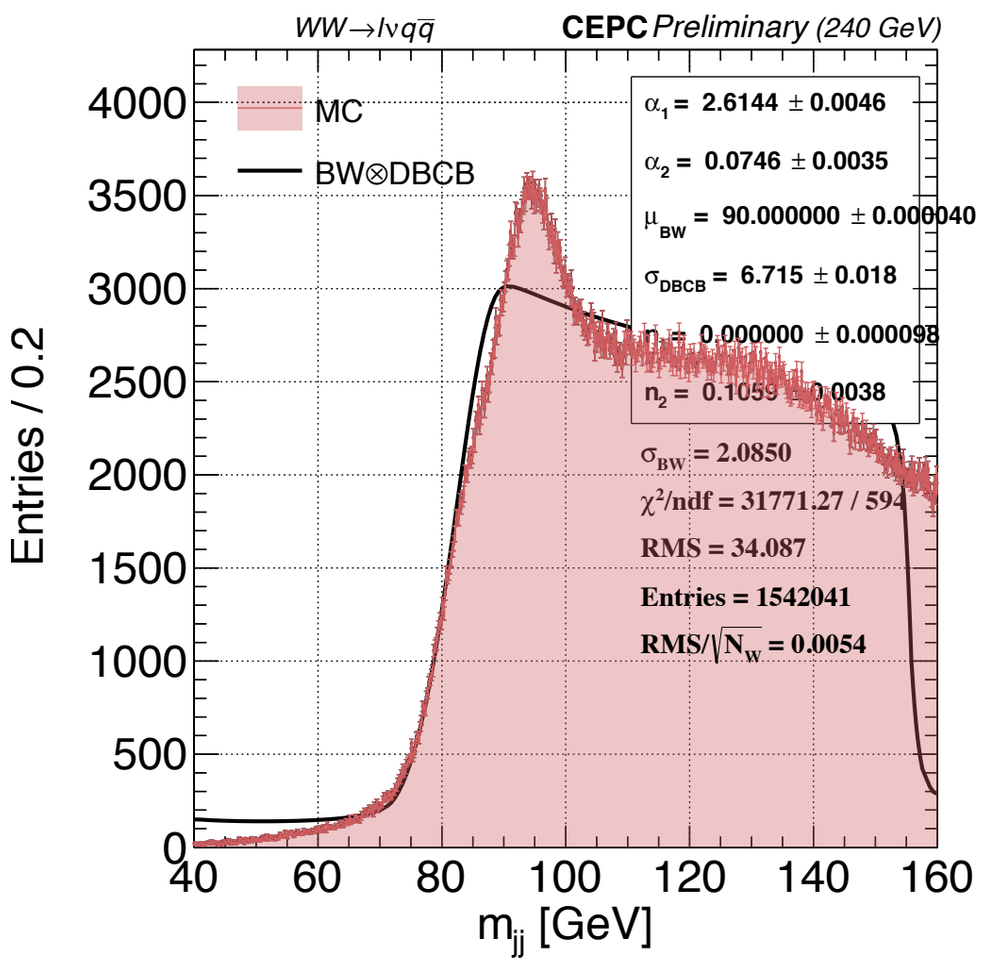


■ **After cleaning the polluted event, it could slightly improve the mass resolution and remove the shoulder**

V1(√s=250GeV) vs. V4(√s=240GeV)



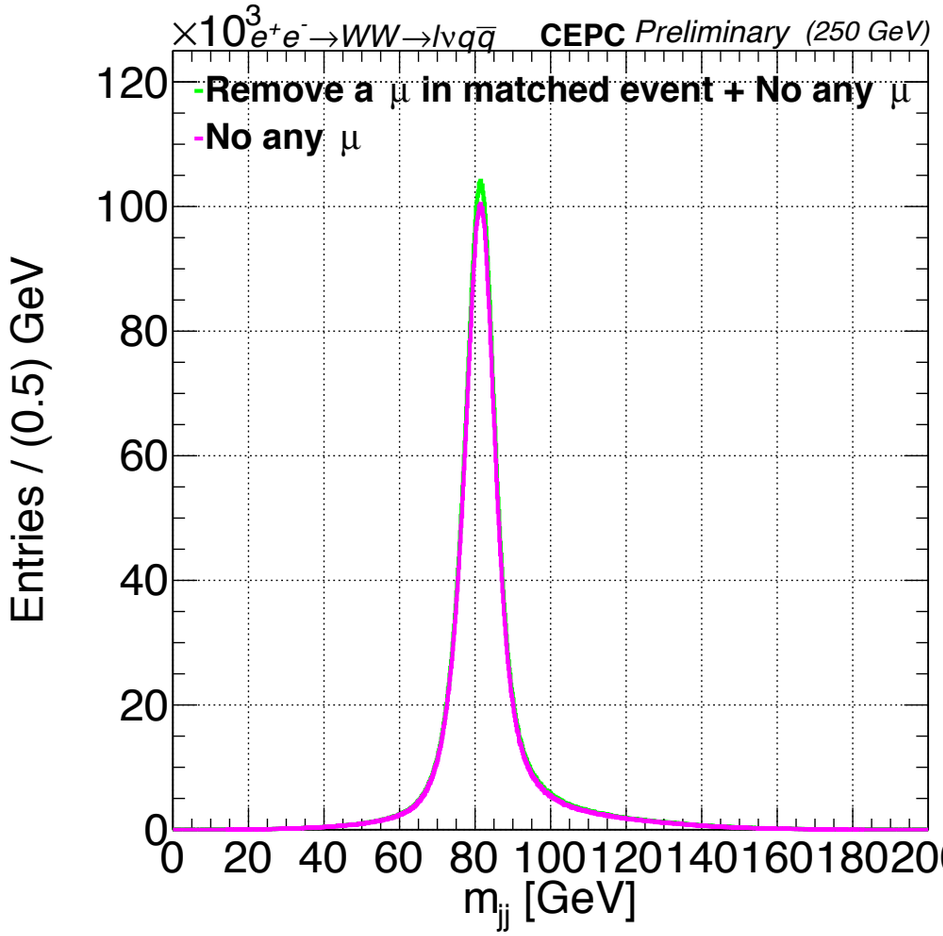
√s = 250 GeV



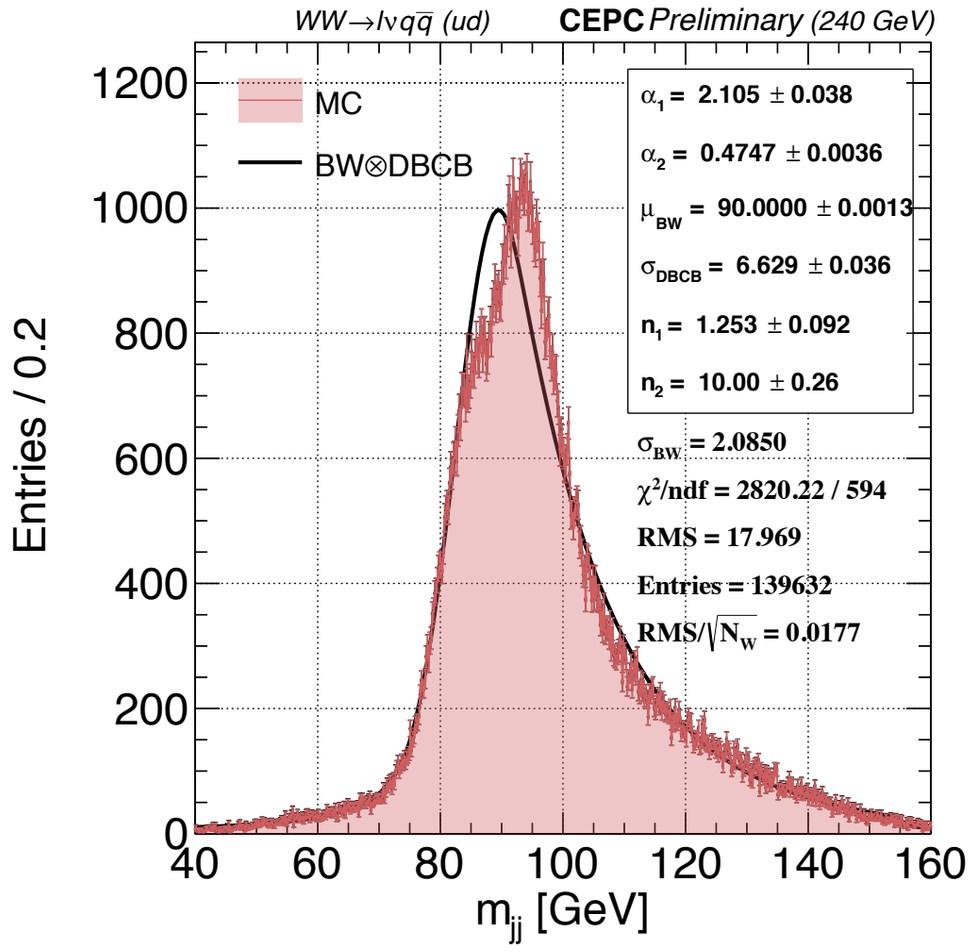
√s = 240 GeV

■ **After using the same approach to cluster jet in V4, I found some problems in reco jet. (Shoulder and peak position)**

V1(√s=250GeV) vs. V4(√s=240GeV)



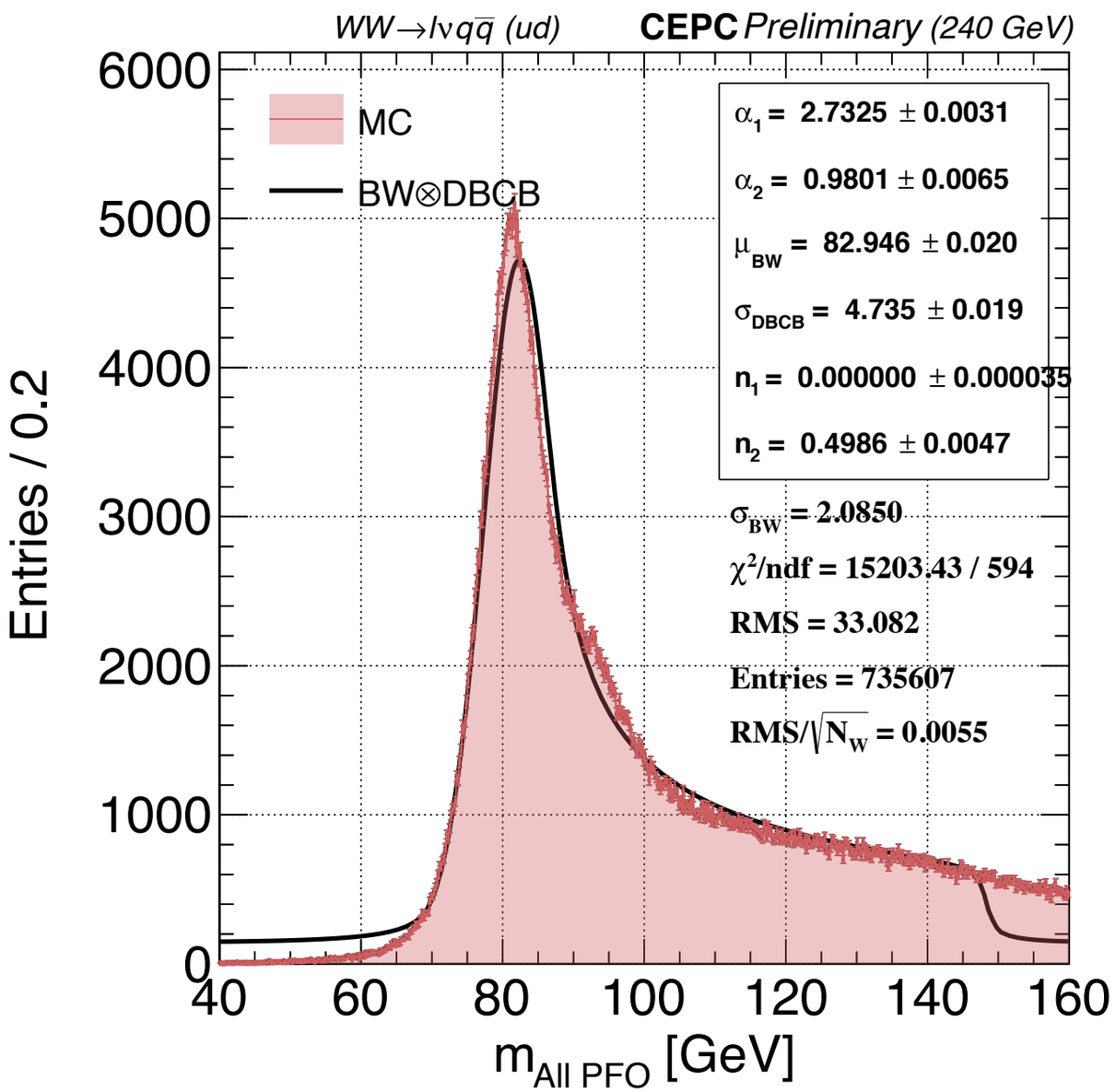
√s = 250 GeV



√s = 240 GeV

■ **After cleaning the polluted event, the shoulder in the V4 can be remove. However, the peak position is wrong.**

V4(√s=240GeV)



■ **If I reconstructed the W mass by all PFOs, the W resonance region is fine.**

Summary

- By MC matching approach, the additional muon is removed and make sure the problem is caused by prompt muon not all muon inside the jets.

To do:

- Check the JEC for the peak region and then study the isolation muon selection criteria in the jet clustering for shoulder region.

Back up

dE(MC μ, μ in jet)