Status of A_{fb} measurement

— CC-EC QCD background Study

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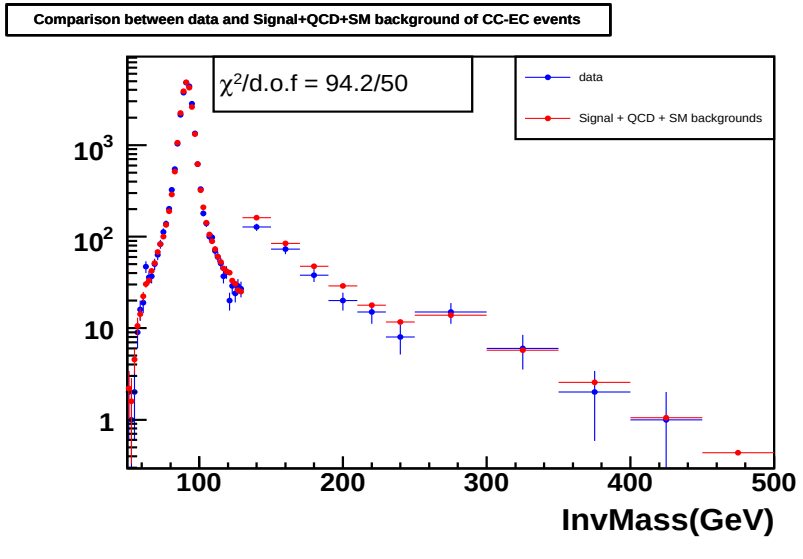
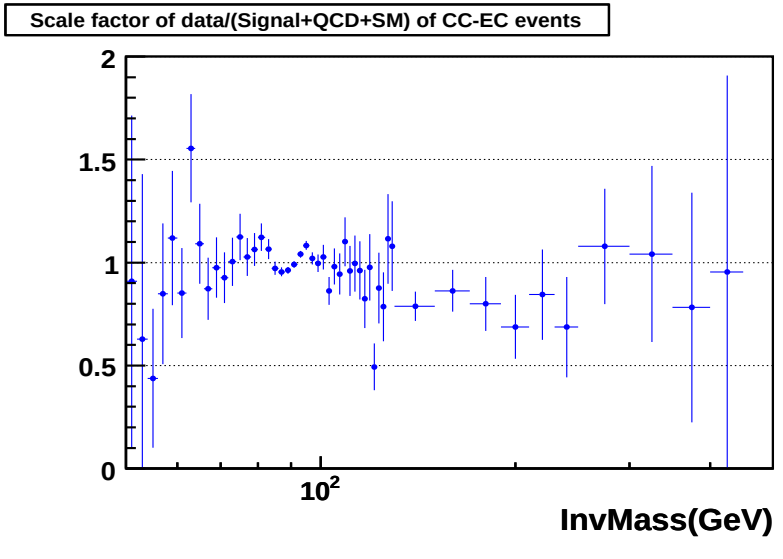
Previous problem

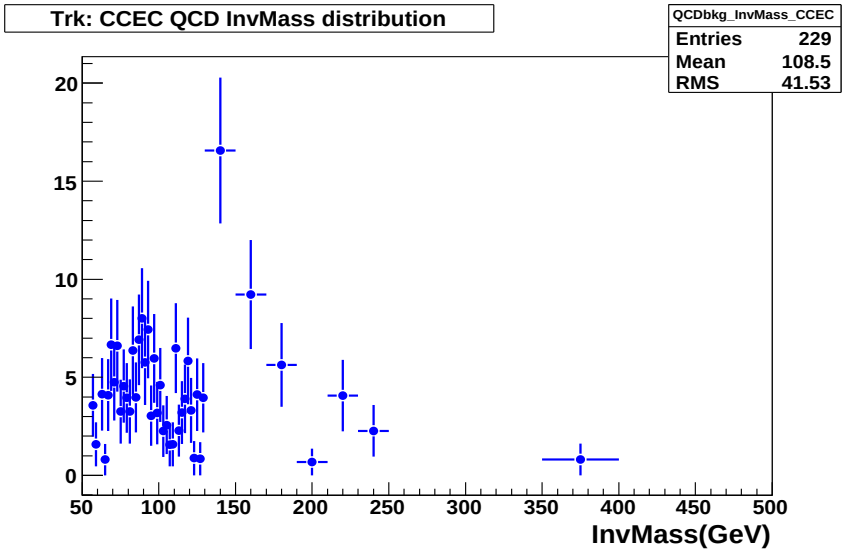
- In event selection, we DONOT apply any track-match cut on CE events.
- So CE events can be divided into two parts:
  - NoTrk: EC electron failed track-match cut
  - Trk: EC electron passed track-match cut
  - Track-match cut: $P > 0.001$
- The results get from NoTrk and Trk should consistence with each other. But Trk results ...

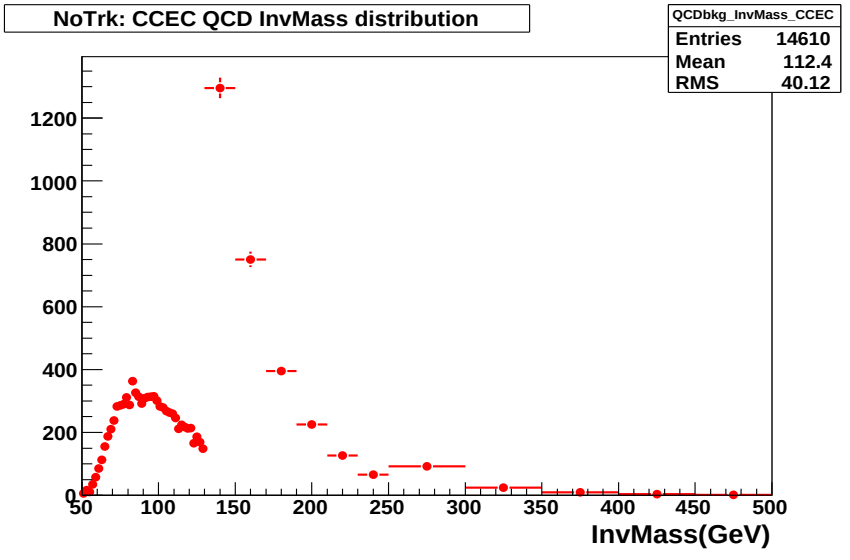


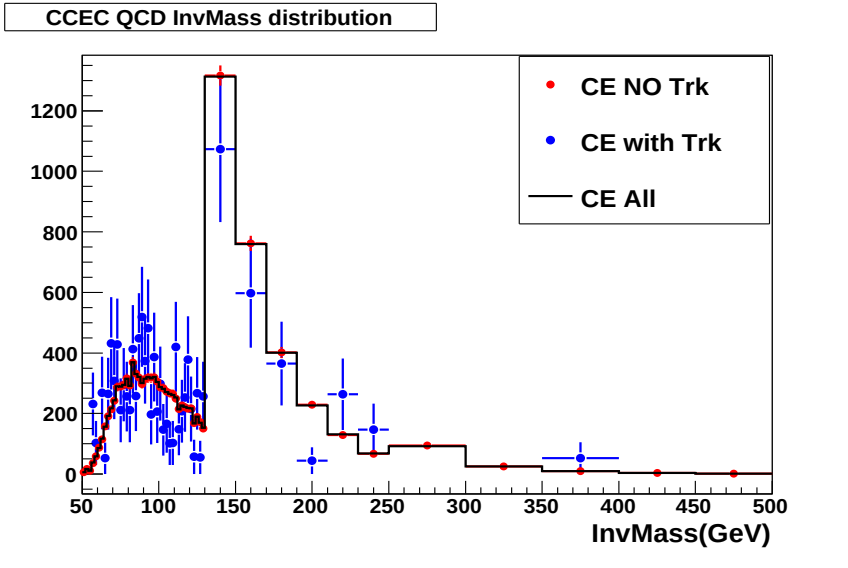


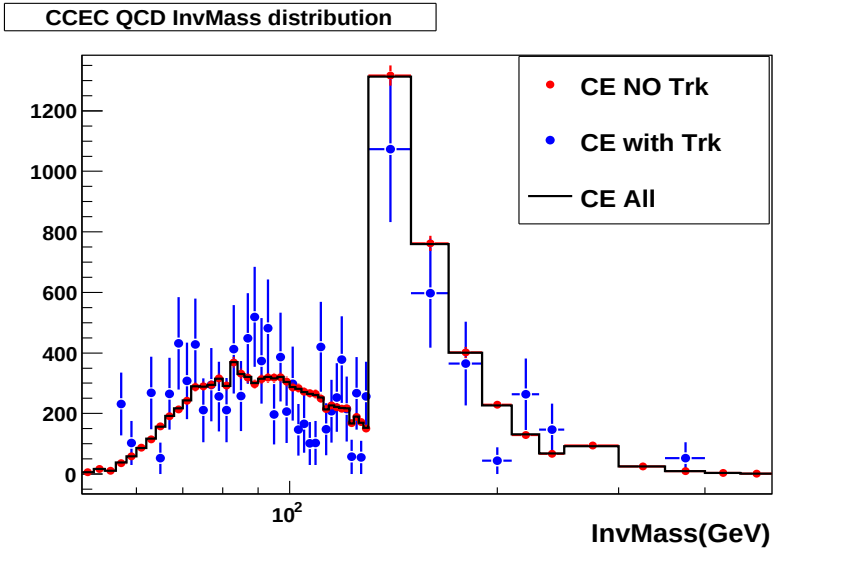
QCD bkg shape

- **With InvMass distribution of data, signal and QCD, we use Minuit fitting method to get the QCD contribution.**
- **In previous, Trk and NoTrk use same QCD shape to fit**
- **Due to the dominator of Z decay in Z peak region, the fitting mass region should be wider.**
- **The reason of use same QCD shape: QCD sample of CC-EC Trk has a poor statistics.**
- **How about try this now:**



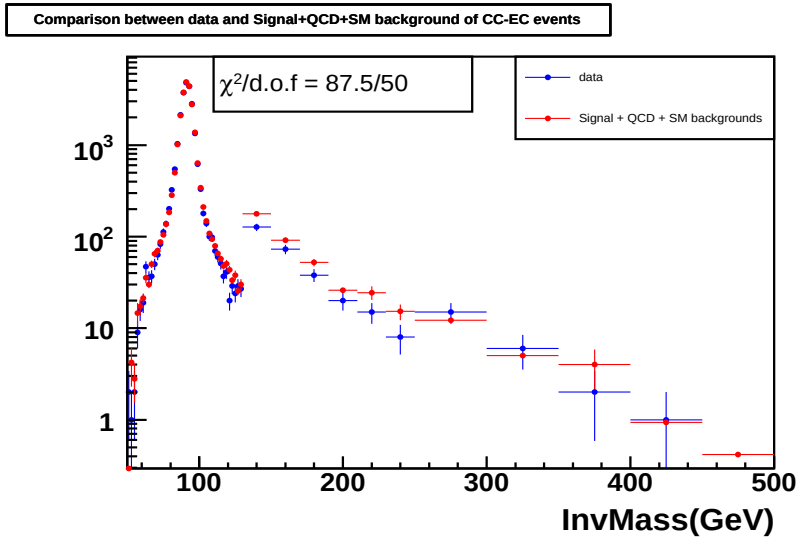


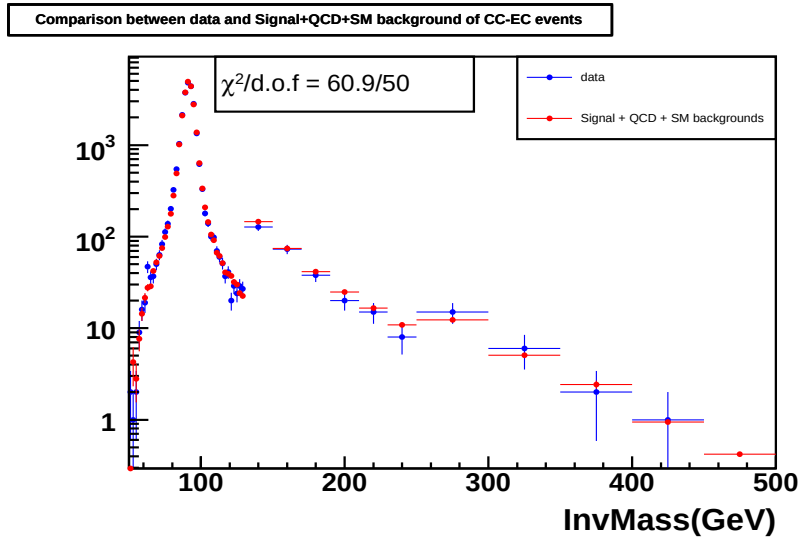


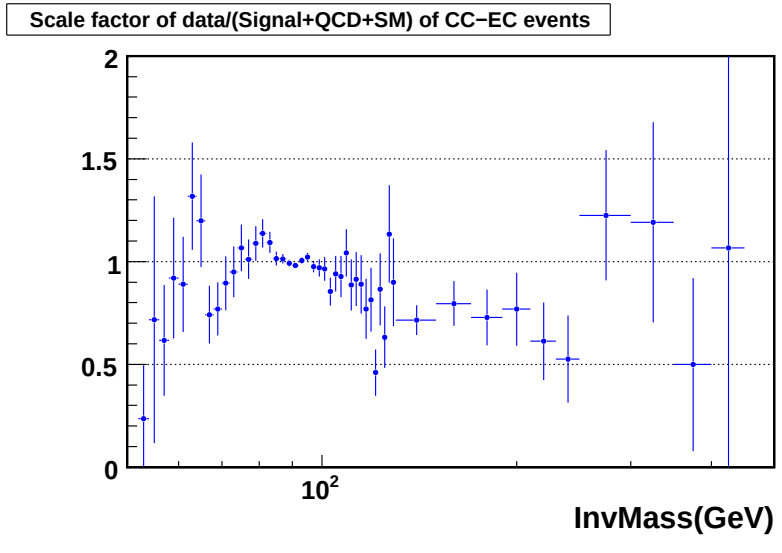


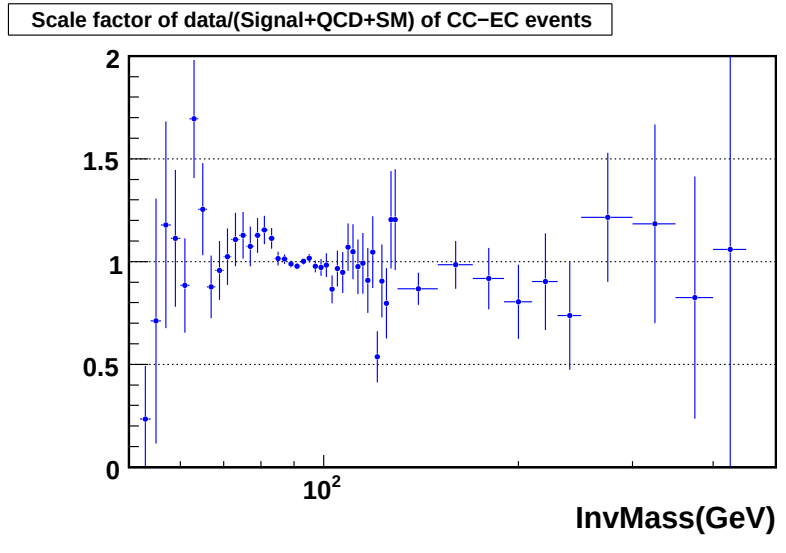
With-Trk: 229 evts; No-Trk: 14610

Trk – InvMass



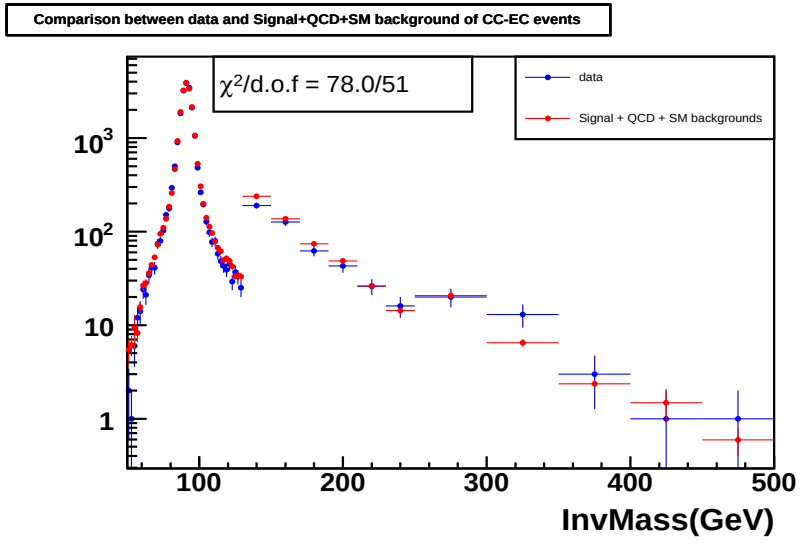


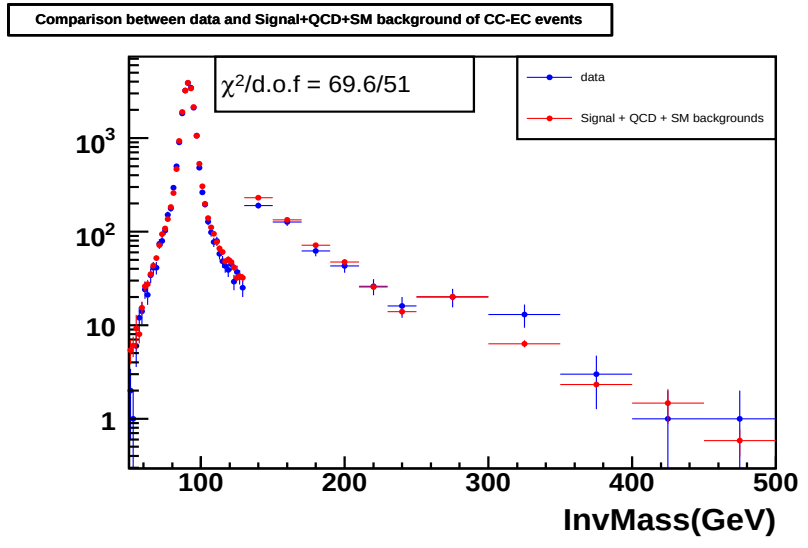


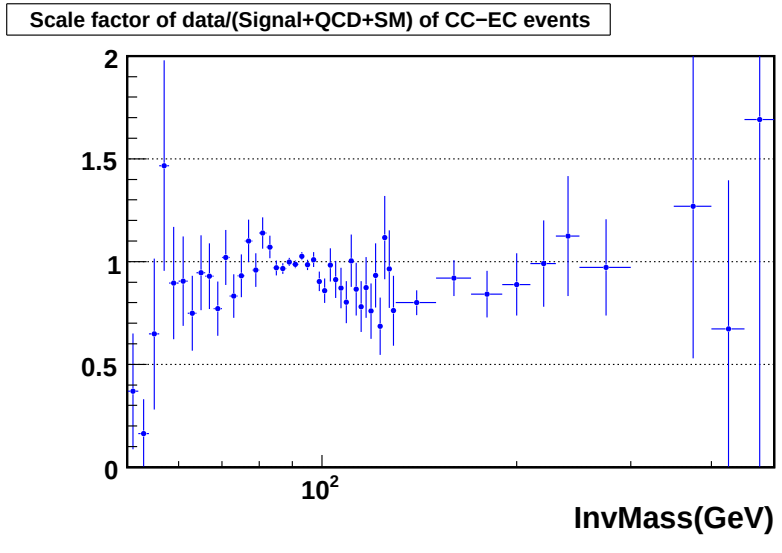


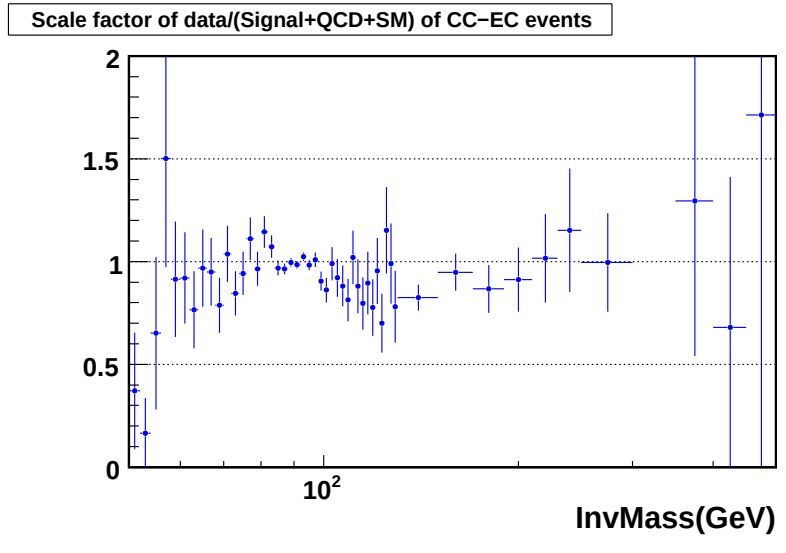
Left: QCD contribution is fitted with InvMass 70-110GeV; Right: QCD contribution is fitted using InvMass 50-150GeV

NoTrk – InvMass









Left: QCD contribution is fitted with InvMass 70-110GeV; Right: QCD contribution is fitted using InvMass 50-150GeV

QCD contribution fitting region

QCD contribution of CE Trk, fitted with difference Mass region.

Mass(GeV)	70-110	70-130	70-150	50-150
qcd contribution	208.2	26.3	-0.96	27.3
χ^2	87.5	60.7	60.2	60.9

QCD contribution of CE NoTrk, fitted with difference Mass region.

Mass(GeV)	70-110	70-130	70-150	50-150
qcd contribution	381.4	364.5	343.9	347.9
χ^2	78.0	72.9	68.5	69.6

In this analysis, we will use 50-150GeV as fitting region, use results of other mass regions to study uncertainty comes from QCD.

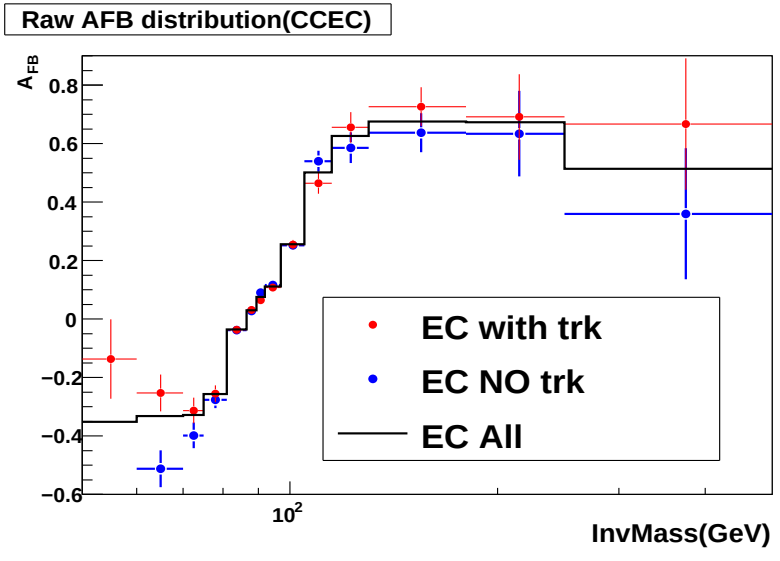
CE QCD bkg: NoTrk + Trk

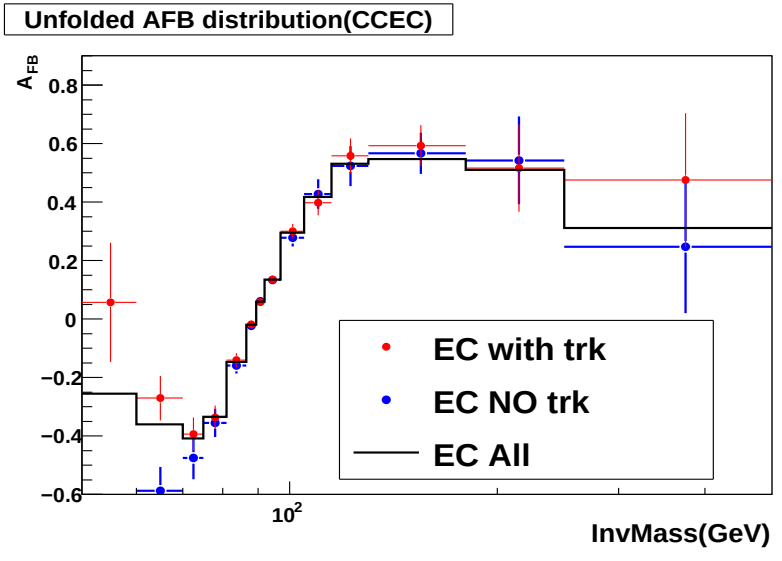
Fit with InvMass region 50-150GeV

Mass	All	NoTrk	Trk	NoTrk + Trk
50 - 60	4.3	3.7	0.76	4.5
60 - 70	25.4	22.3	2.32	24.6
70 - 75	22.2	19.4	1.81	21.2
75 - 81	29.9	26.3	1.98	28.3
81 - 86.5	30.9	27.2	1.99	29.2
86.5 - 89.5	15.7	13.7	1.49	15.2
89.5 - 92	12.6	11.0	1.21	12.2
92 - 97	26.5	23.2	2.19	25.4
97 - 105	38.6	34.0	1.98	36.0
105 - 115	41.4	36.5	2.01	38.5
115 - 130	47.8	42.0	3.73	45.7
130 - 180	76.2	67.2	4.16	71.4
180 - 250	19.8	17.4	1.52	18.9
250 - 500	4.4	3.9	0.12	4.0

QCD contribution of CCEC-All has a reasonable agreement with contribution of Trk+NoTrk.

A_{fb}: NoTrk vs. Trk





Raw AFB **Unfolded AFB**

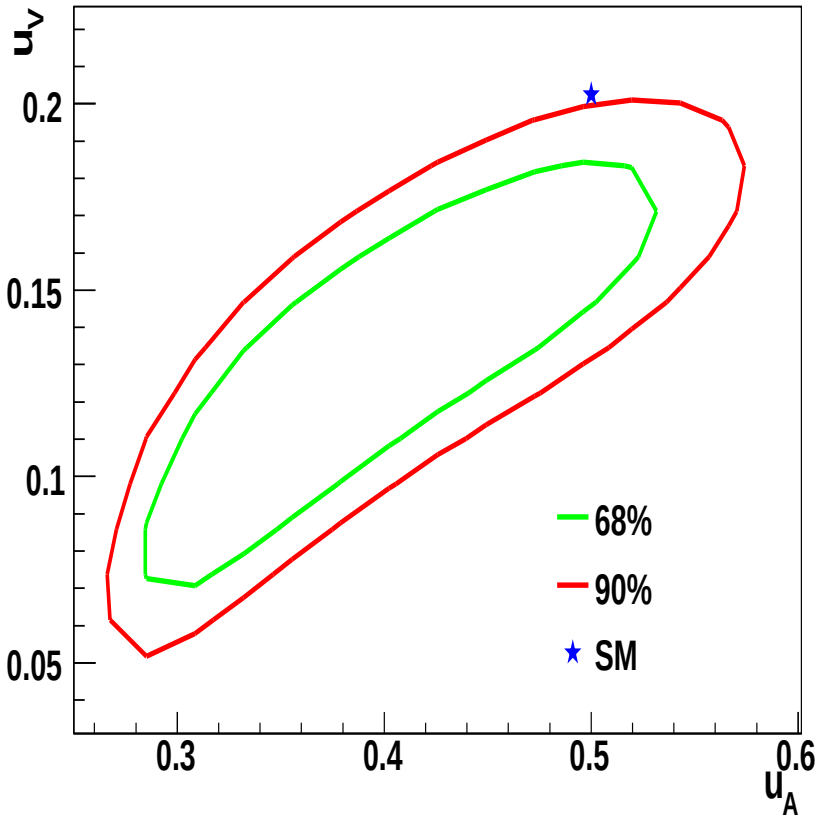
The disagreements of first two bins are come from poor statistics.

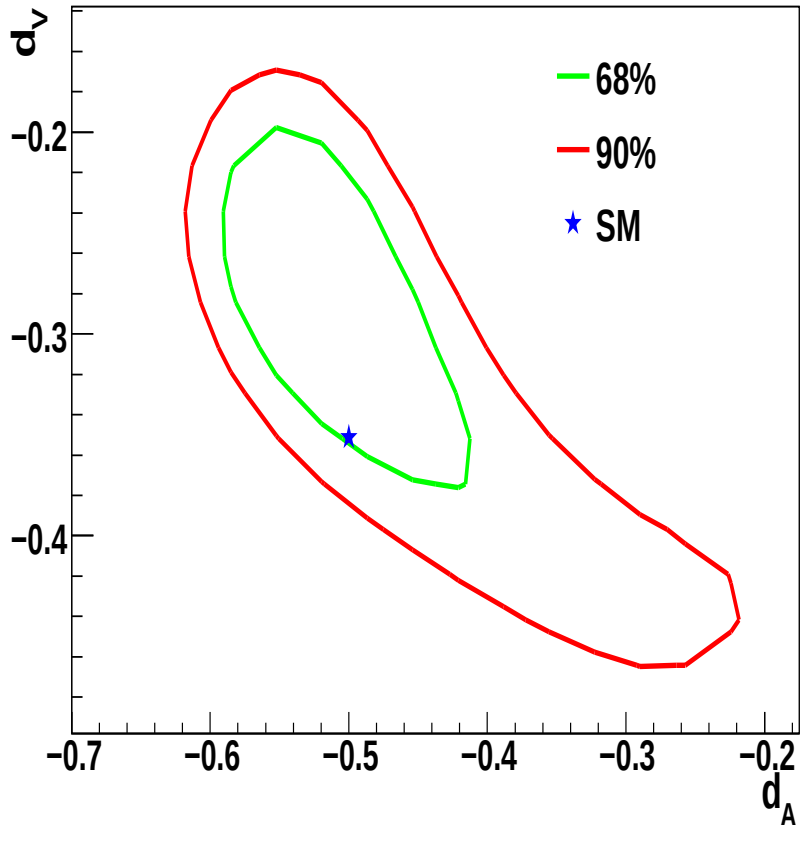
Notrk vs. Trk – $\sin^2\theta_W$ results

- **Notrk:** $\sin^2\theta_W$ = 0.22704±0.00183
- **Trk:** $\sin^2\theta_W$ = 0.23038±0.00164

$$\frac{0.2304 - 0.2270}{\sqrt{0.0018 * 0.0018 + 0.0016 * 0.0016}} = 1.4\sigma$$

New results: Z-light quark couplings measurement





- Use NLO generator ZGrad2 to study Z-light quark couplings.
- Use unfolded A_{FB} to extract Z-light quark couplings.
- Set Z-d quark couplings to SM value when study Z-u quark couplings.

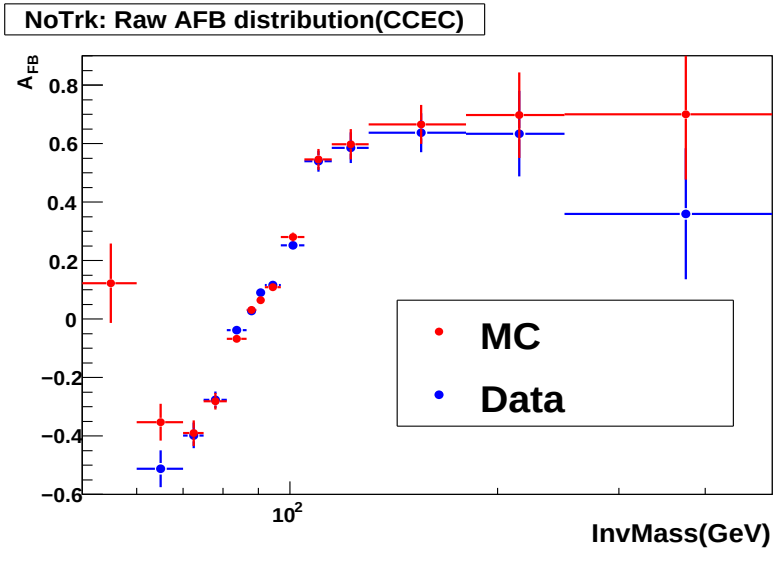
Summary

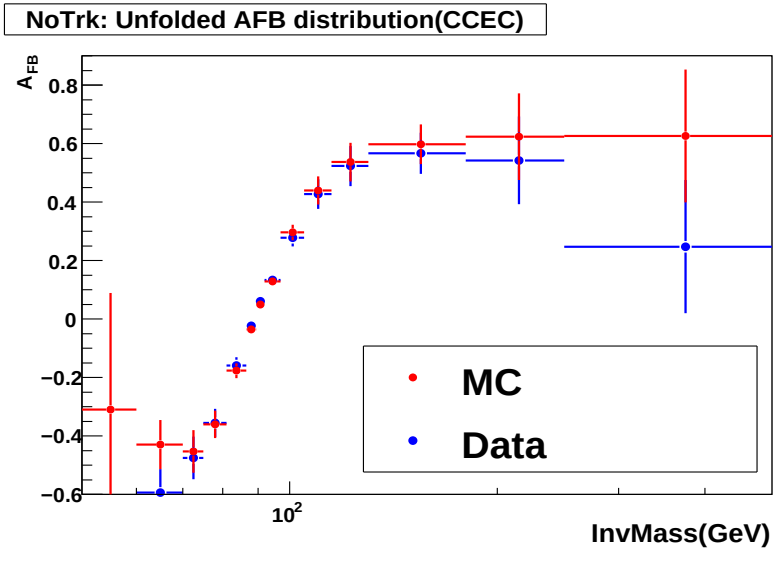
- **The CE events Trk and NoTrk results check has been finished.**
- **The results of Trk and NoTrk are consistence with each other.**
- **Extracted Z to light quark couplings.**
- **Both of analysis note and conference draft have been updated, ready to review.**

http://www-d0.hef.kun.nl///fullAgenda.php?ida=a08256#2009-02-03

Backup

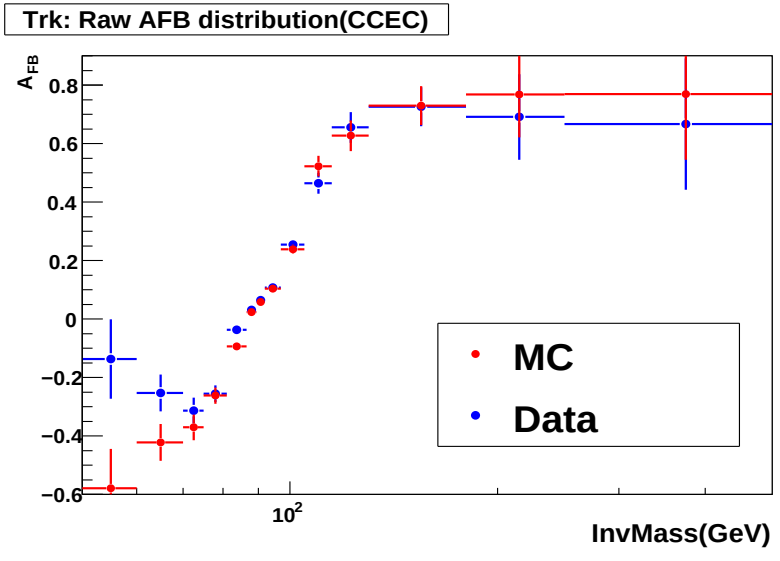
NoTrk: A_{fb}

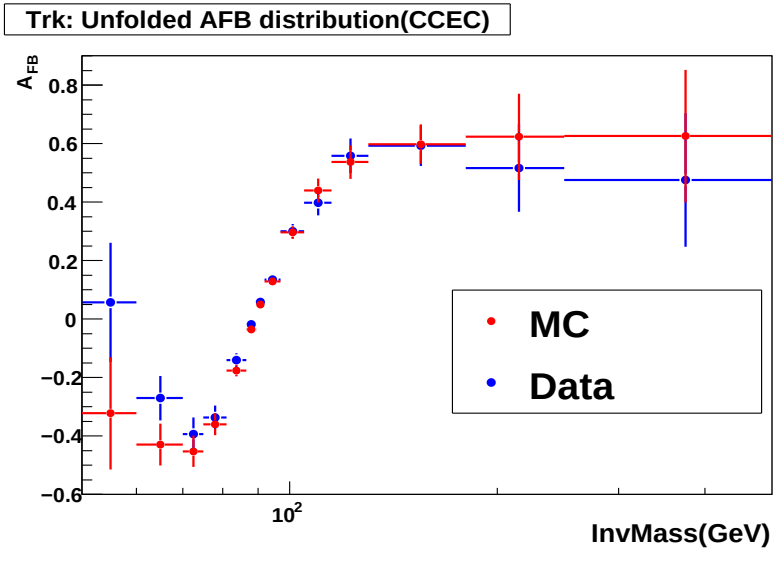




Raw AFB **Unfolded AFB**

Trk: A_{fb}





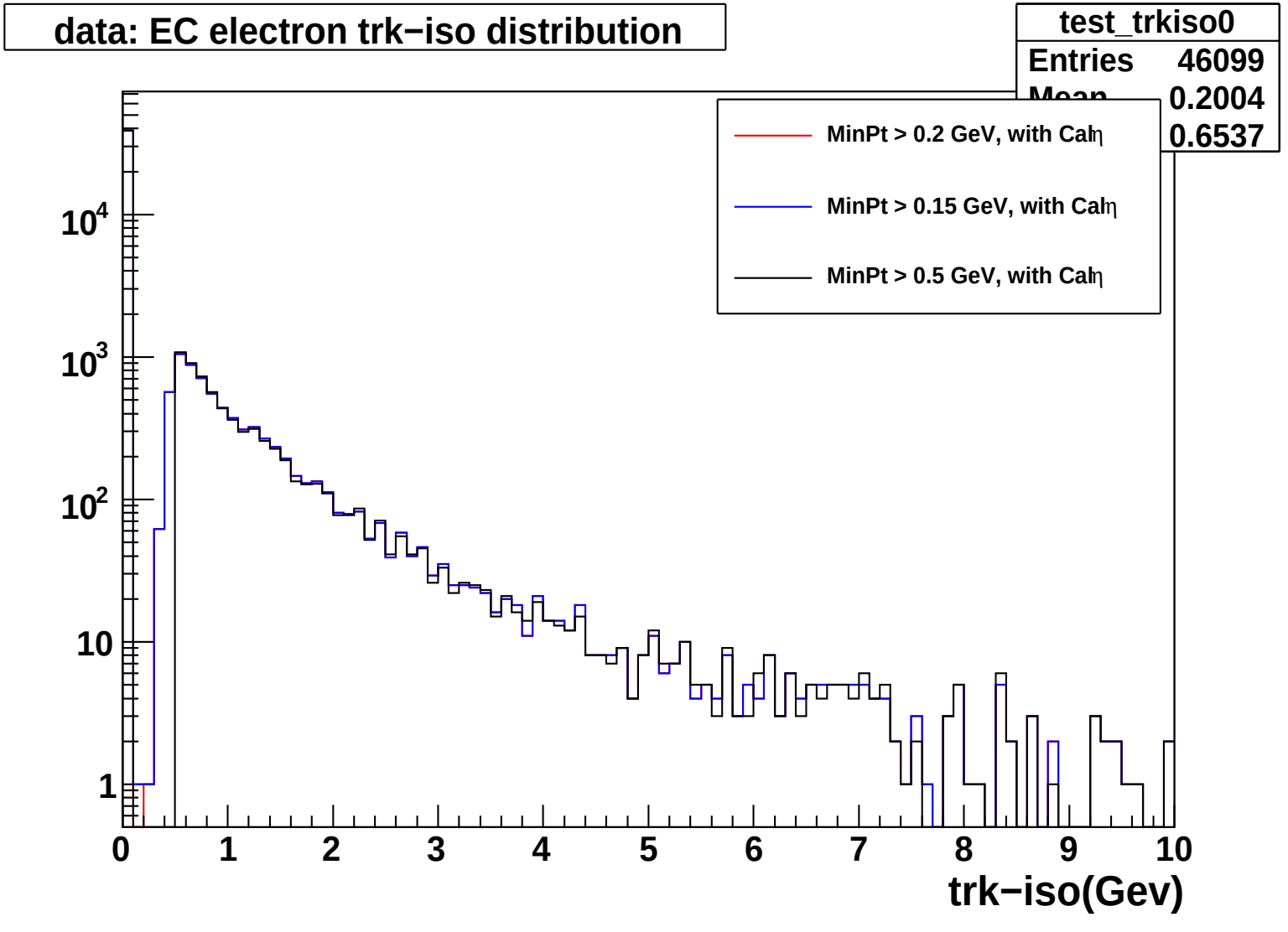
Raw AFB

Unfolded AFB

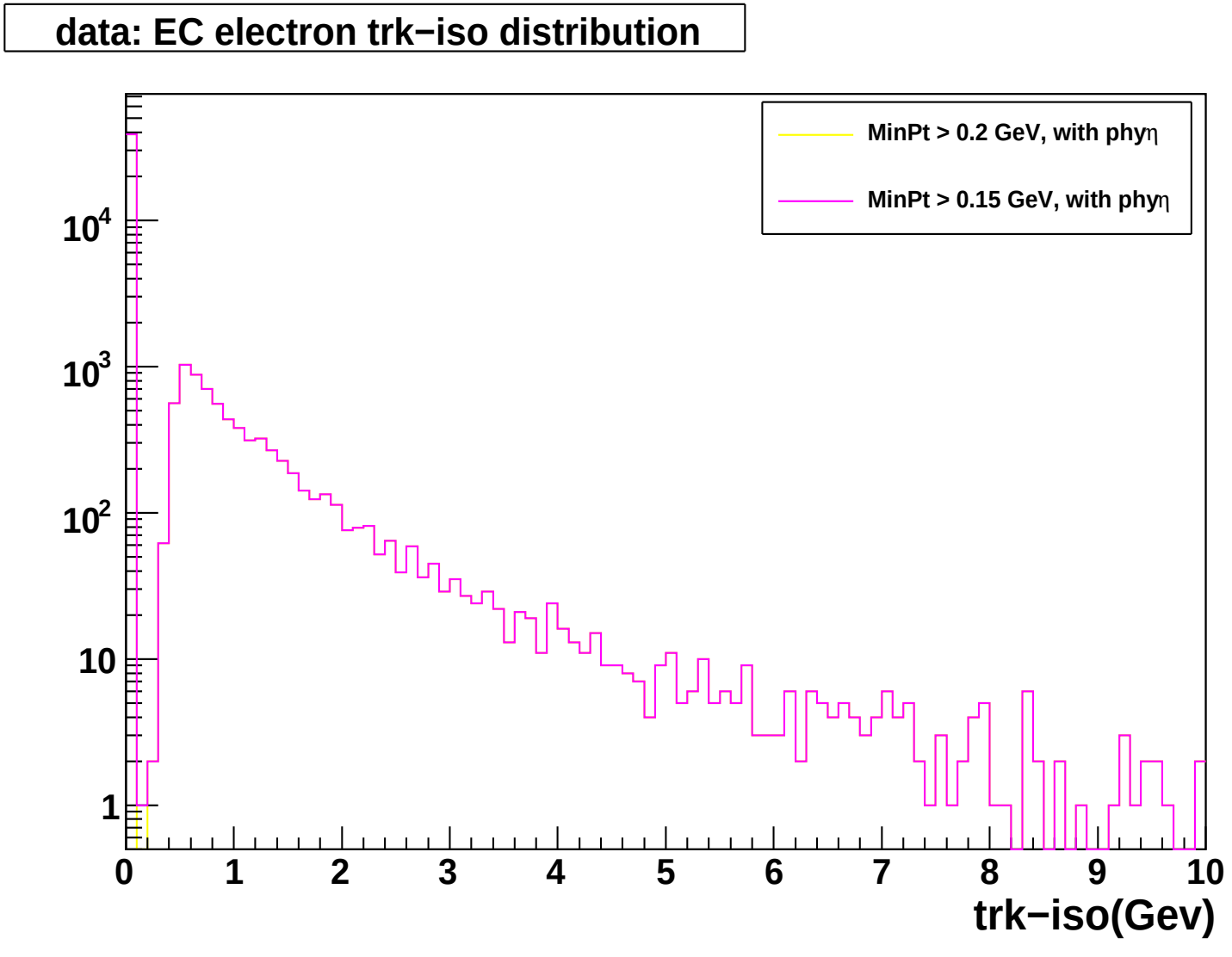
Trk-iso

Electron in EC region is required to has a isolated track: the scalar sum of transverse momentum of the excluded tracks($trk - pt > 0.15GeV$) in annulus cone $0.05 < dR < 0.4$ should be small than 1.5 GeV.

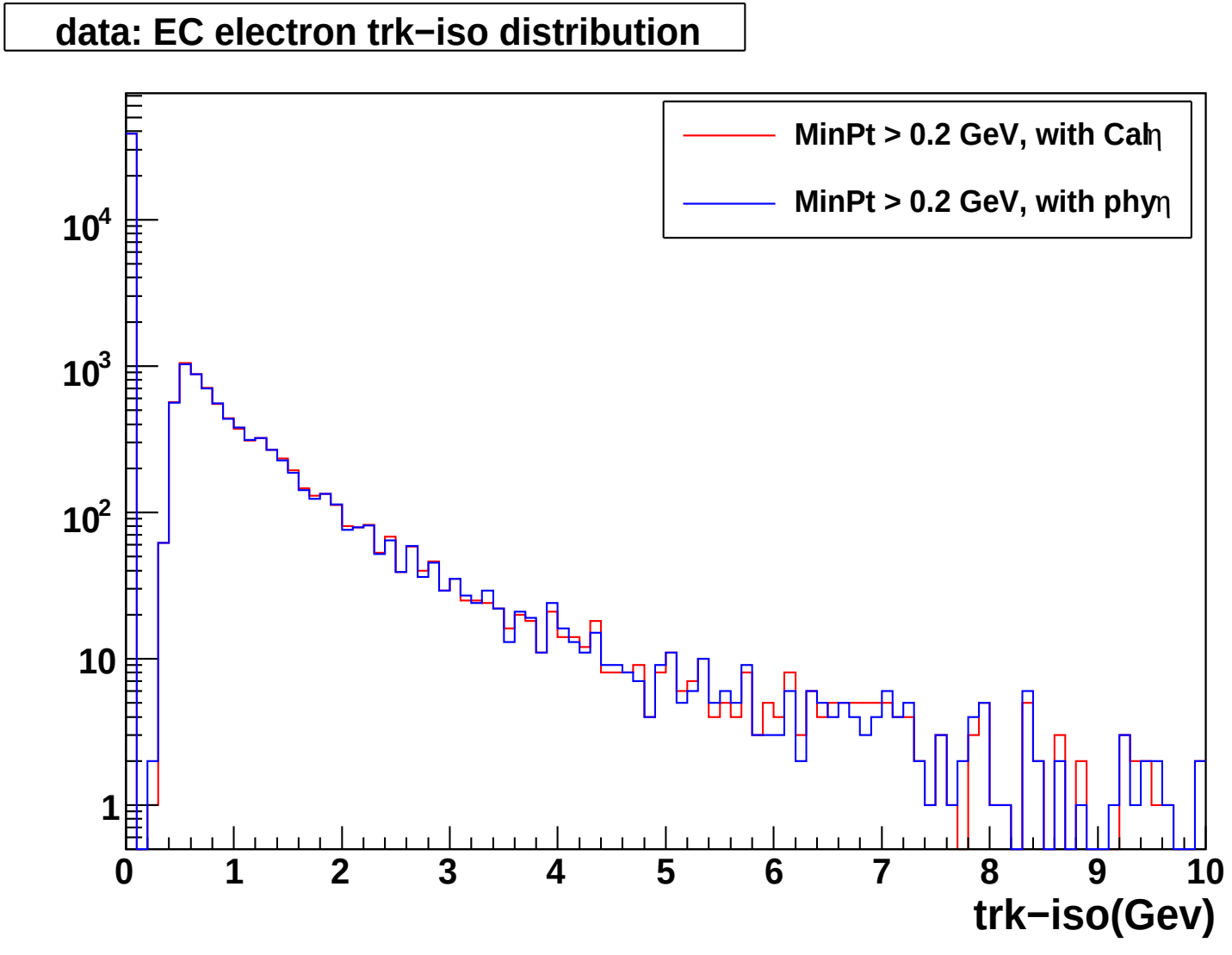
Data trk-iso: dR using Calη and Calϕ



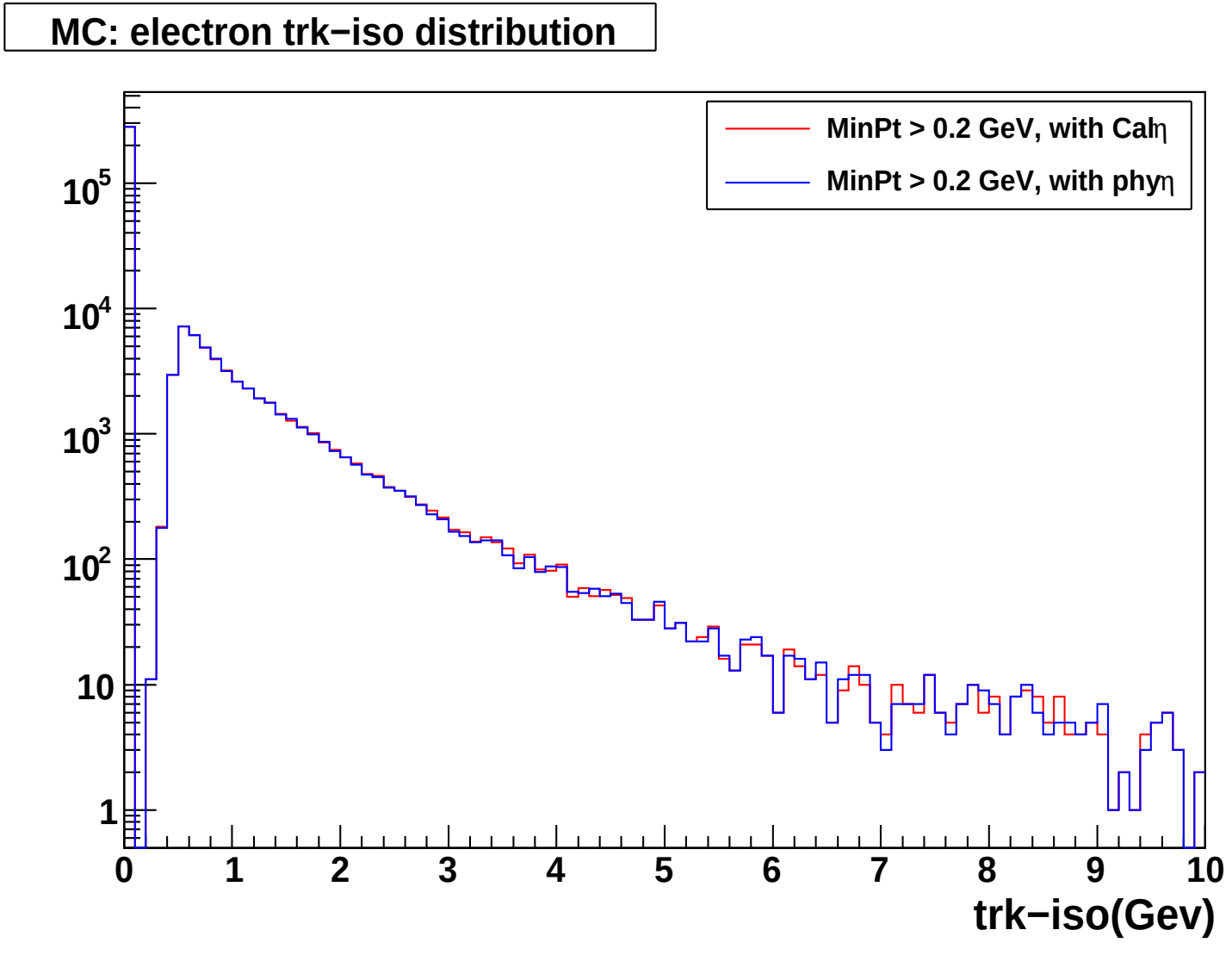
Data trk-iso: dR using phyη and phyϕ



Data trk-iso


data: EC electron trk−iso distribution
MinPt > 0.2 GeV, with Calη
MinPt > 0.2 GeV, with phyη
10^4
10^3
10^2
10
1
0
1
2
3
4
5
6
7
8
9
10
trk−iso(Gev)

MC trk-iso


MC: electron trk−iso distribution
MinPt > 0.2 GeV, with Calη
MinPt > 0.2 GeV, with phyη
10^5
10^4
10^3
10^2
10
1
0
1
2
3
4
5
6
7
8
9
10
trk−iso(Gev)