Lepton flux
Systematics study

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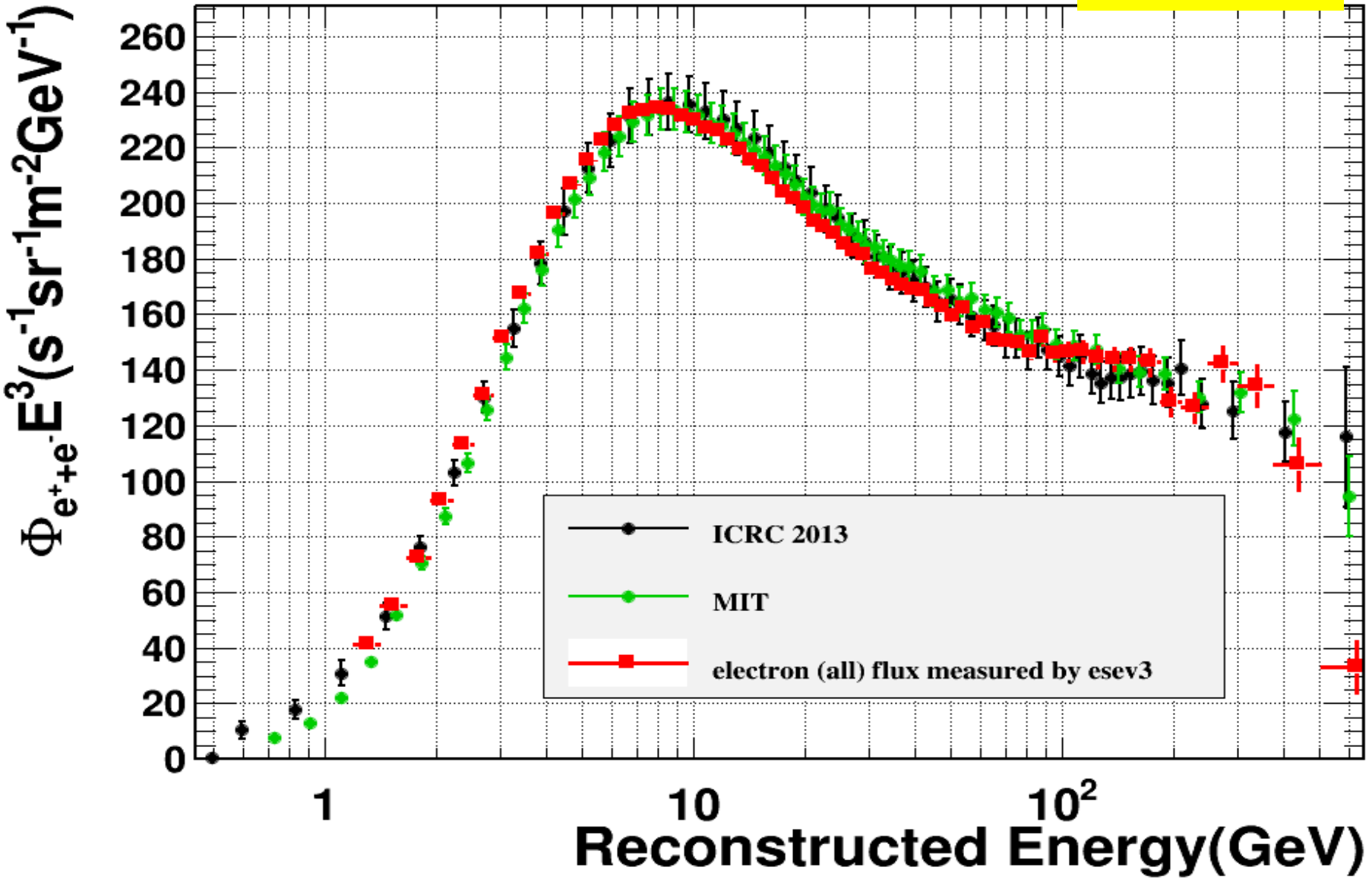
Introduction

- The lepton and electron flux is measured with **ESEV3** by applying a cut on TRDKLikelihoodRatio
  - **Statistical uncertainties**:
    - Data & MC
    - Cut efficiency on TRD likelihood (syst. included)
  - **Systematic uncertainties**
    - Selection efficiency discrepancy: Data < -- > MC
- **Consistency checks** by changing
  - Preselection & selection
    - Rcut, quality cuts
    - electron cuts, sample purity…
  - Binning
  - Fit technique (histo or analytical function…)

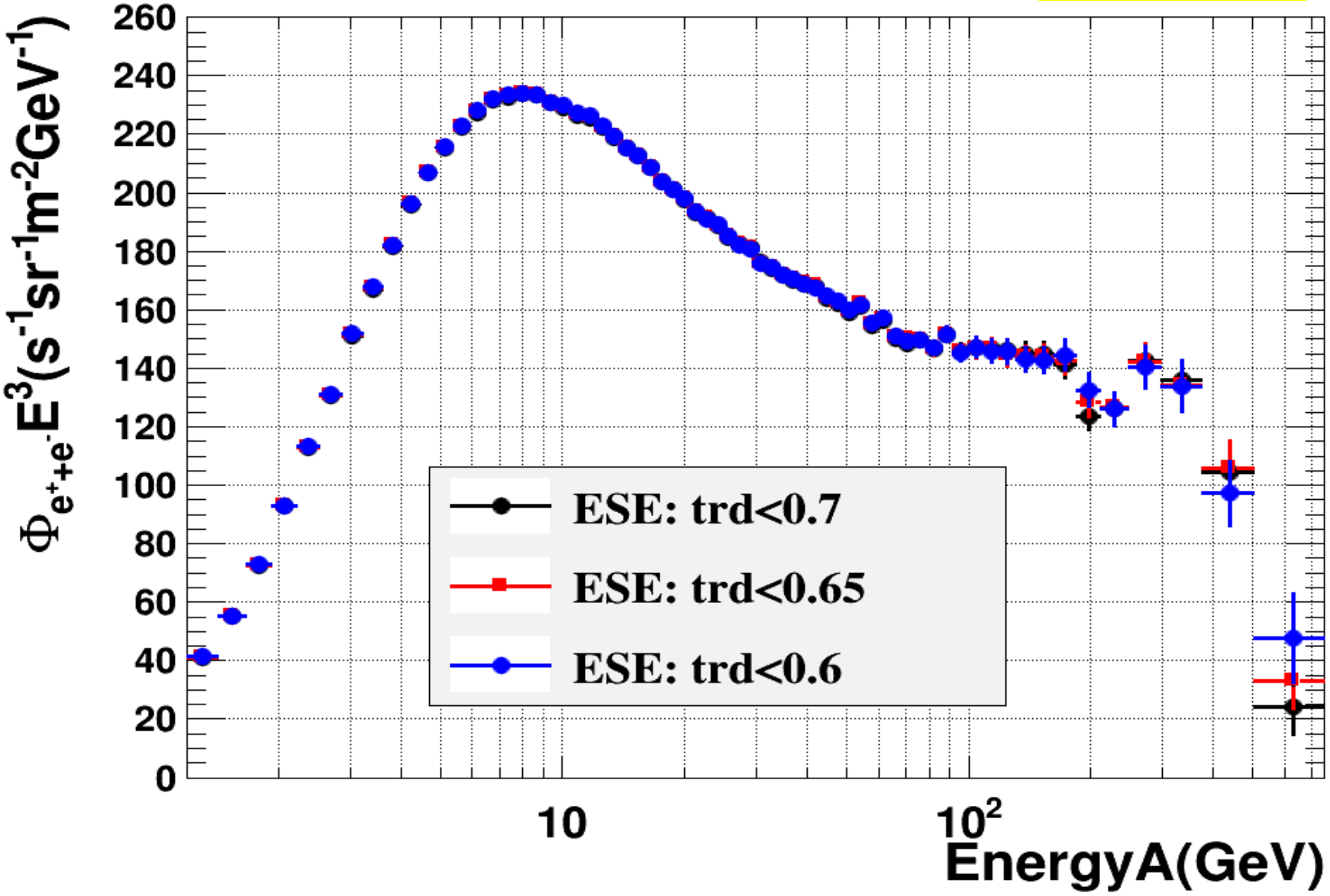
Lepton flux: ntrack==1

Binning Aachen

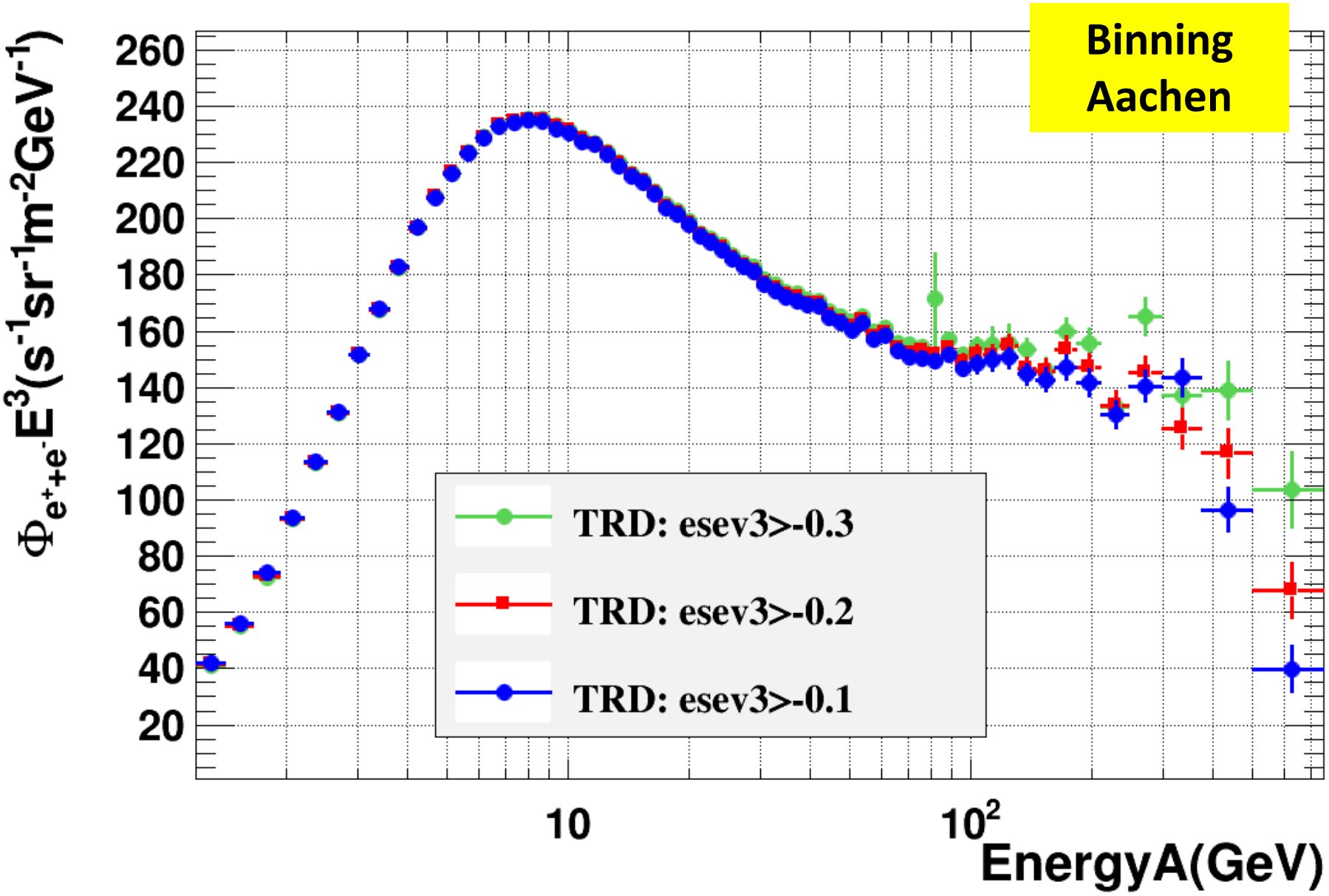


Consistency check

Binning Aachen



Lepton flux measured with TRD



Preselection:

- *LowEdge>1.3*Max(cf[3][0], cf[3][1])*
- *Physics trigger*
- TRDLikelihood calculated
- Nshower≤2
- Ecal fiducial volume
  - EcalEntry<30.6cm
  - EcalExit<30.6cm

Electron selection:

- Ntrack==1
- Ecal-tracker matching
  deltaX<3 & deltaY<5
- enD/abs(rig)>0.6
- enA/abs(rig)<10
- Beta_tof>0.5
- TRD Likelihood<0.65

- ISS.B620/pass4: 29 months
  - June 2011 – November 2013
- MC: el.B620dev

Selection cuts study

❖ **Acceptance(basic): MC**

- **NHitsTrd>=8**
- **Nshower>=1**
- **Ntrack>=1**

❖ **Acceptance ECAL: MC**

Trdlh<0.4
Qtof <1.8
βtof>0.8
Qtrk_inner<1.5

- Nshower<=2
- Ecal fiducial (30.6cm)

❖ **Track-ECAL: ISS-MC**

Esev3>0.05
Trdlh<0.4
Qtof<1.8
Btof>0.8

- Ntrack==1
- ΔX<3cm, ΔY<5cm
- EnergyD/Rig>0.6
- EnergyA/Rig<10

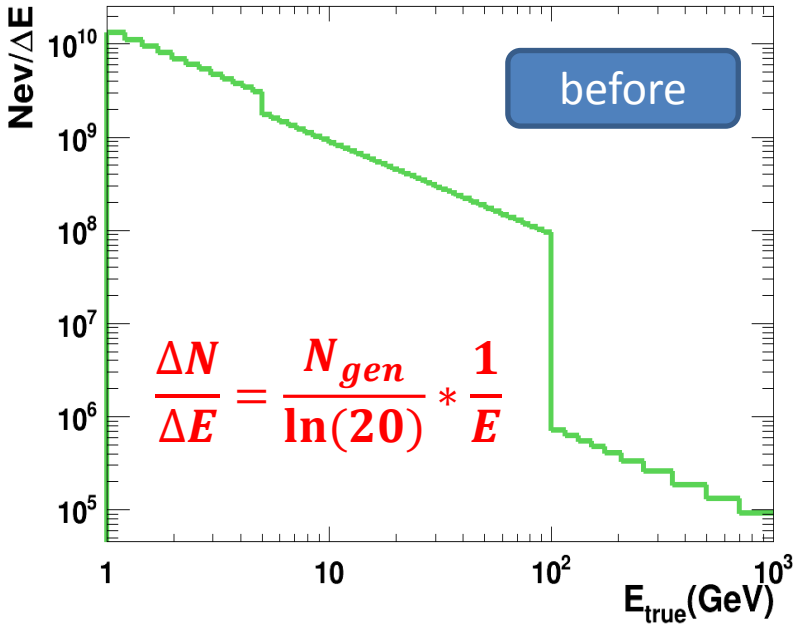
❖ **ToF-charge: ISS-MC**

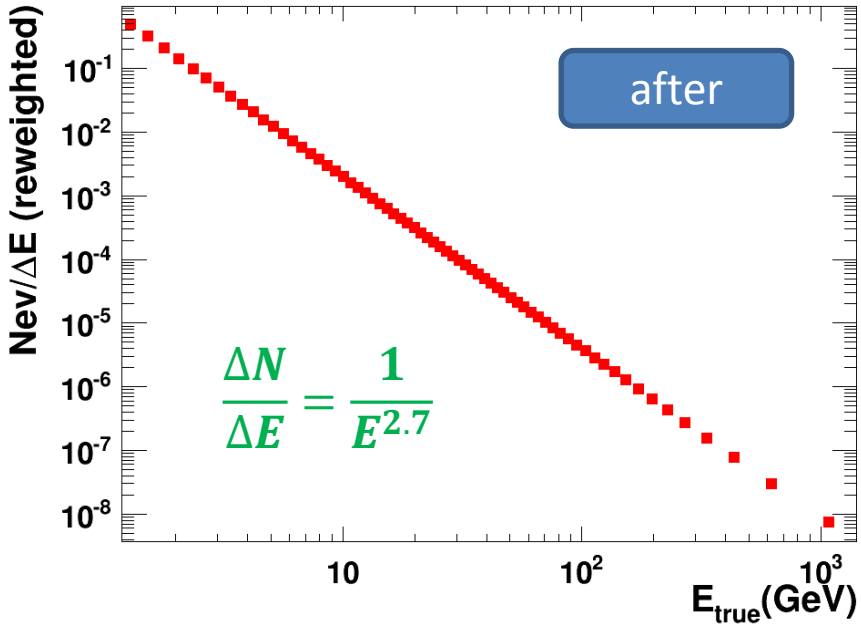
Esev3>0.05
Trdlh<0.4
TRDlh eHe<0.7

- Beta_tof>0.5
- Q_trk_inner<1.5

MC REWEIGHTING FOR -2.7

Purpose

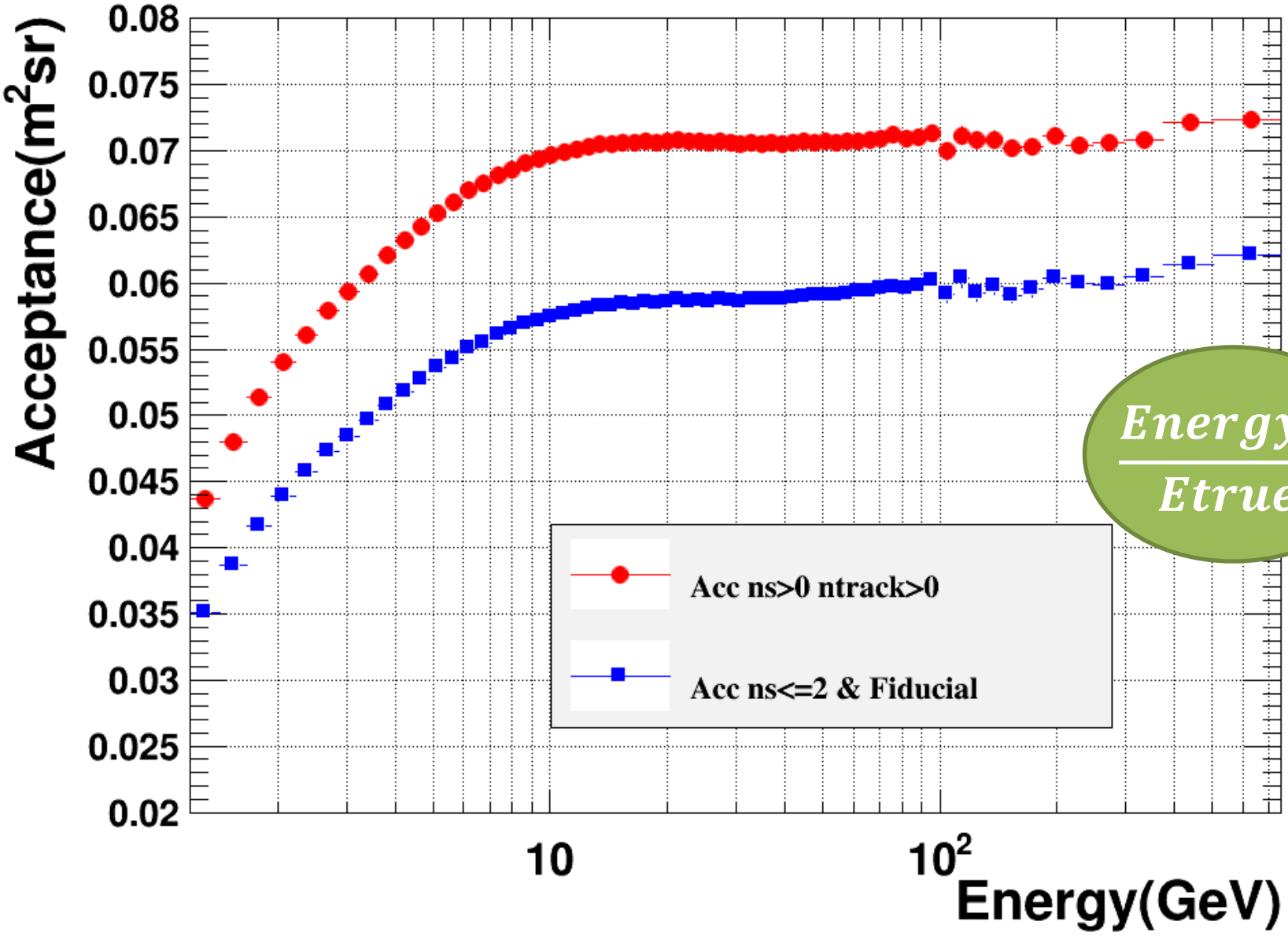




- MC is generated as a flat distribution on log(E)
  - Equivalent to a flux of index -1
  - Migration and fiducial studies possibly affected
- Reweight
  - To a flux of index -2.7

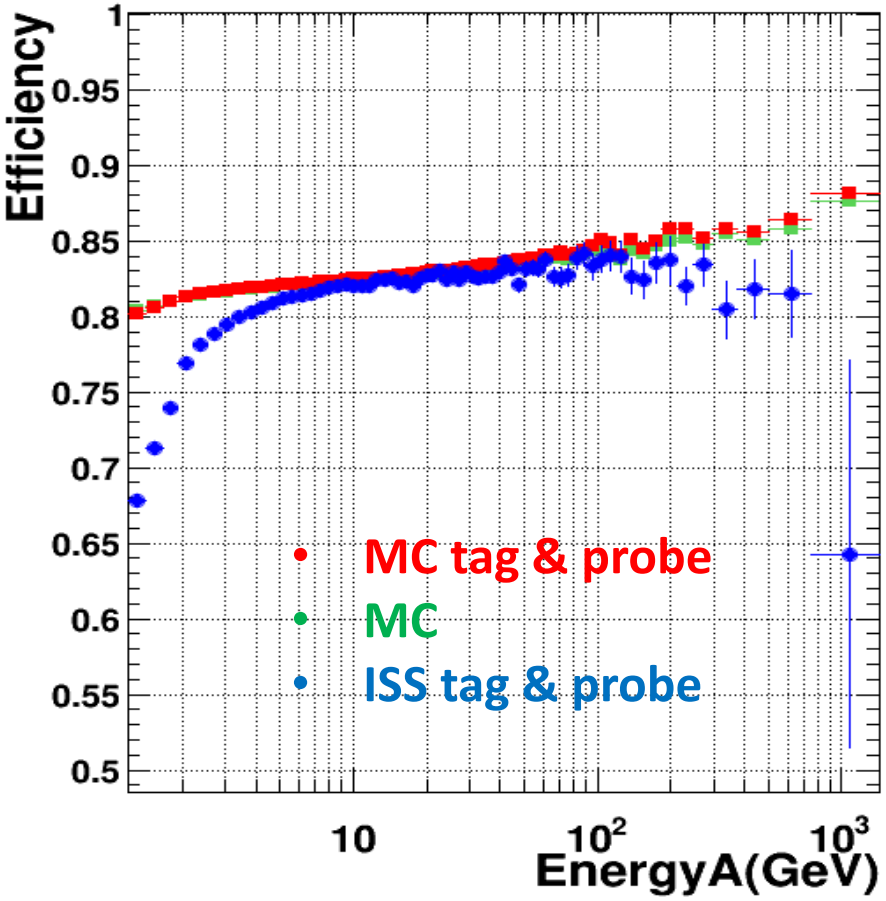
❖ *Acceptance and Efficiency to be studied with EnergyA*

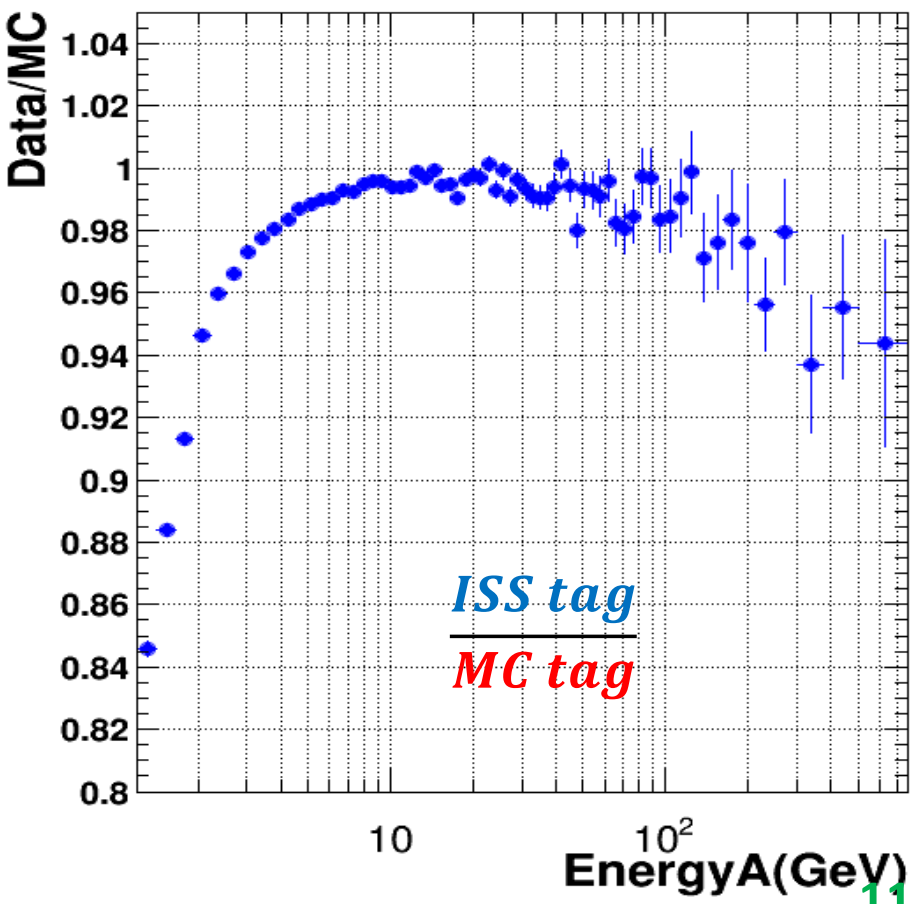
Acceptance


Acceptance(m²sr)
0.08
0.075
0.07
0.065
0.06
0.055
0.05
0.045
0.04
0.035
0.03
0.025
0.02
10
10²
Energy(GeV)
Acc ns>0 ntrack>0
Acc ns<=2 & Fiducial
EnergyA / Etrue

Acceptance validation

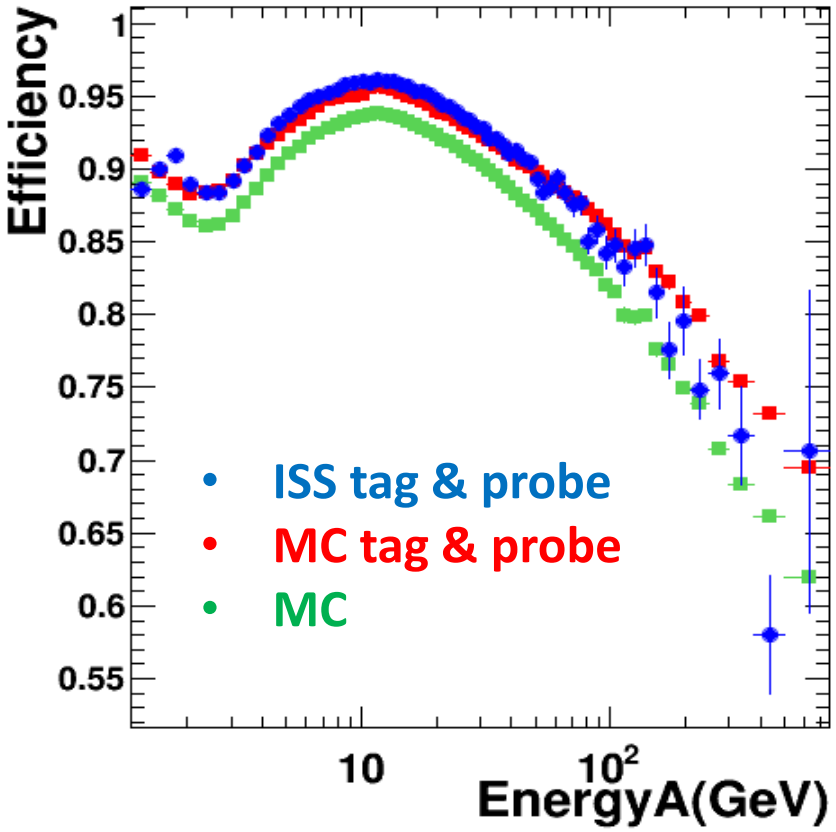
- Nshower<=2
- EcalEntry<30.6cm
- EcalExit<30.6cm

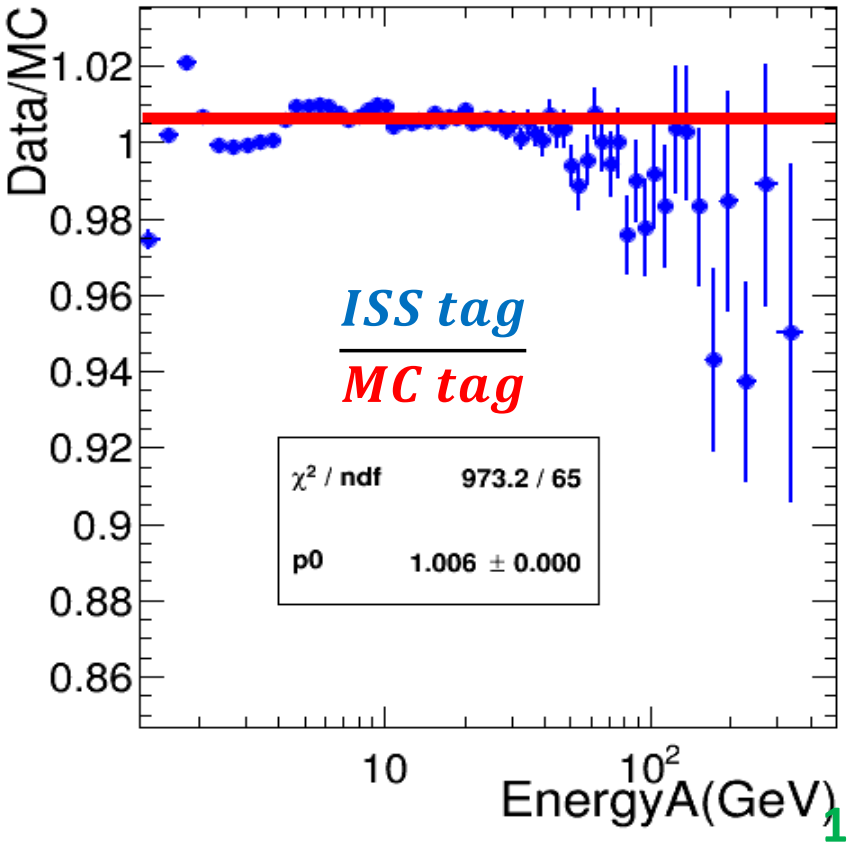




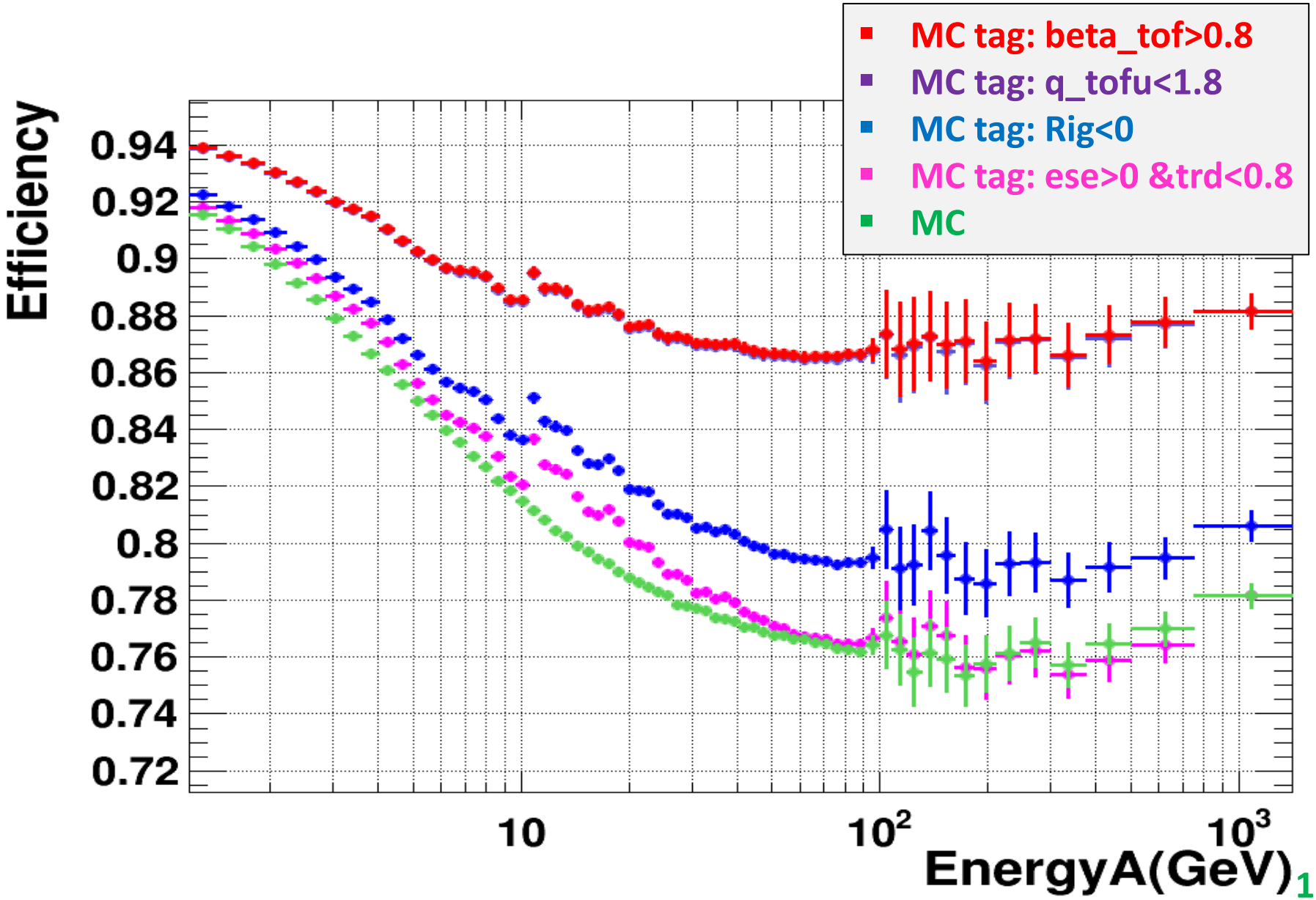
Combined Efficiency

- DeltaX<3cm & DeltaY<5cm
- EnergyD/Rig>0.6 & EnergyA/Rig<10
- Beta_ToF>0.5
- Q_trk_inner<1.5

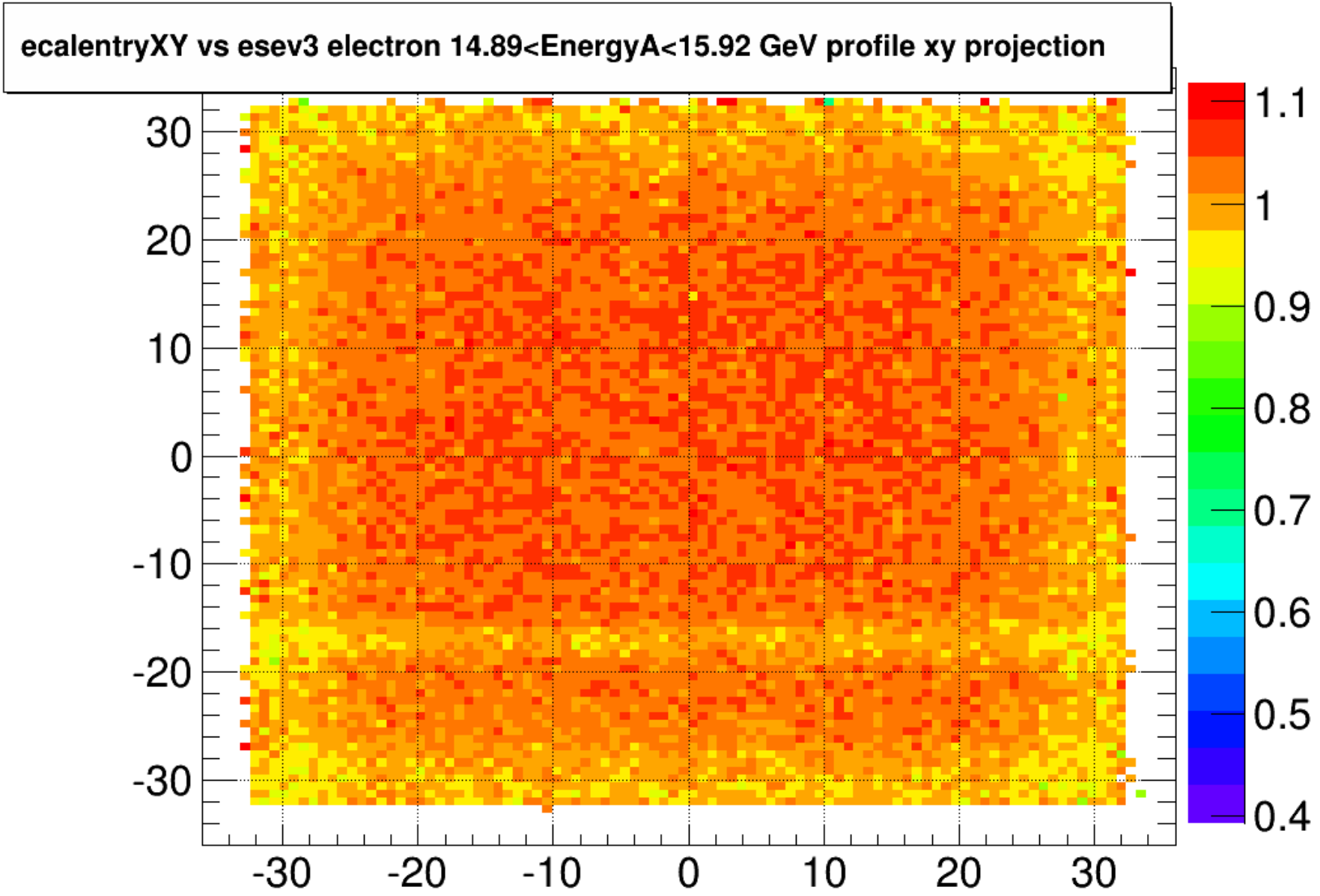




Single track efficiency: MC



ESE vs EcalEntry



Flux with tighter Fidu. cut