Physics Performance of Detector by Smearing

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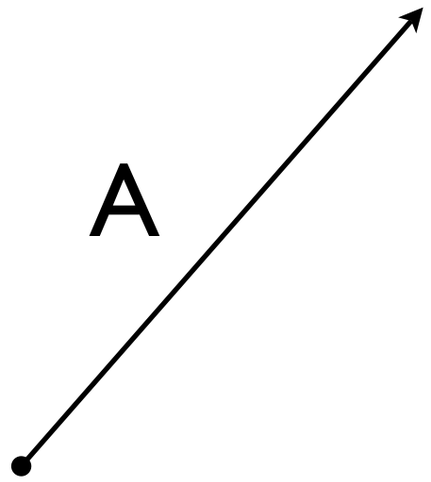
Smearing ~ quick sim.

- smear physical values by gaussian dist.
  (easy and rapid => early stage of exp. guess)
  - tracker
    - pT
    - angles
  - calorimeter
    - cluster position
    - cluster energy

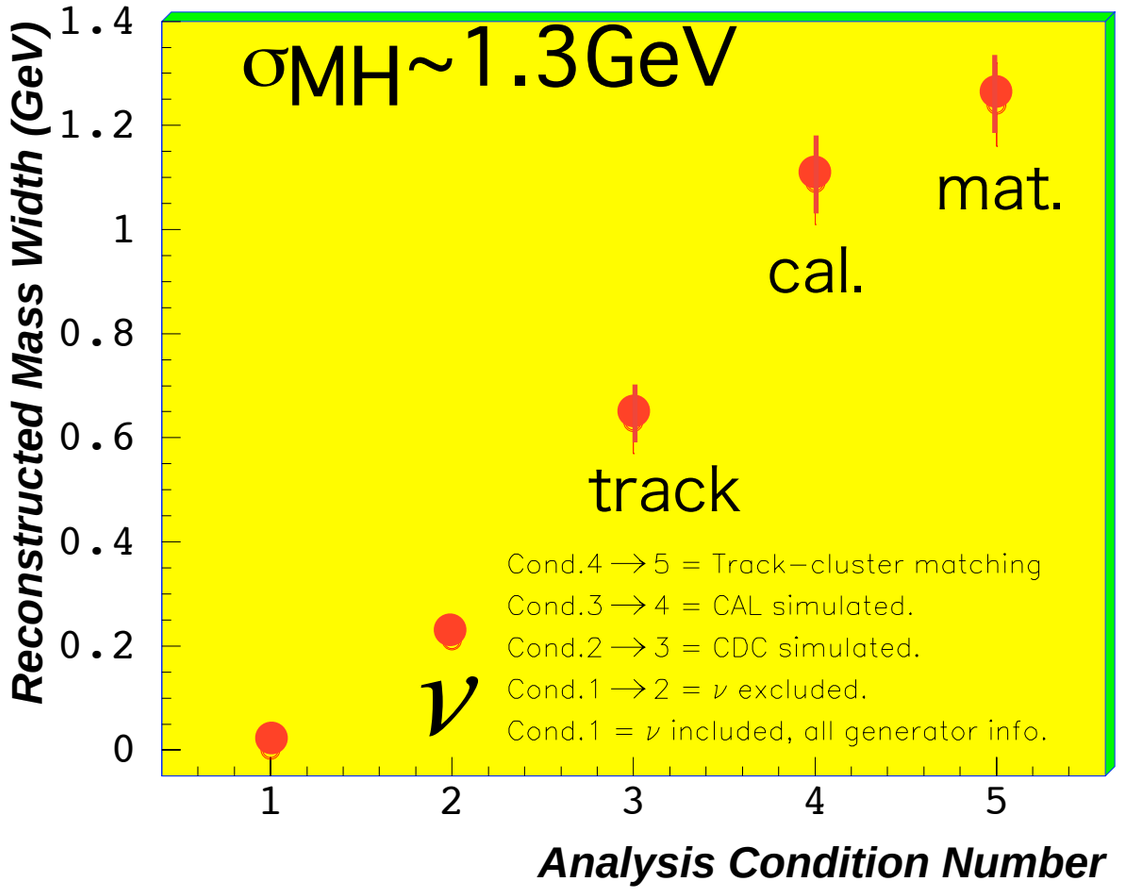
$$A = A_0(1 + N_{Gauss}(0, \sigma))$$



Early results by Y.Fujii

JLC-I report

$e^+e^- \to ZH \to \nu\bar{\nu}b\bar{b} \to 2jets$ $e^+e^- \to WW \to \ell\nu qq' \to \ell\nu 2jets$

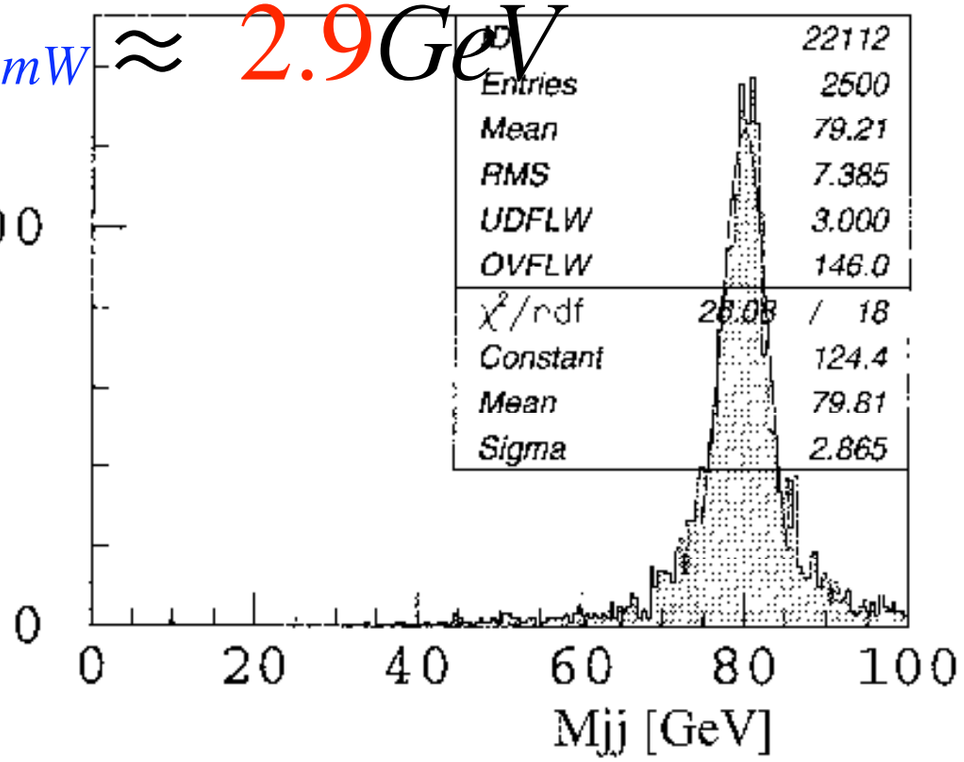


momentum resol. ~0.6GeV

cal. energy resol. ~ 1.0GeV

Track-Cluster matching ~ 0.6GeV

$\sigma_{mW} \approx 2.9 GeV$

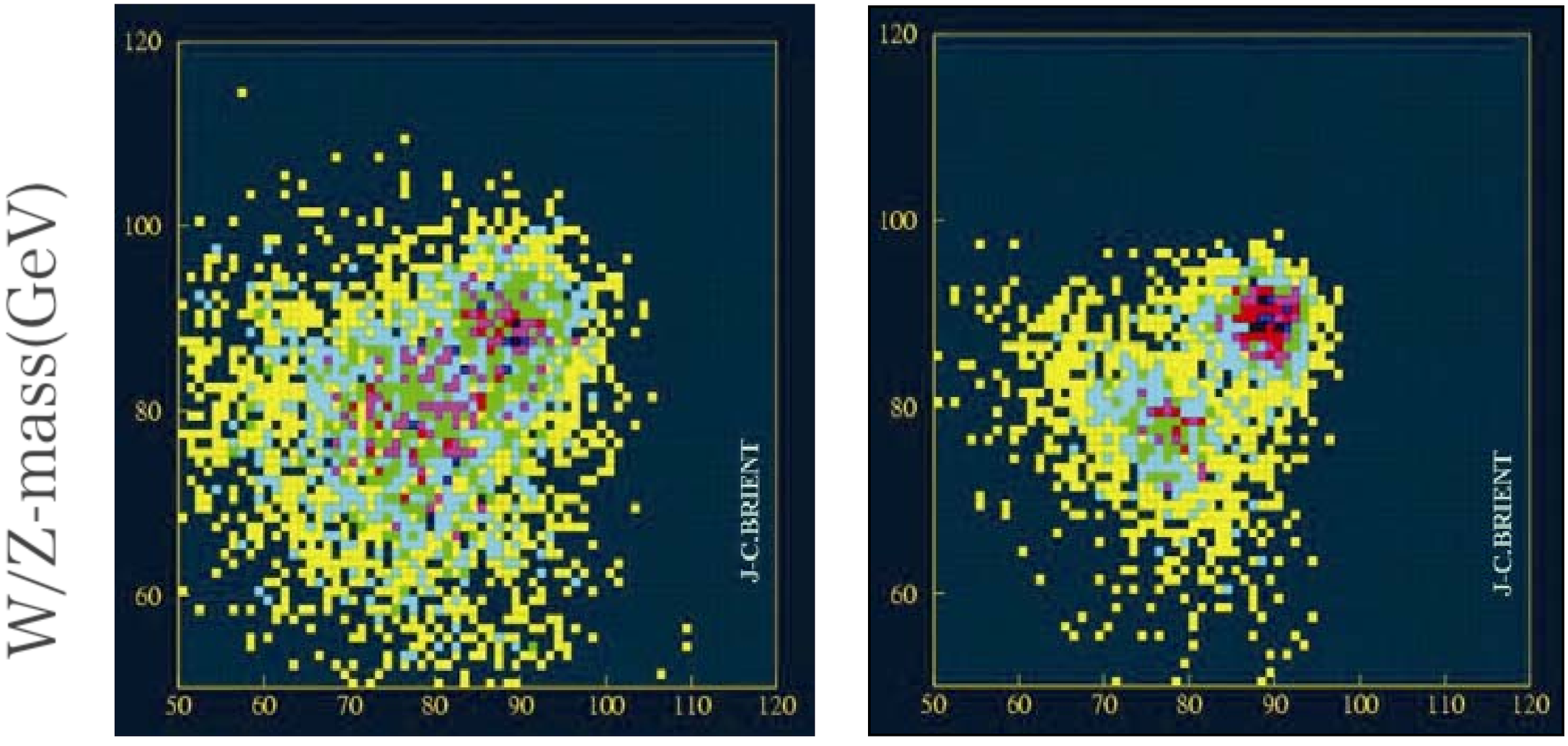


Natural width of W	~ 1.6 GeV
Neutrino escape	~ 0.8 GeV
CDC mom. resolution	~ 1.3 GeV
CAL energy resolution	~ 1.2 GeV
Track-cluster association	~ 1.9 GeV
Jet Clustering	~ 1.1 GeV

Recent impact by J-C Brient

$$e^+e^- \rightarrow \nu\bar{\nu}WW/\nu\bar{\nu}ZZ \rightarrow qq'qq' \rightarrow 4jets$$

$$\sigma_{Ejet} = 60\%/\sqrt{Ejet} \qquad \sigma_{Ejet} = 30\%/\sqrt{Ejet}$$



$$\frac{35\%}{\sqrt{E_\pi}} \Rightarrow \frac{50\%}{\sqrt{E_{jet}}}$$

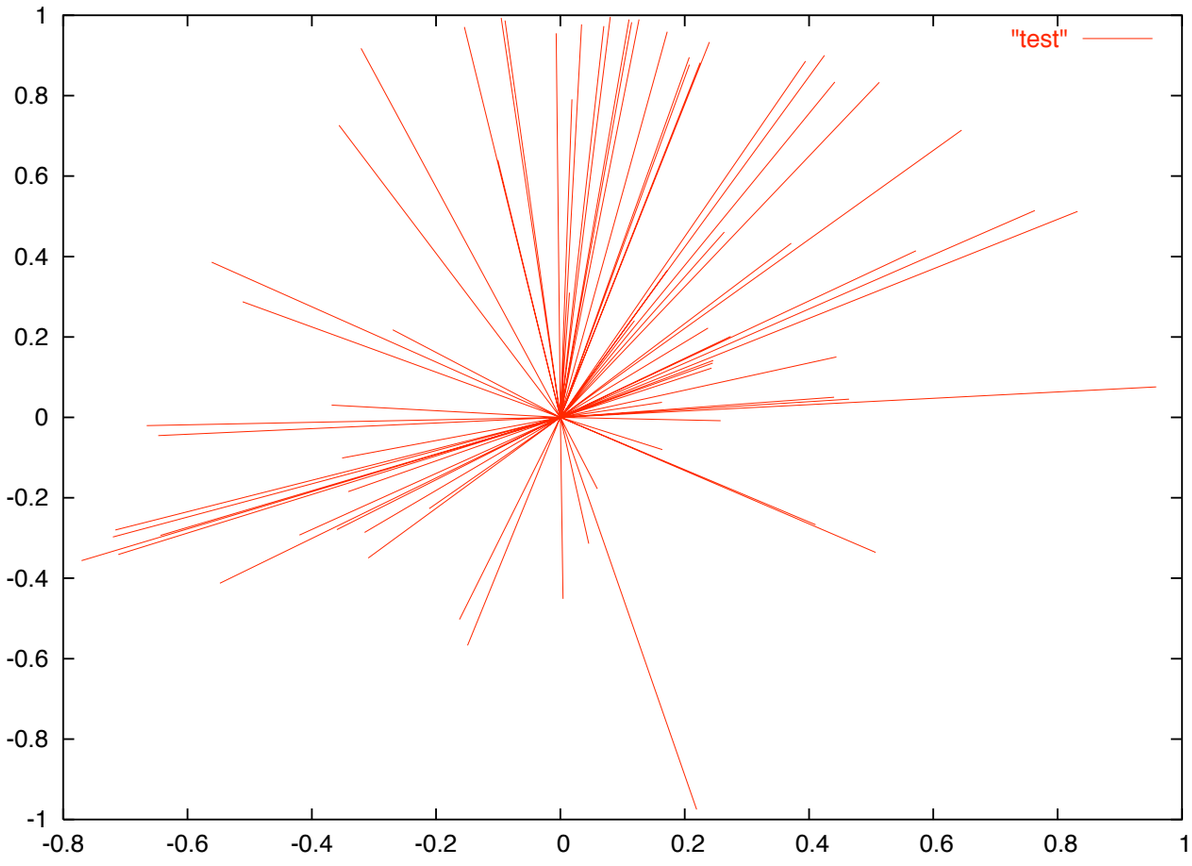
Pythia : an event generator

$$e^+e^- \rightarrow WW$$

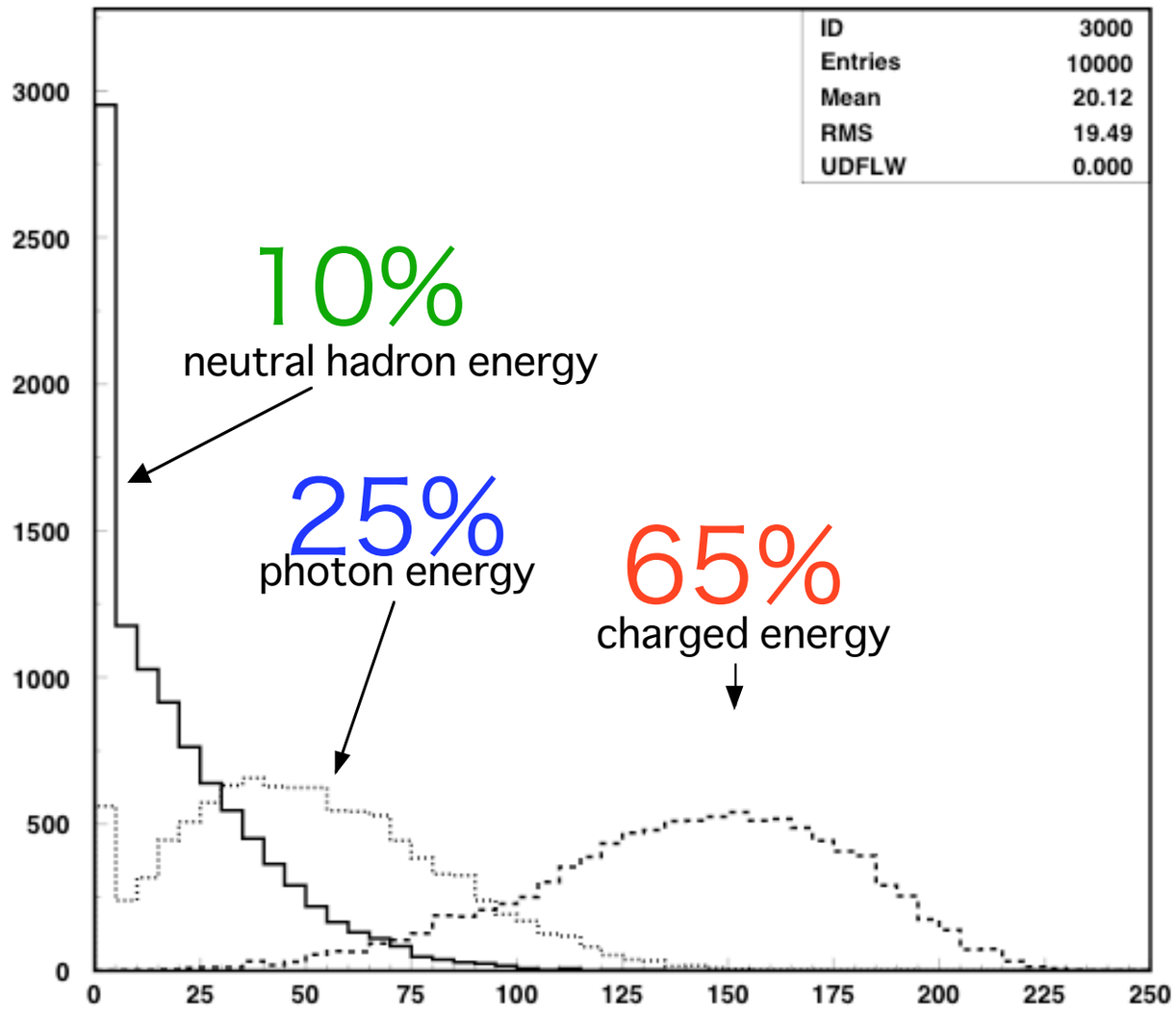
$$e^+e^- \rightarrow \nu\bar{\nu}WW/\nu\bar{\nu}ZZ \rightarrow qq'qq' \rightarrow 4jets$$

$$ECM = 250GeV$$

energy distrubution : one entry for each energy per event

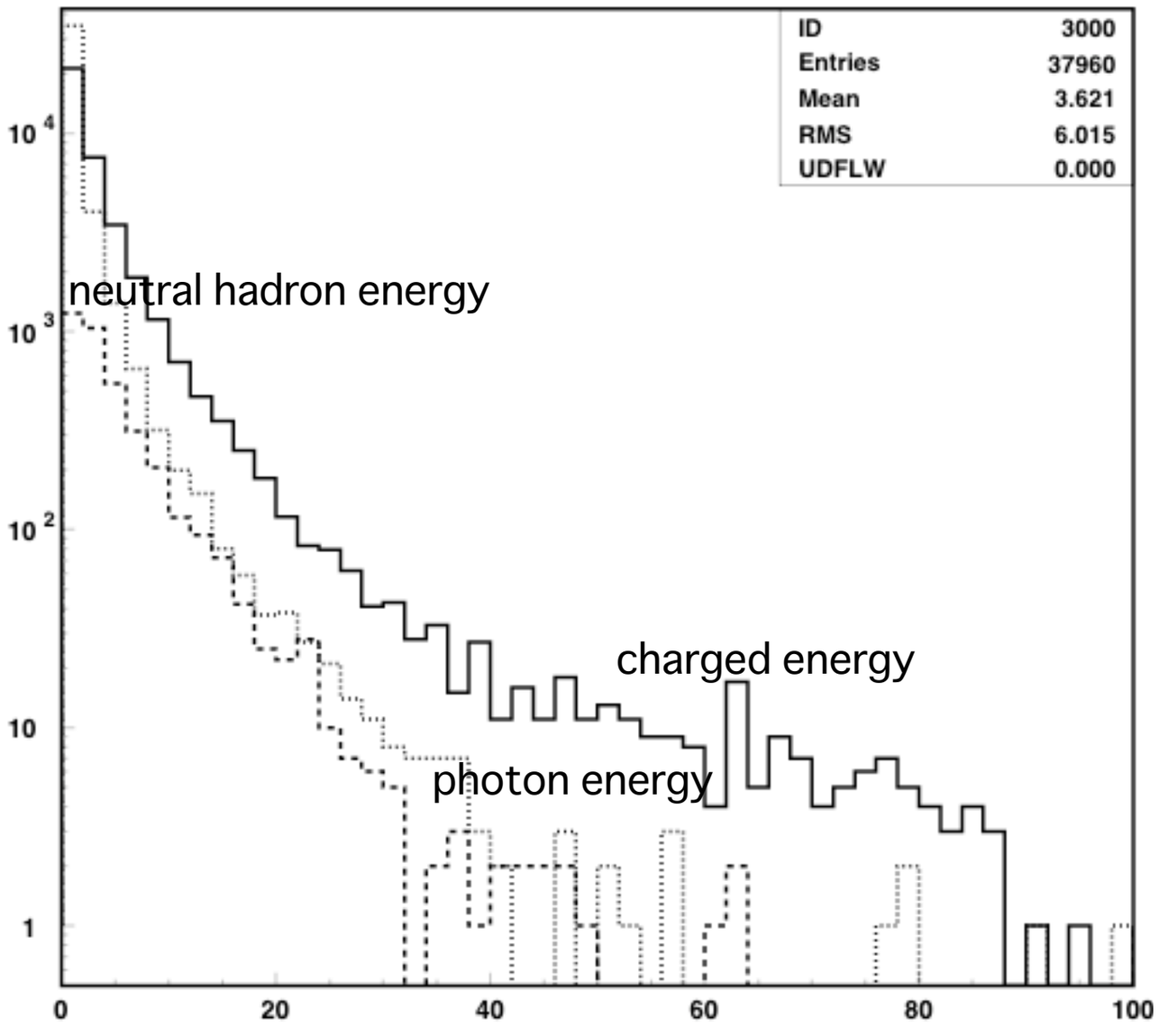


$r - \phi$



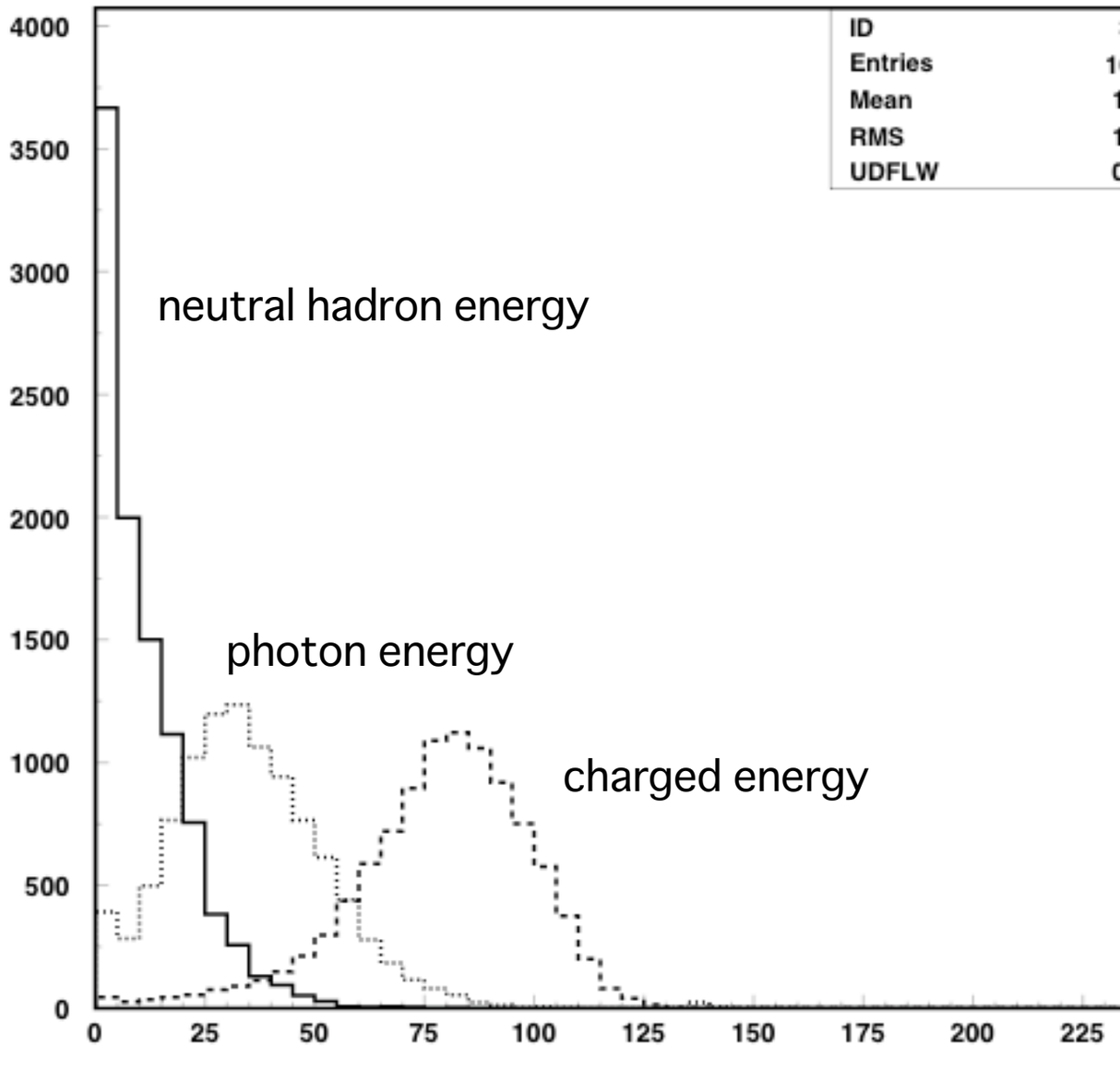
Higgs results

PYTHIA e+e- > ZH @ 250GeV result with mH=120 GeV



particle energy (GeV)

PYTHIA e+e- > ZH ($Z>\nu\bar{\nu}$) @ 250GeV result

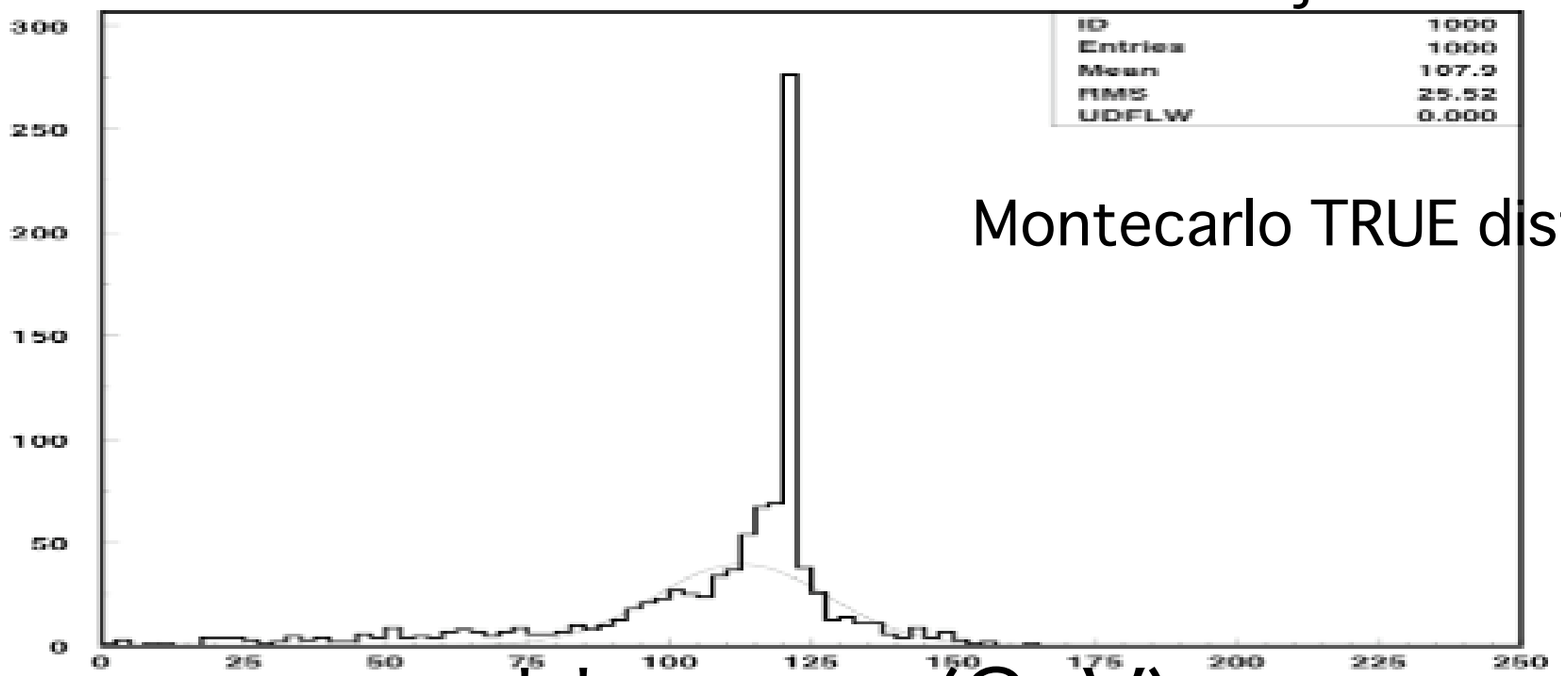


energy/event (GeV)

Higgs results cont.d

PYTHIA 6.2 ECM=250GeV mH=120GeV

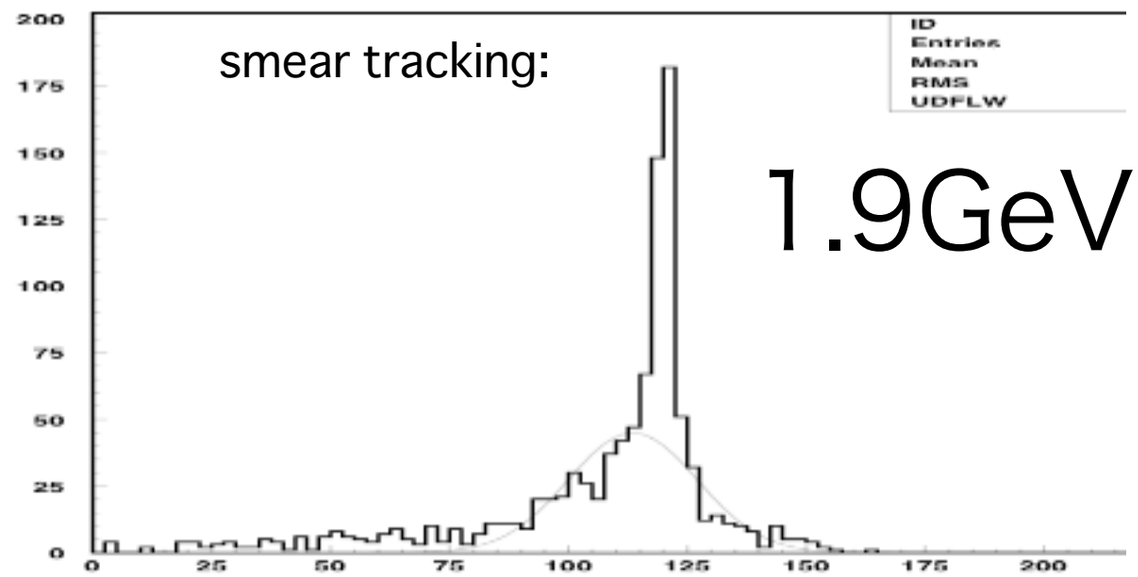
e+e- --> ZH --> νν + bb --> νν + 2jets



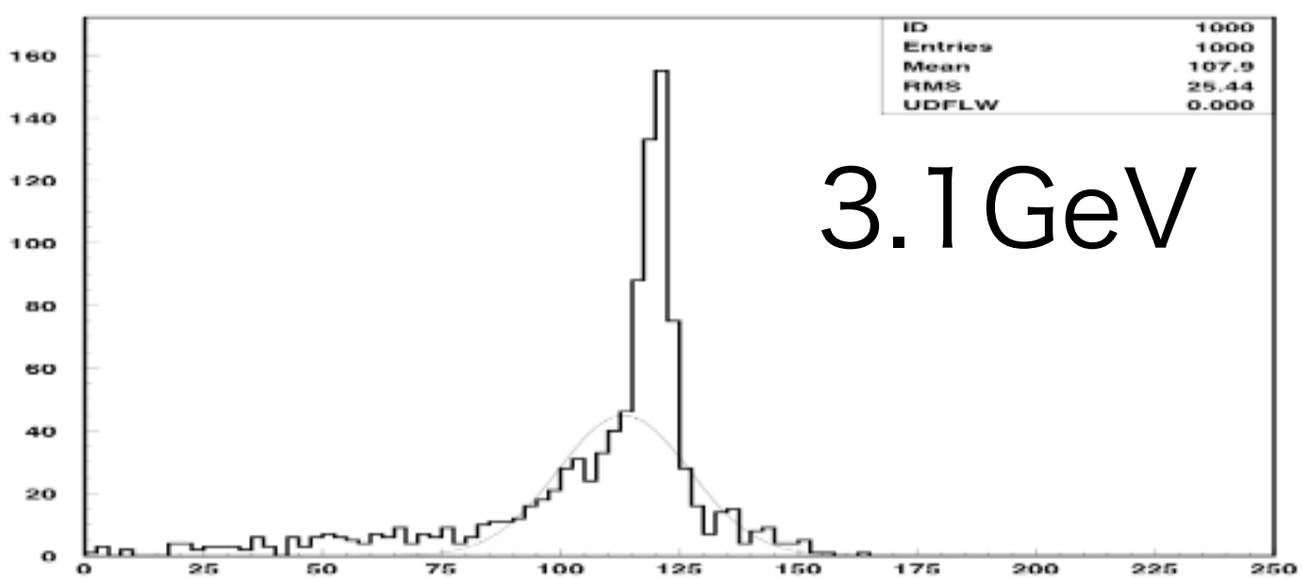
Montecarlo TRUE distribution

bb-mass (GeV)

rc=0.0001,rt=rf=0.07 (4deg) : σmH=1.88GeV



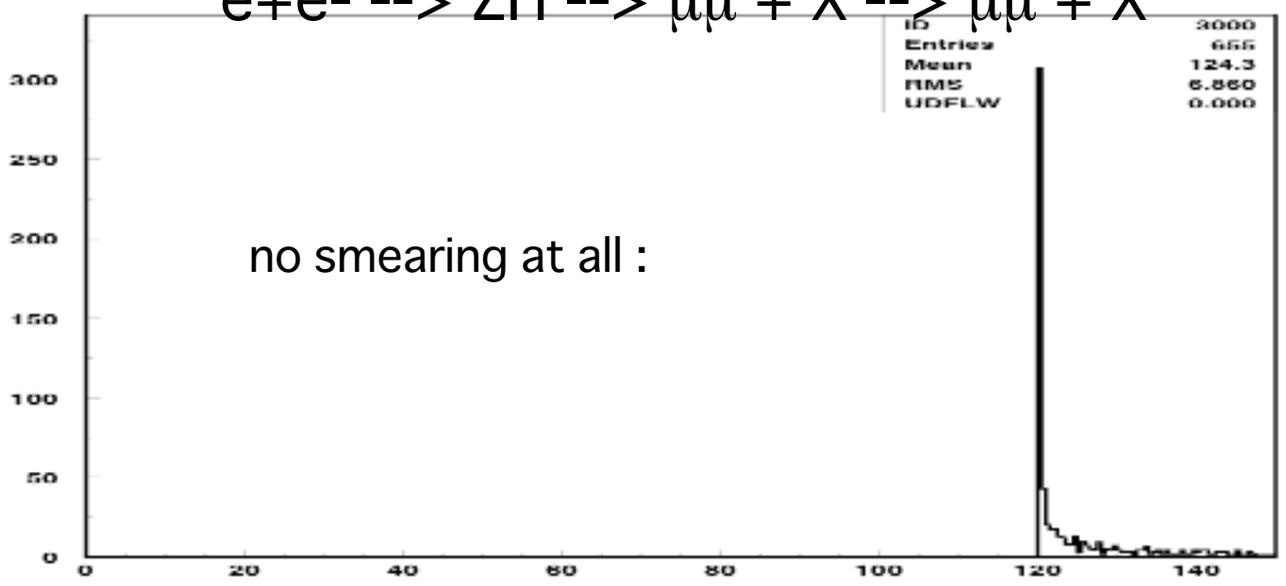
rc=0.0001,rt=rf=0.07 (4deg),rp=0.15,rn=0.5 : σmH=3.07GeV



Higgs results cont.d

PYTHIA 6.2 ECM=250GeV mH=120GeV

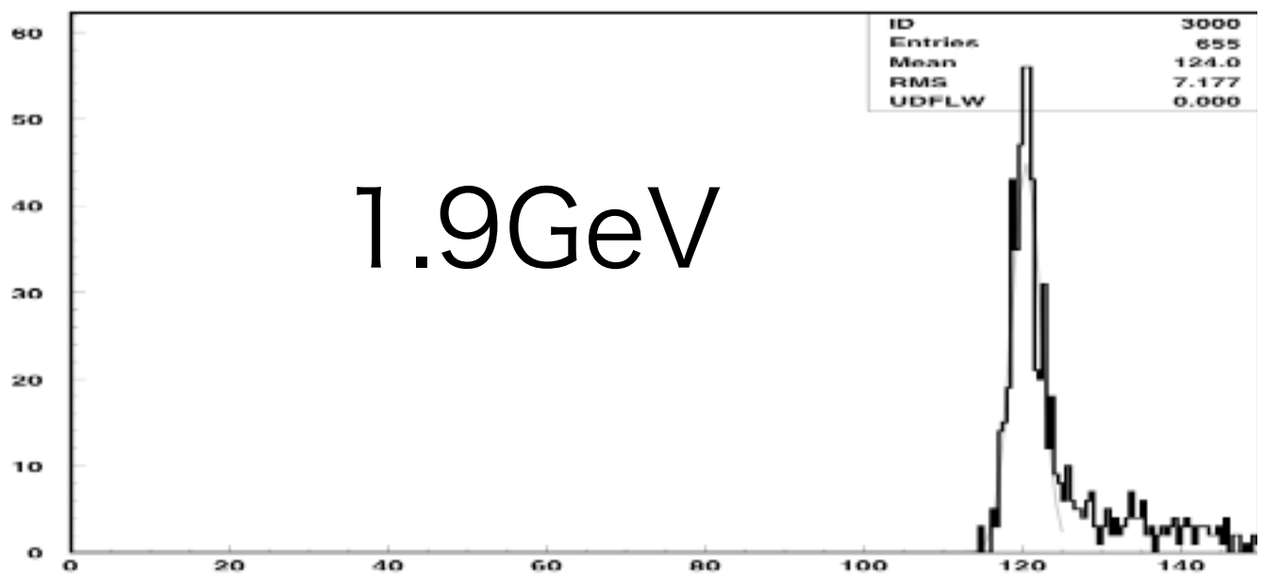
e+e- --> ZH --> μμ + X --> μμ + X



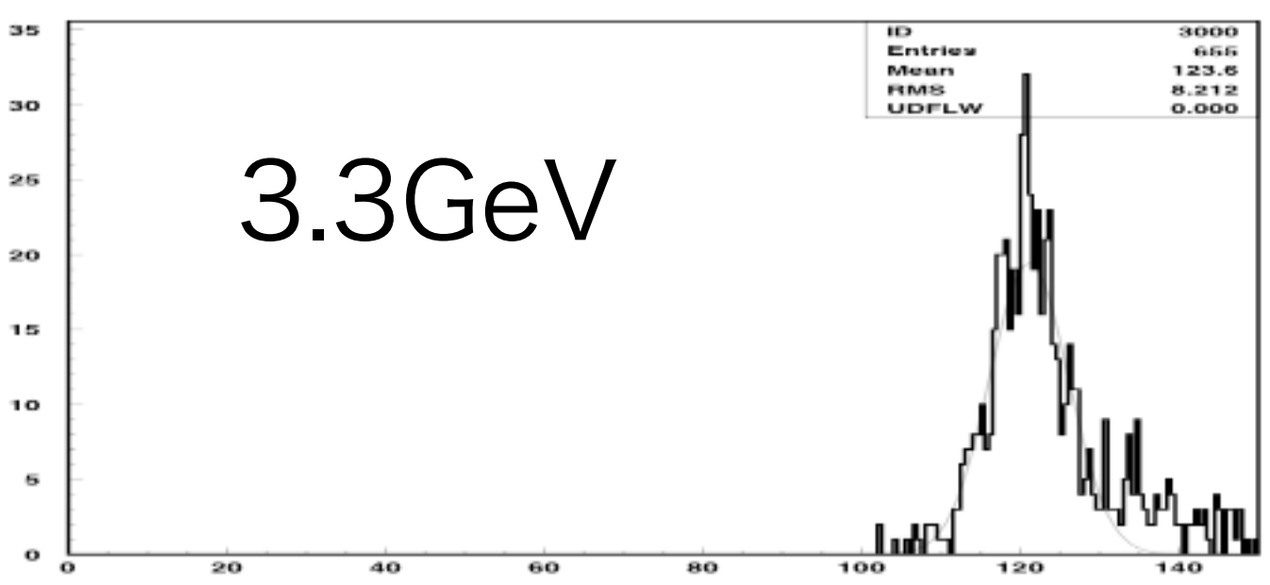
no smearing at all :

mu-mu Invariant Mass (GeV)

rc=0.00005,rt=rf=0.035 (2deg) : σmH=1.88GeV

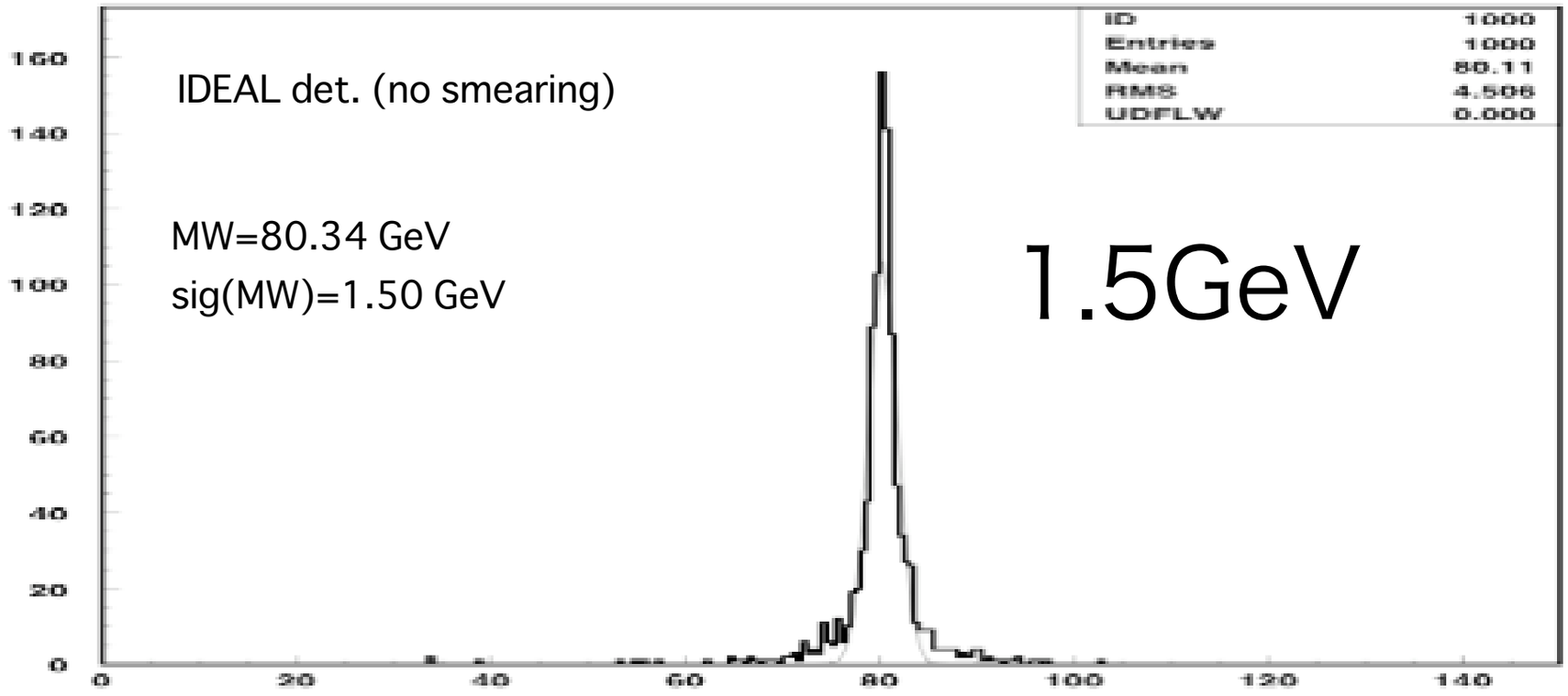


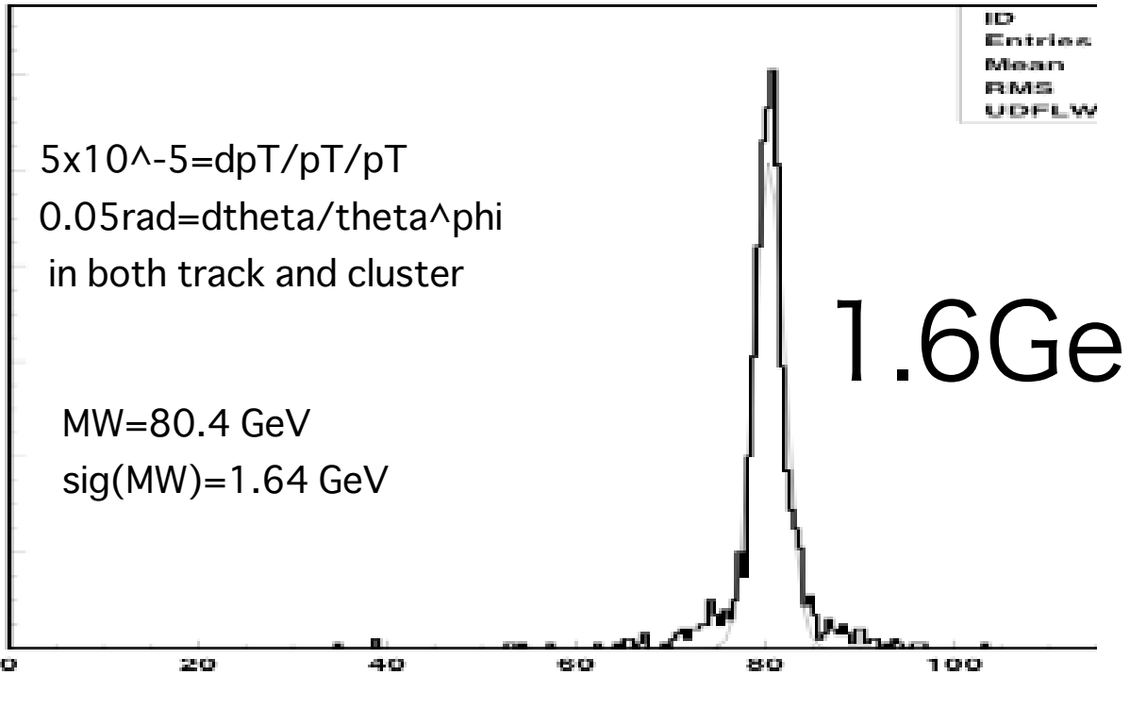
rc=0.0001,rt=rf=0.07 (4deg) : σmH=3.28GeV

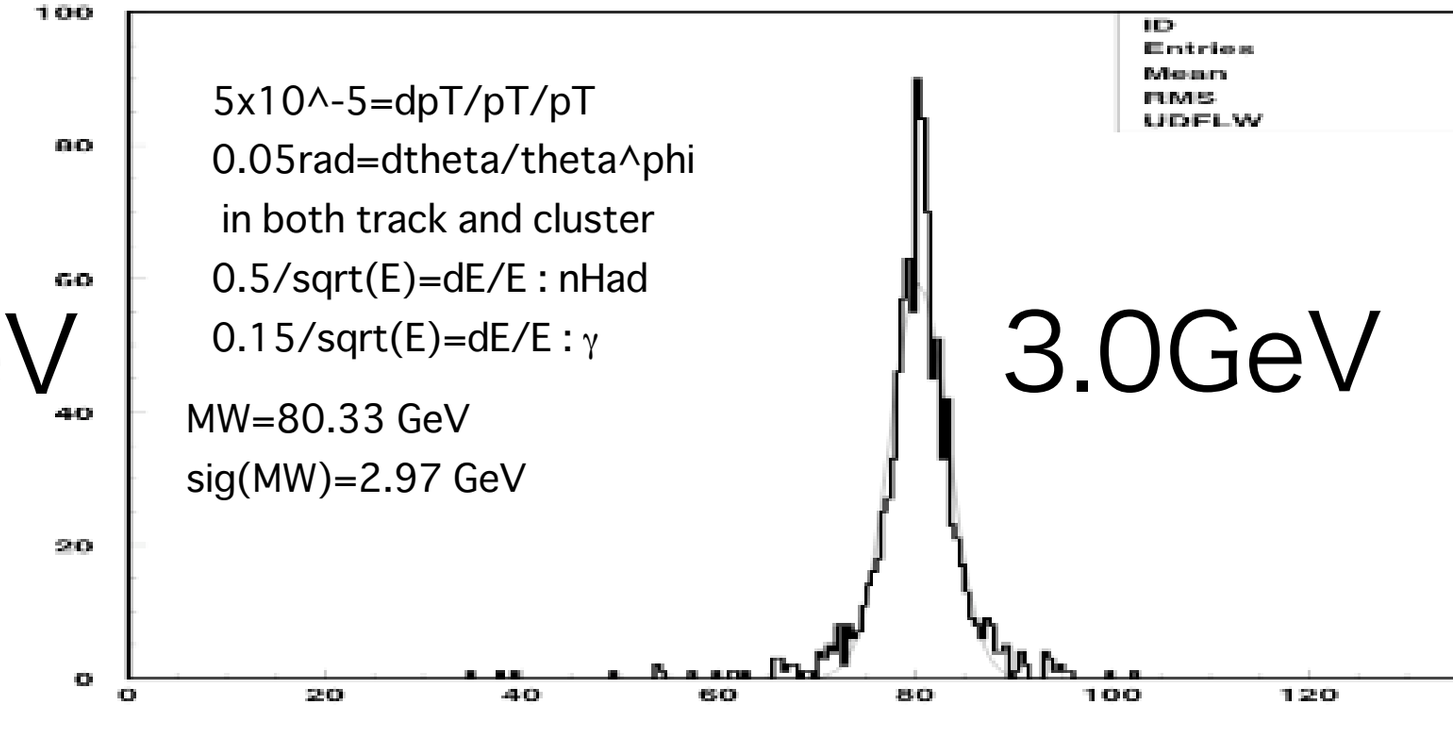


WW results

PYTHIA e+e- > WW @180GeV result

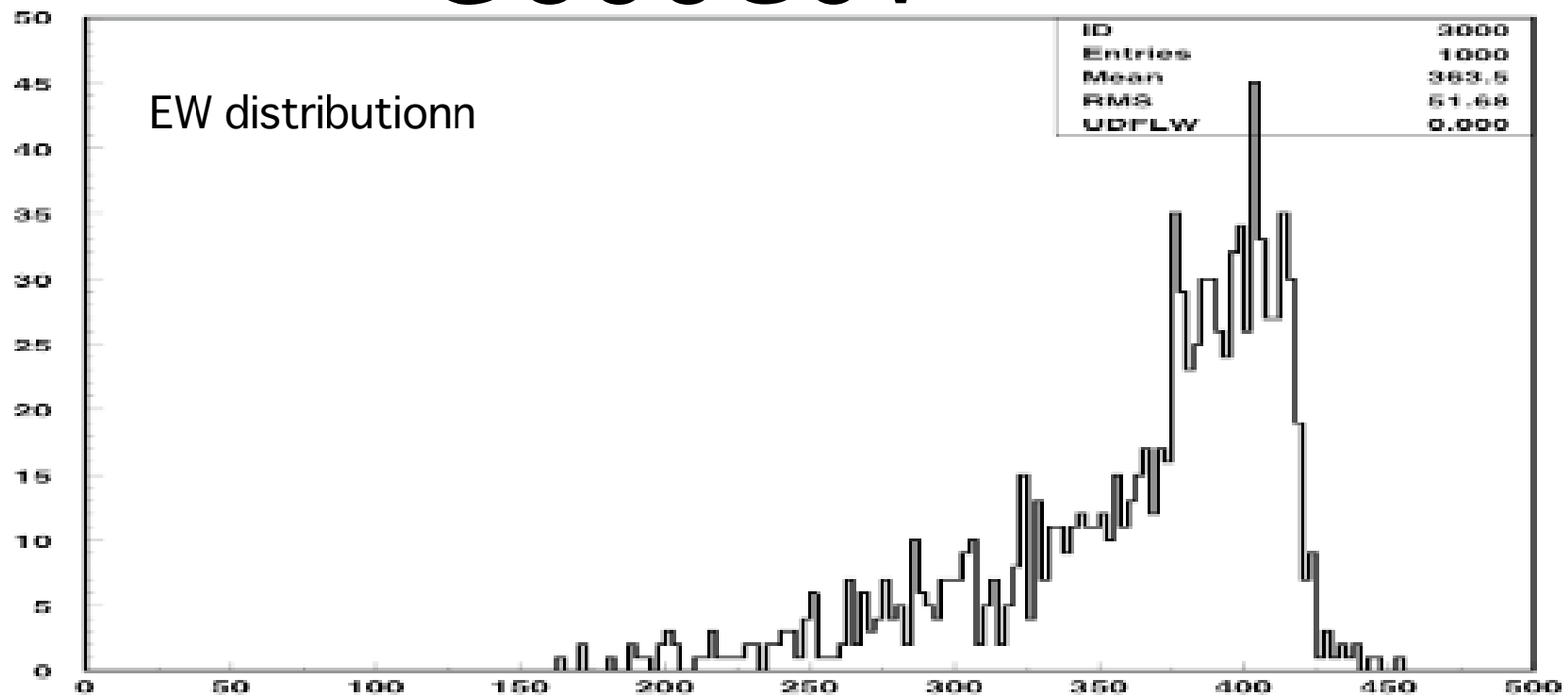


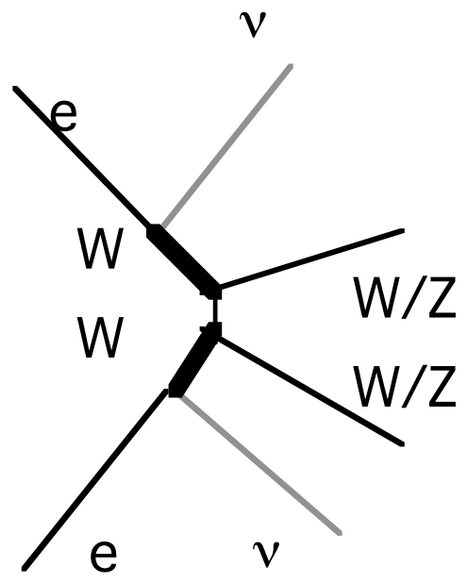




$e^+e^- \rightarrow \nu\bar{\nu}WW$ results

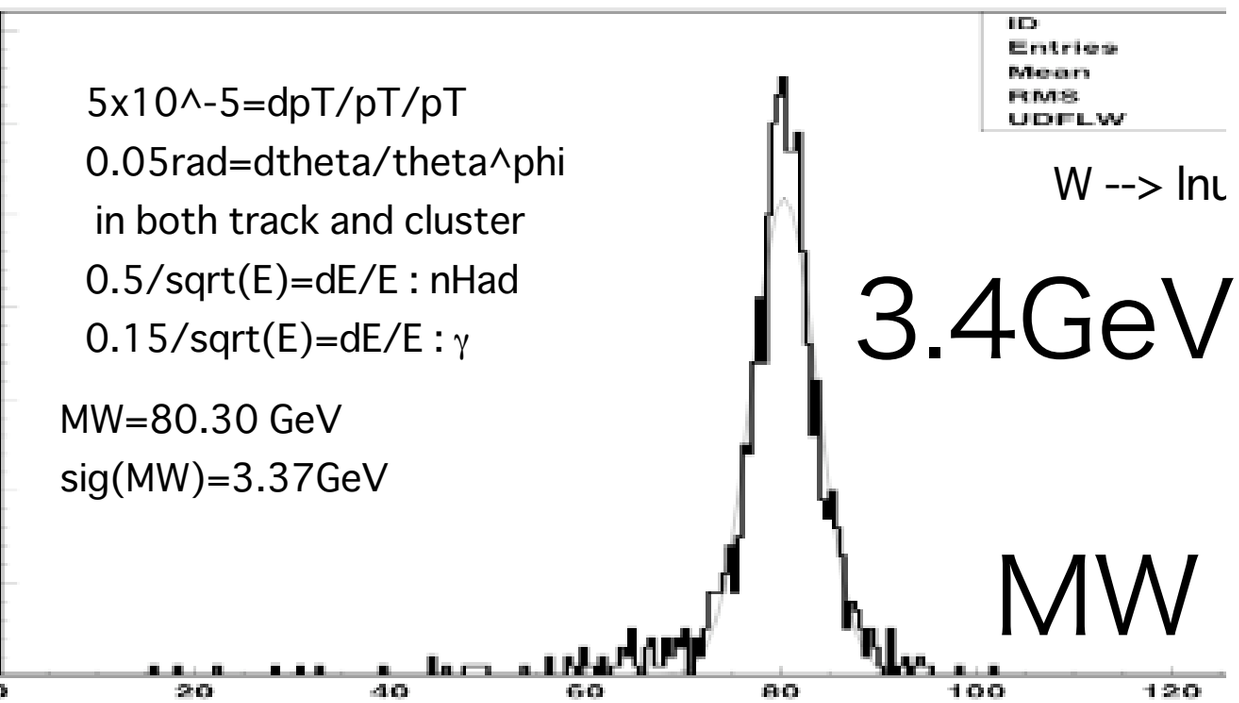
@500GeV



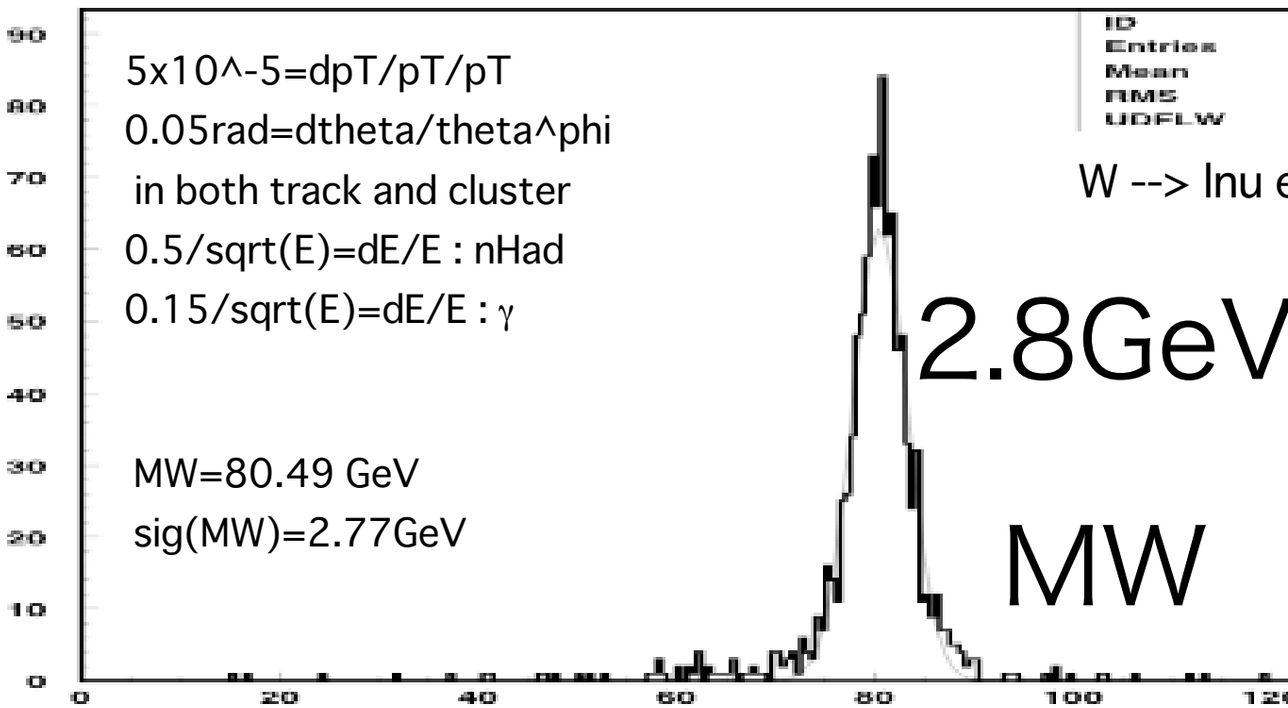


EW

W->ln :included



W->ln :excluded



tentative conclusion

$e^+ e^- \rightarrow \nu\bar{\nu}WW$

smearing is not sufficient enough

cluster overlap plays an important role

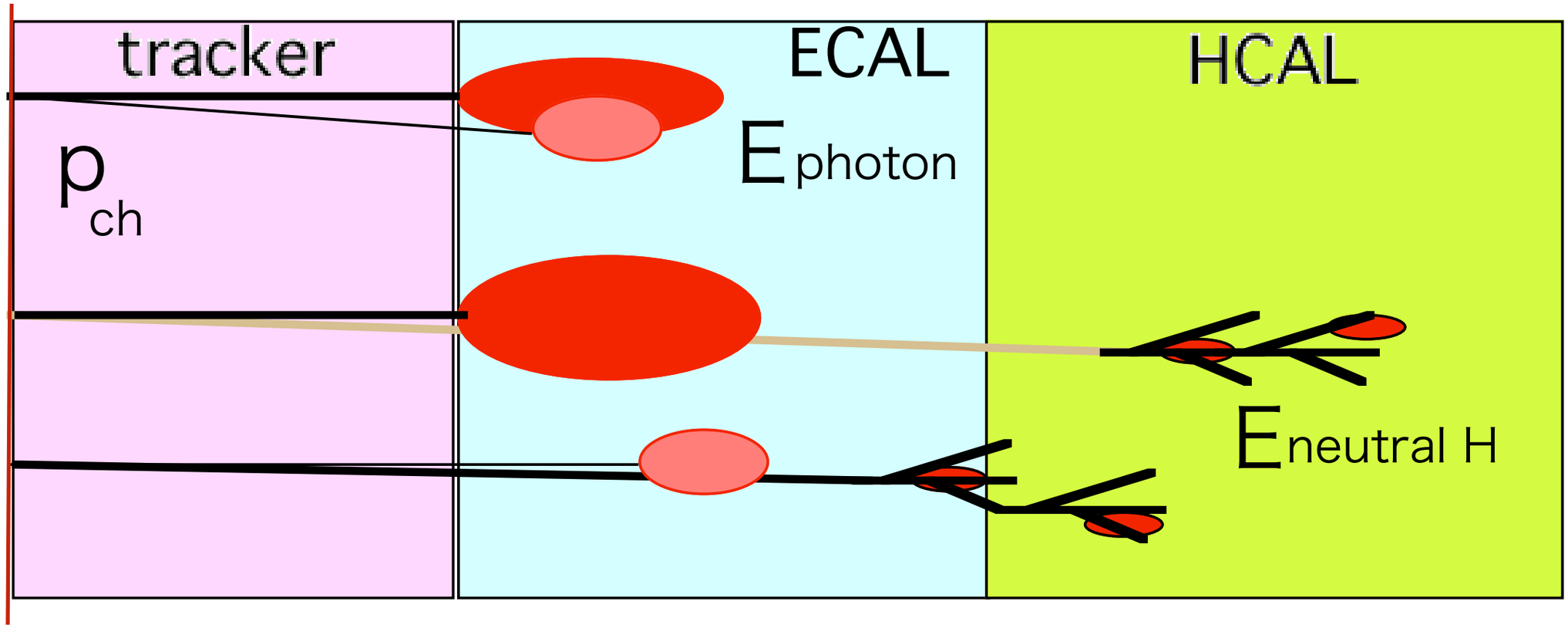
$$\frac{35\%}{\sqrt{E_\pi}} \overset{?}{\underset{?}{\Rightarrow}} \frac{50\%}{\sqrt{E_{jet}}}$$

PFA

smearing vs PFA

beam

cluster overlap



$$E_{jet} = \sum_{charged} p_i + \sum_{photon} E_i + \sum_{neutral\ hadron} E_i$$