

EMC BW simulation parameters study

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Outline

- 1 Status of simulation parameters
- 2 What has been done
- 3 Results
- 4 Conclusion and outlook

- With the current parameters of digitization the energy range 15 GeV. (EnergyRange:Double_t 15) corresponds to 14 bits (NBits:Int_t 14). So it corresponds to the step in energy $15/2^{14} = 0.9\text{MeV}$.
- In real experiment, since the expected energy range for backward endcap is lower, parameters of electronics will be adjusted accordingly.
- At the moment these parameters are global for the whole emc. There are two ways to solve this problem:
 - 1 Introduce the energy range for backward endcap as a separate parameter.
 - 2 Adjust energy range correspondingly if only results for backward endcap are interesting.

Single photons:

- Energy: 0.03, 0.1, 0.25 GeV
- ϕ : 45°
- θ : 155°
- Number of events: 10000
- Energy range: 15 GeV (default), 7.5 GeV, 3 GeV, 1 GeV

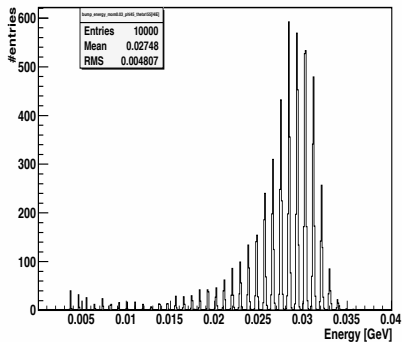
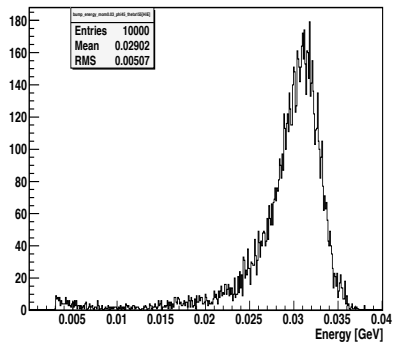
Bump energy [mom0.03 ϕ 45 θ 155][HiE]Bump energy [mom0.03 ϕ 45 θ 155][HiE]

Figure: Energy of a bump with higher energy per event. Parameters: $mom = 30\text{MeV}$, $\phi = 45^\circ$, $\theta = 155^\circ$. Left hand figure: $energyrange = 15\text{GeV}$, right hand figure: $energyrange = 7.5$

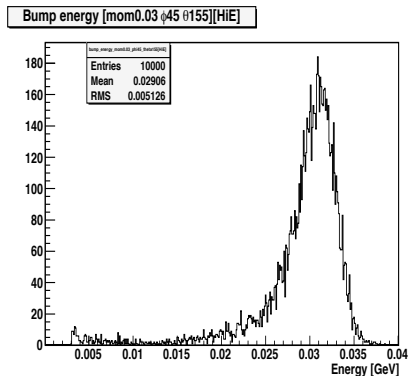
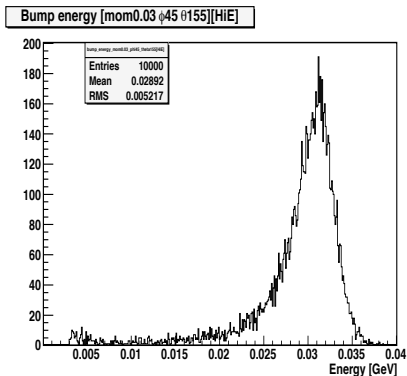


Figure: Energy of a bump with higher energy per event. Parameters: $mom = 30\text{MeV}$, $\phi = 45^\circ$, $\theta = 155^\circ$ Left hand figure: $energyrange = 3\text{GeV}$, right hand figure: $energyrange = 1\text{GeV}$

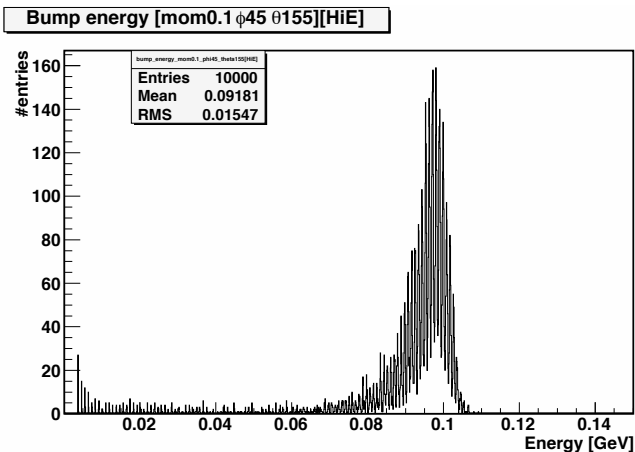


Figure: Energy of a bump with higher energy per event. Parameters:
 $mom = 100\text{MeV}$, $\phi = 45^\circ$, $\theta = 155^\circ$, $energyrange = 15\text{GeV}$

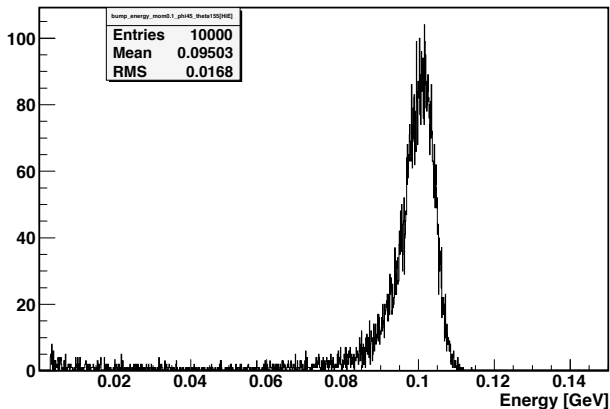
Bump energy [mom0.1 ϕ 45 θ 155][HiE]

Figure: Energy of a bump with higher energy per event. Parameters: $mom = 100\text{MeV}$, $\phi = 45^\circ$, $\theta = 155^\circ$, $energyrange = 1\text{GeV}$

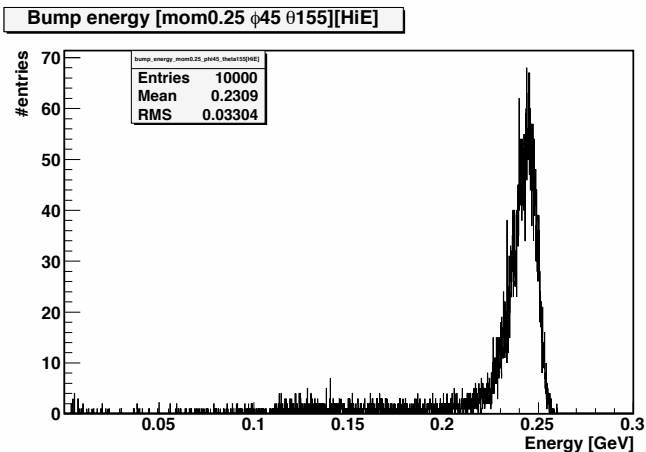


Figure: Energy of a bump with higher energy per event. Parameters:
 $mom = 250\text{MeV}$, $\phi = 45^\circ$, $\theta = 155^\circ$, $energyrange = 15\text{GeV}$

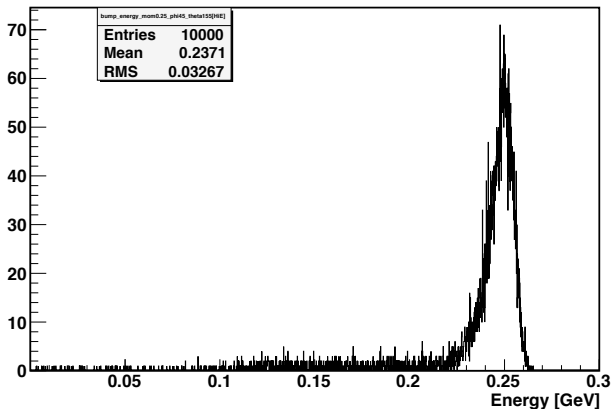
Bump energy [mom0.25 ϕ 45 θ 155][HiE]

Figure: Energy of a bump with higher energy per event. Parameters: $mom = 250\text{MeV}$, $\phi = 45^\circ$, $\theta = 155^\circ$, $energyrange = 1\text{GeV}$

Conclusion and outlook

■ Conclusion

- 1 Changing energy range parameter dramatically change the shape of the energy histograms at low ($\leq 100\text{MeV}$) energy
- 2 Peak position shifts in "right" position with decreasing energy range

■ Outlook

Introduce the energy range(value?) for backward endcap as a separate parameter