STATUS of the ECAL reconstruction
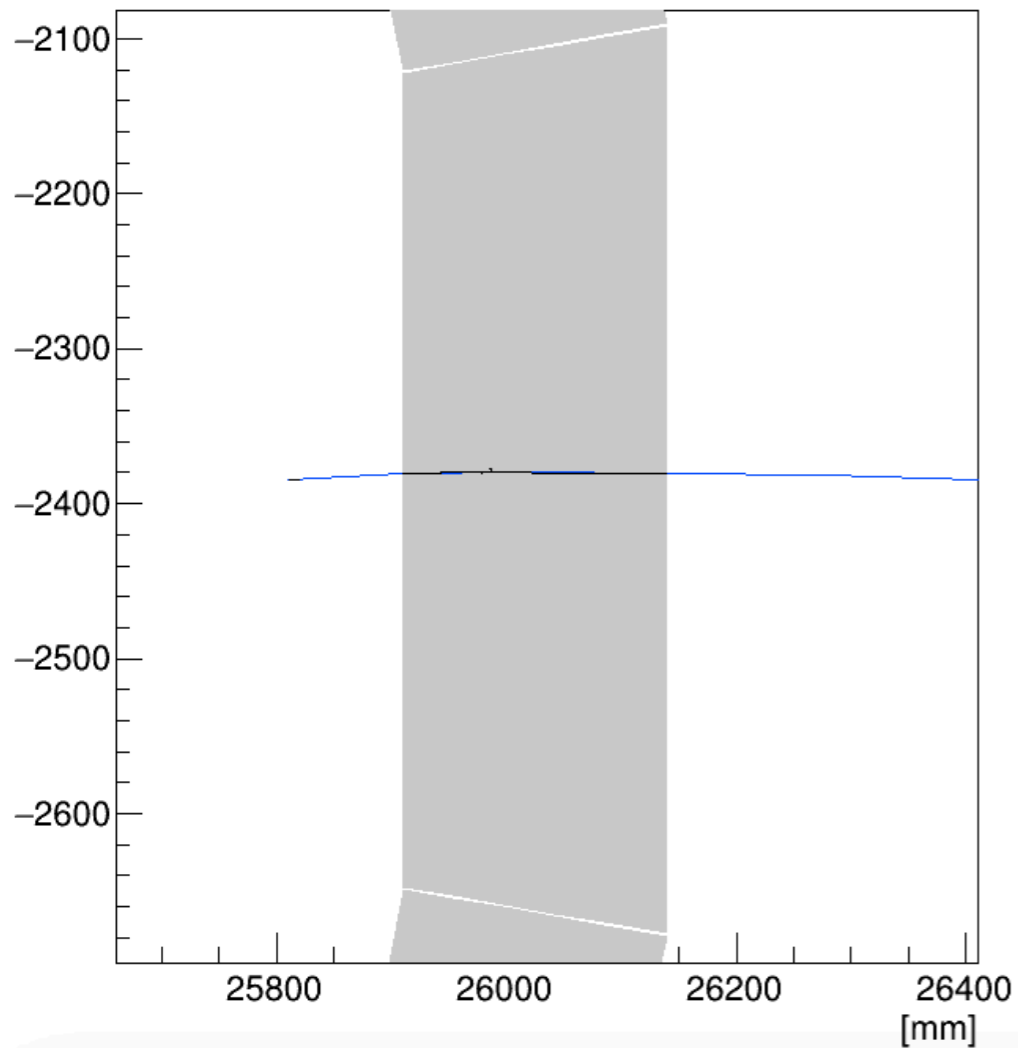
SAND meeting - 29/11/23

Denise Casazza for the Ferrara group
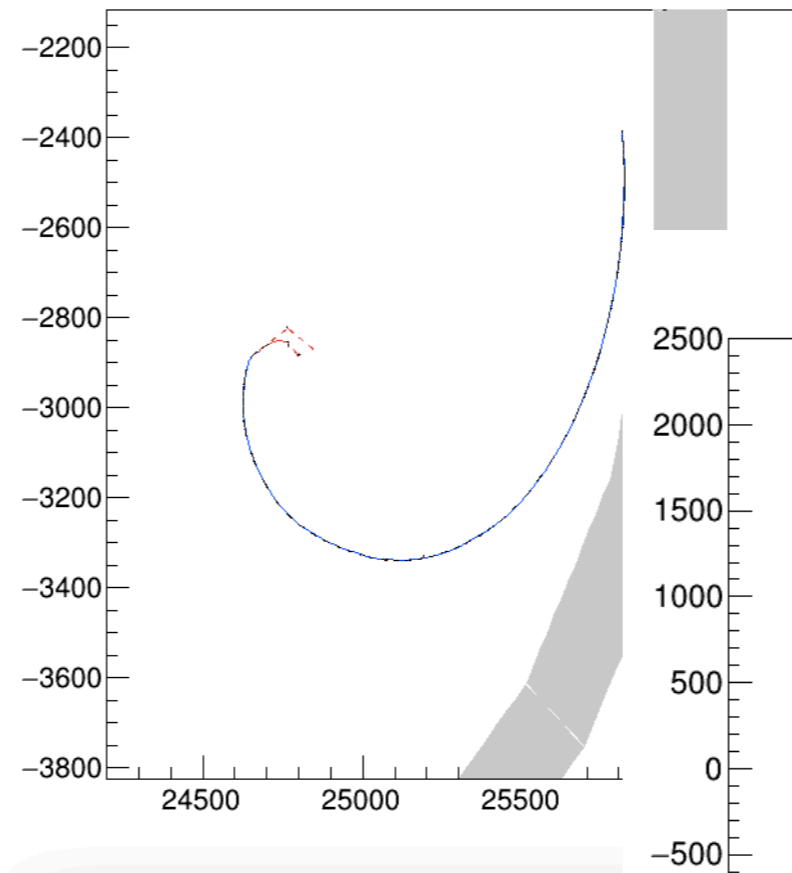
Association cluster - primary particle

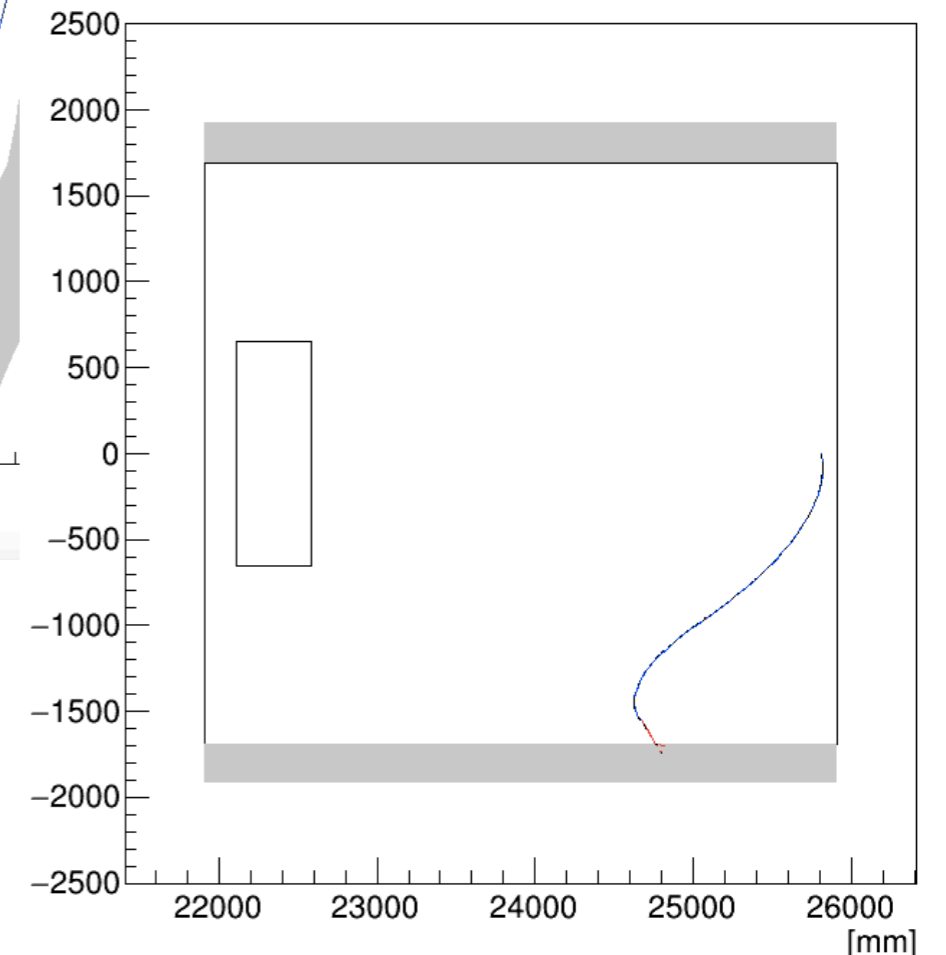**MC sample**: 10000 <u>muons</u> near the barrel $E \in [0,5] \; GeV$
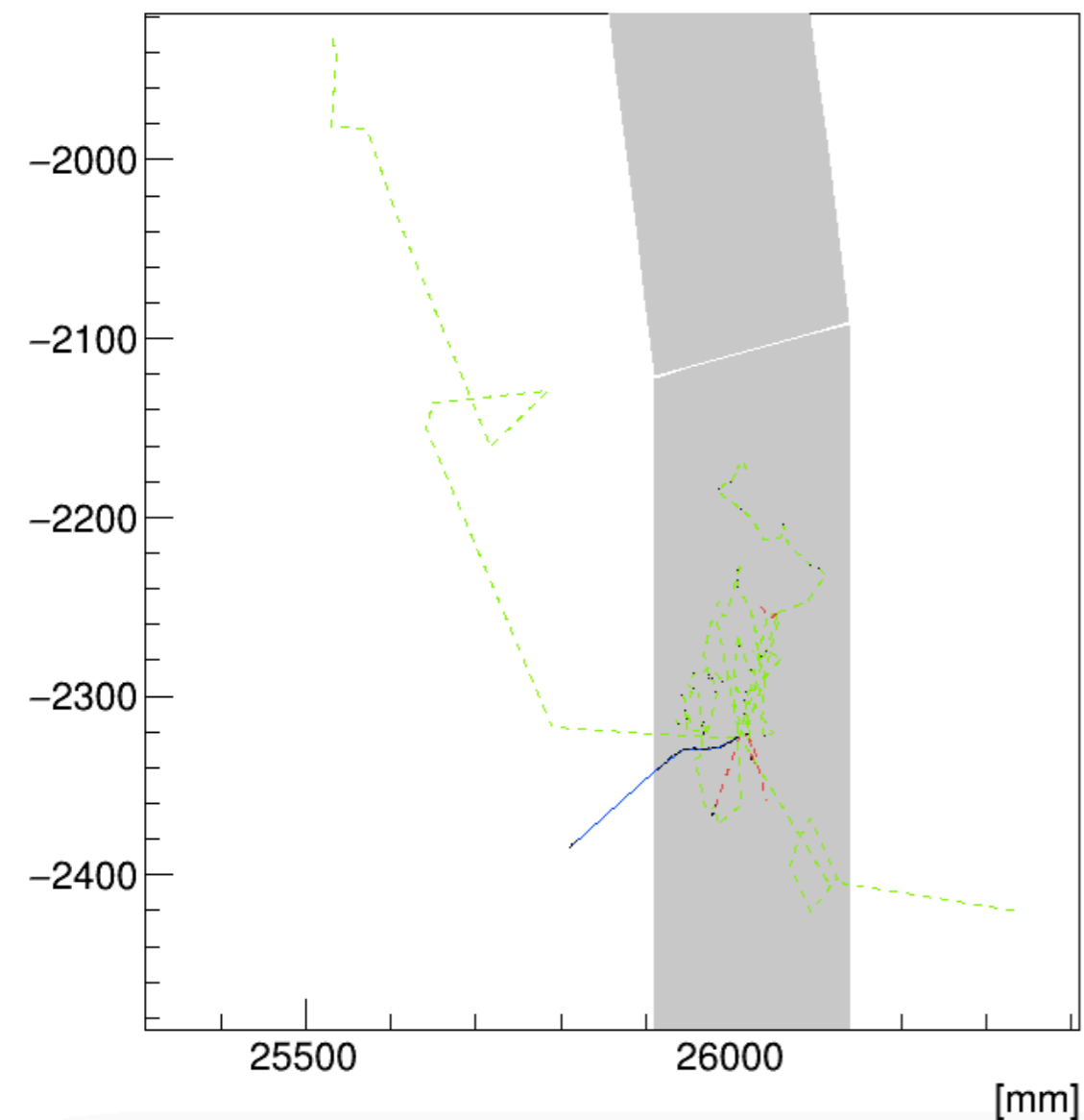
1 cluster - 1 PP muon

1 cluster - 1 PP non muon

Association cluster - primary particle

MC sample: 10000 <u>muons</u> near the barrel $E \in [0,5] \; GeV$
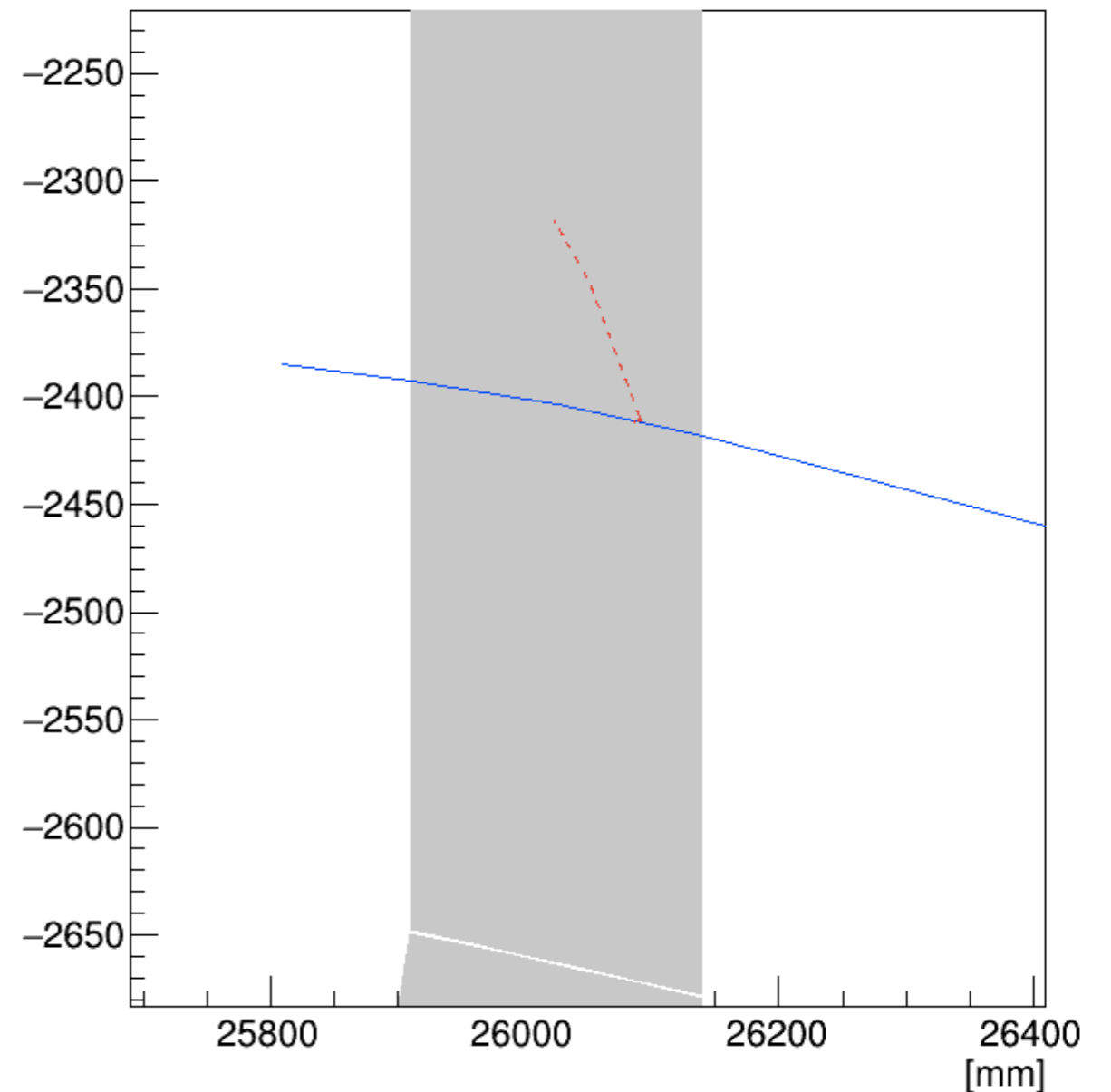
> 1 cluster - PP muon & others

$\mu + n$

$\mu + e$

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Association cluster - primary particle

MC sample: 10000 <u>muons</u> near the barrel $E \in [0,5] \, GeV$

Clusters

	Single cluster event	Multiple cluster event
Total events	7256	2714 (945 considered)
μ	7239	936
e^+	4	127
e^-	12	831
p	1	120
n	//	86
$nuclei$	//	21

Events not considered if there are multiple clusters associated with muon

30 events without clusters in ECAL

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Initial energy of discarded events
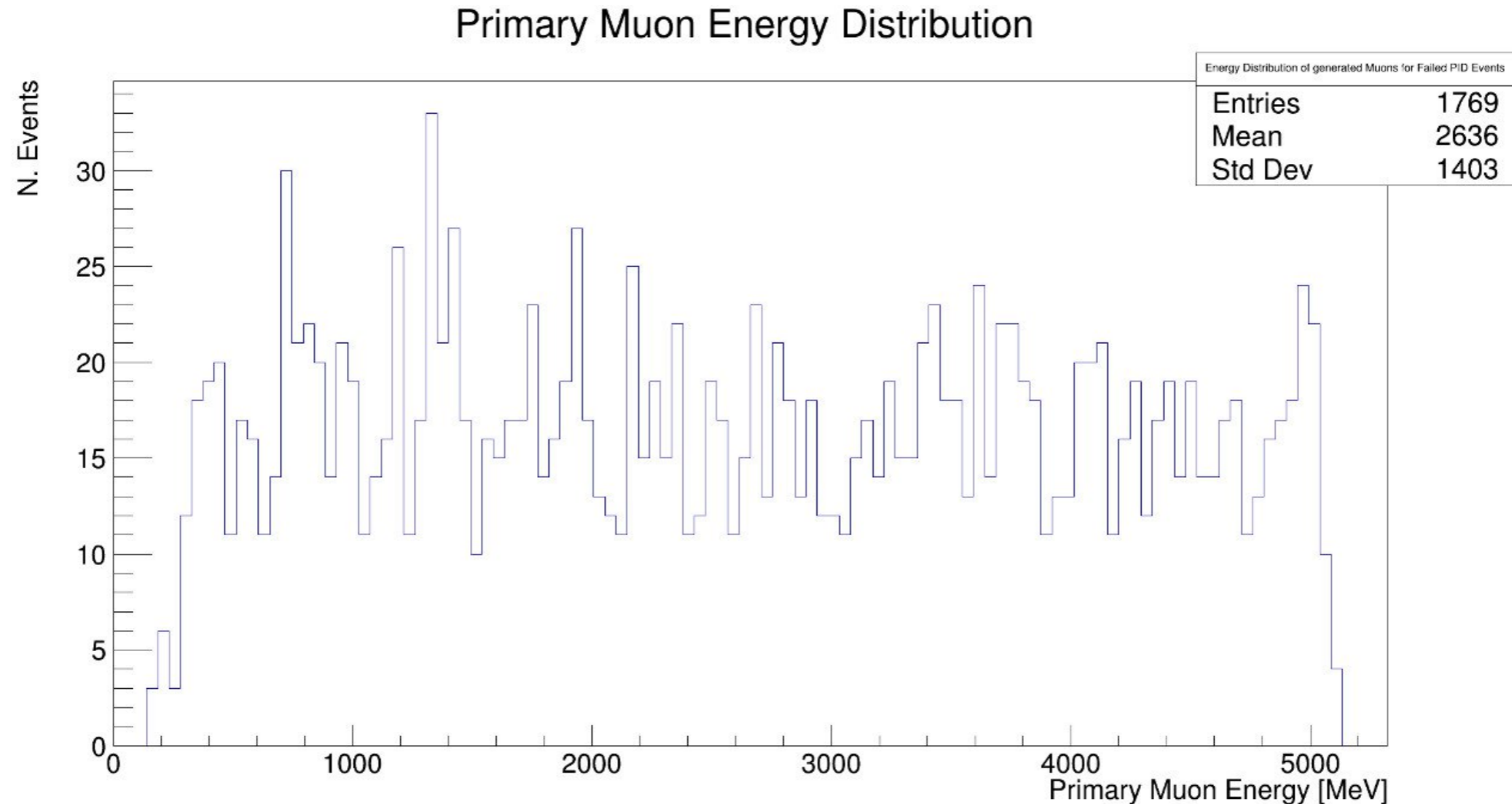
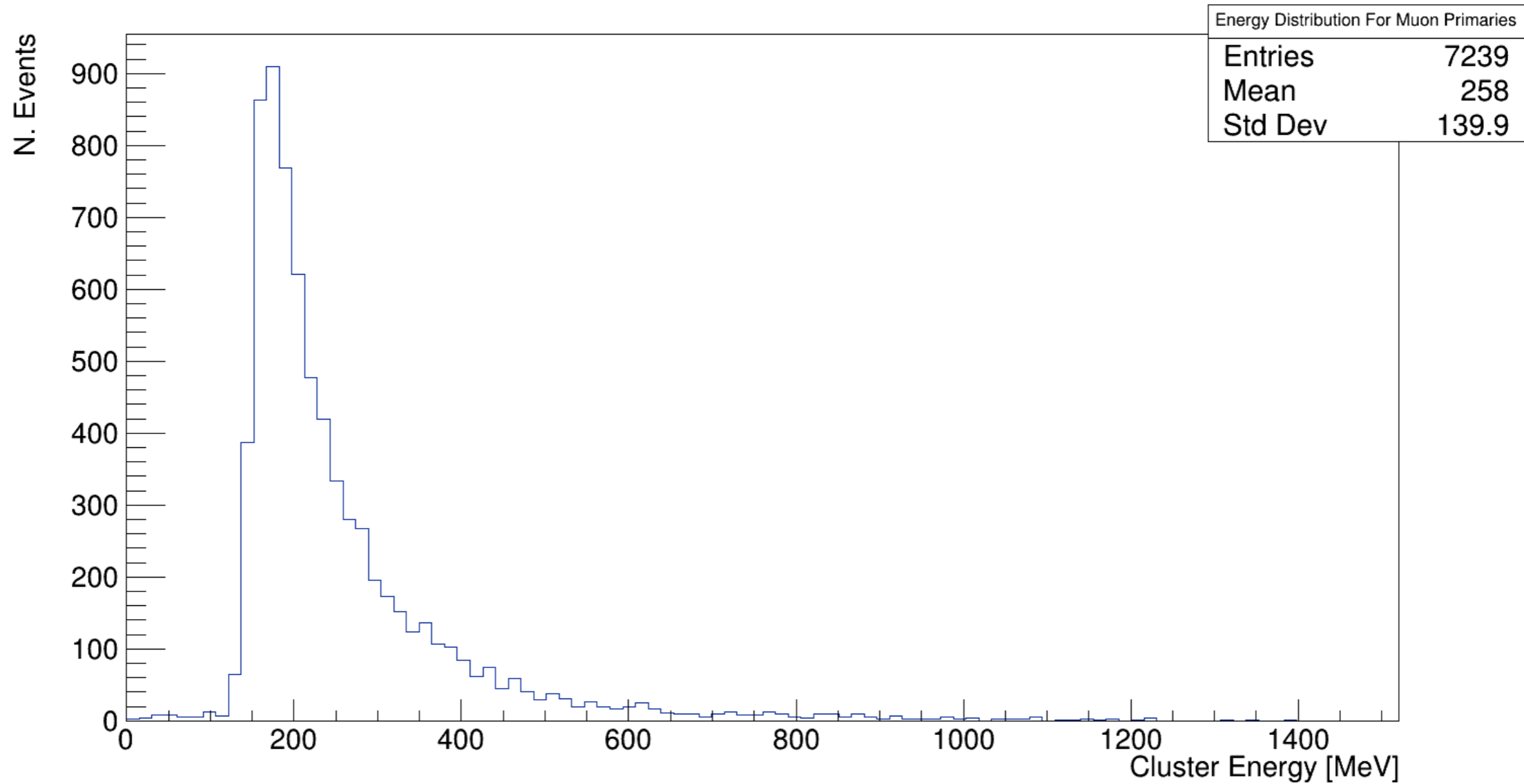**MC sample**: 10000 <u>muons</u> near the barrel $E \in [0,5] \ GeV$.
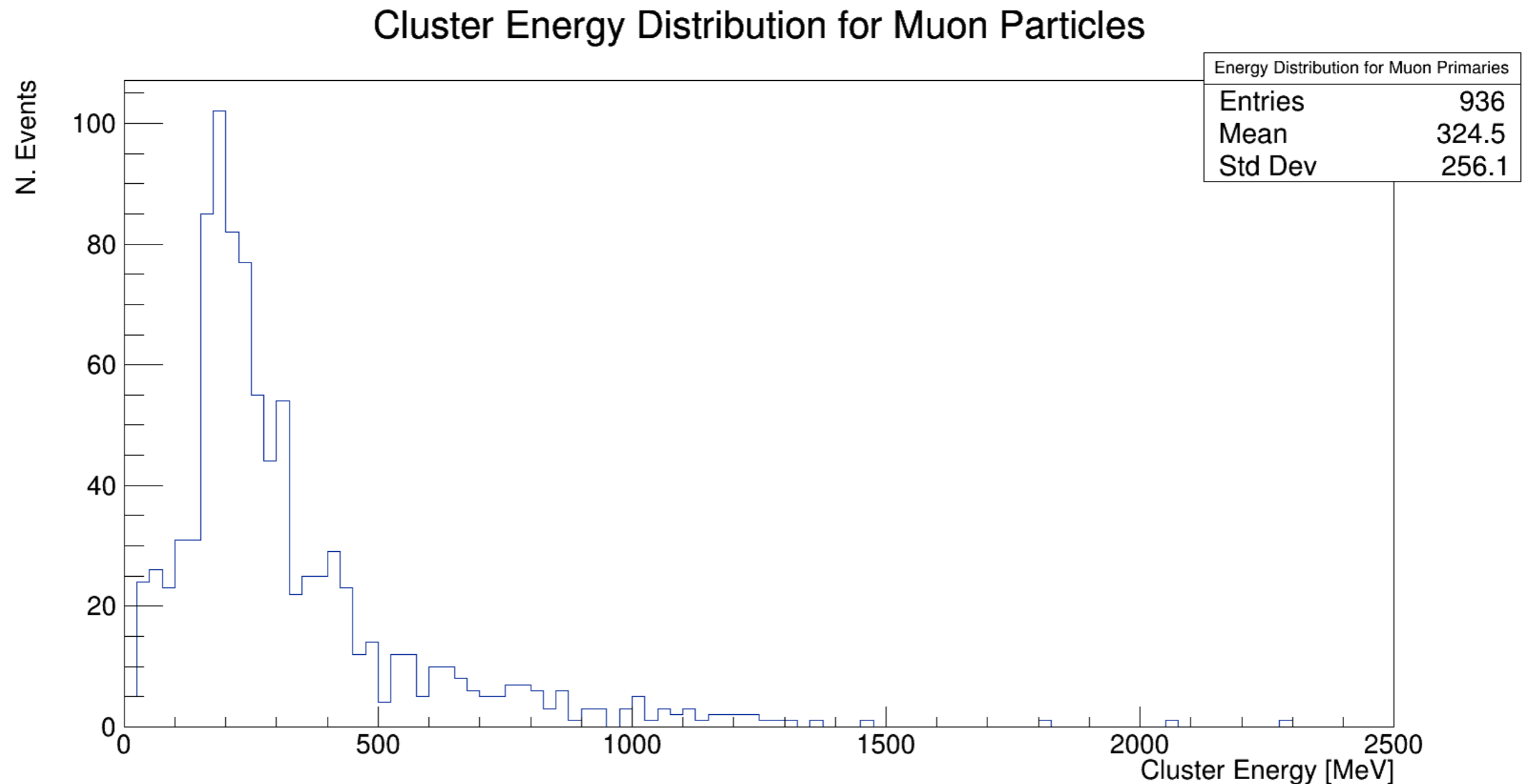
The 1769 events <u>not</u> considered are not biased.

Single cluster μ: energy

Cluster Energy Distribution for Muon Particles

Energy Distribution For Muon Primaries	
Entries	7239
Mean	258
Std Dev	139.9

Muon cluster energy in <u>events</u> with <u>single</u> clusters.

Denise Casazza I Status of the ECAL reconstruction

Multiple cluster μ: energy

Cluster Energy Distribution for Muon Particles

Energy Distribution for Muon Primaries	
Entries	936
Mean	324.5
Std Dev	256.1

Muon cluster energy in <u>events</u> with <u>multiple</u> clusters.
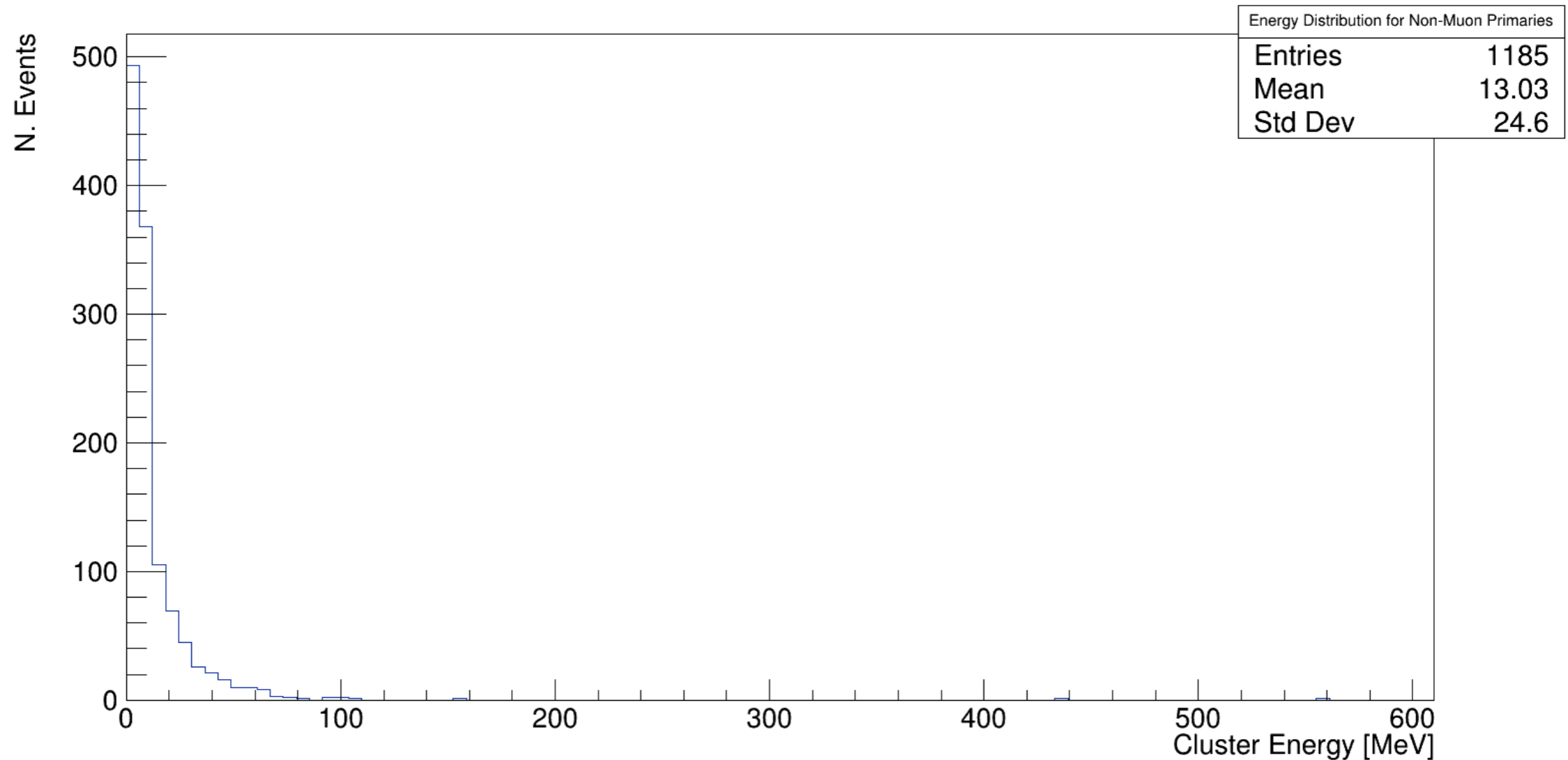
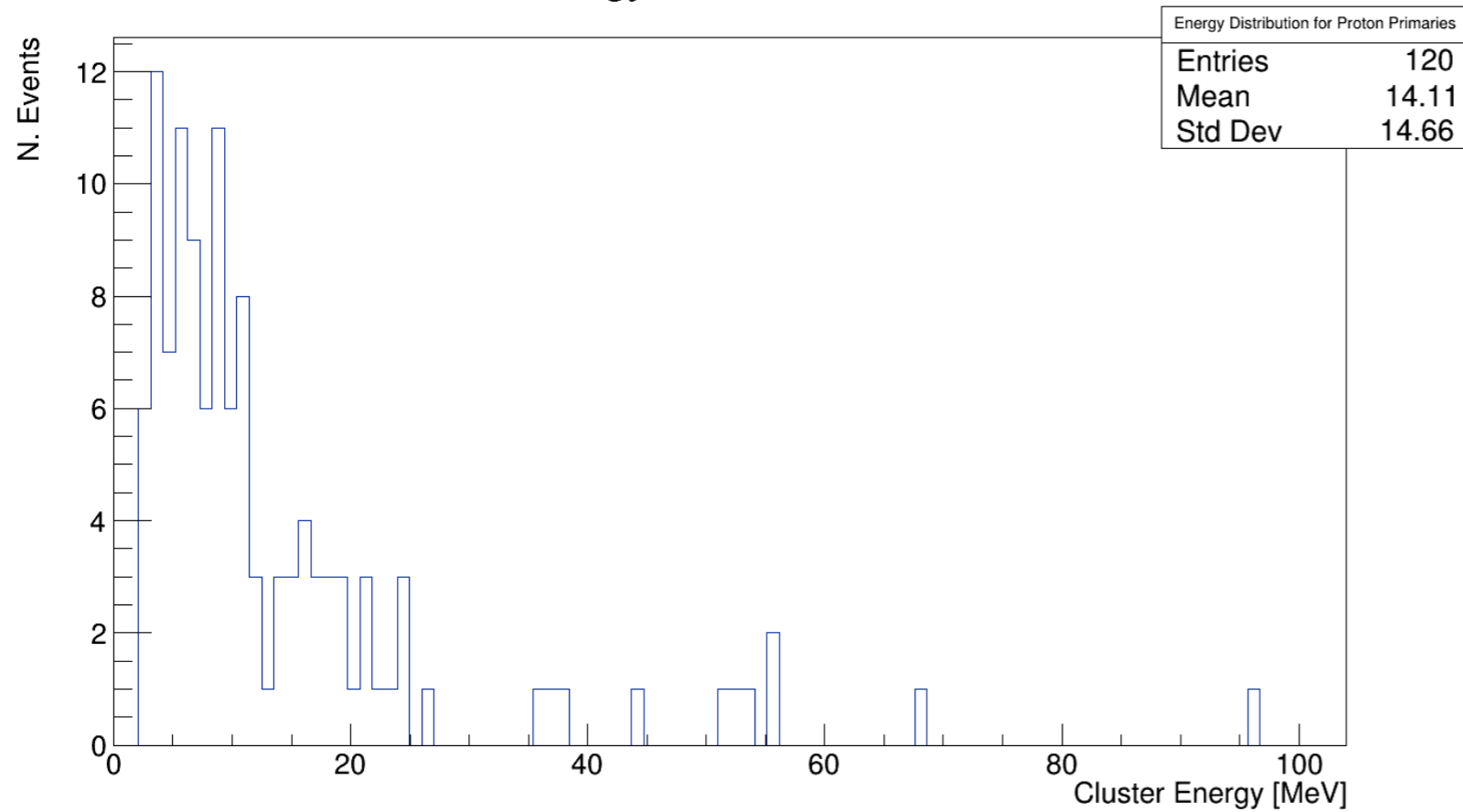# Multiple cluster non-μ: energy

Non-muon cluster energy in <u>events</u> with <u>multiple</u> clusters.
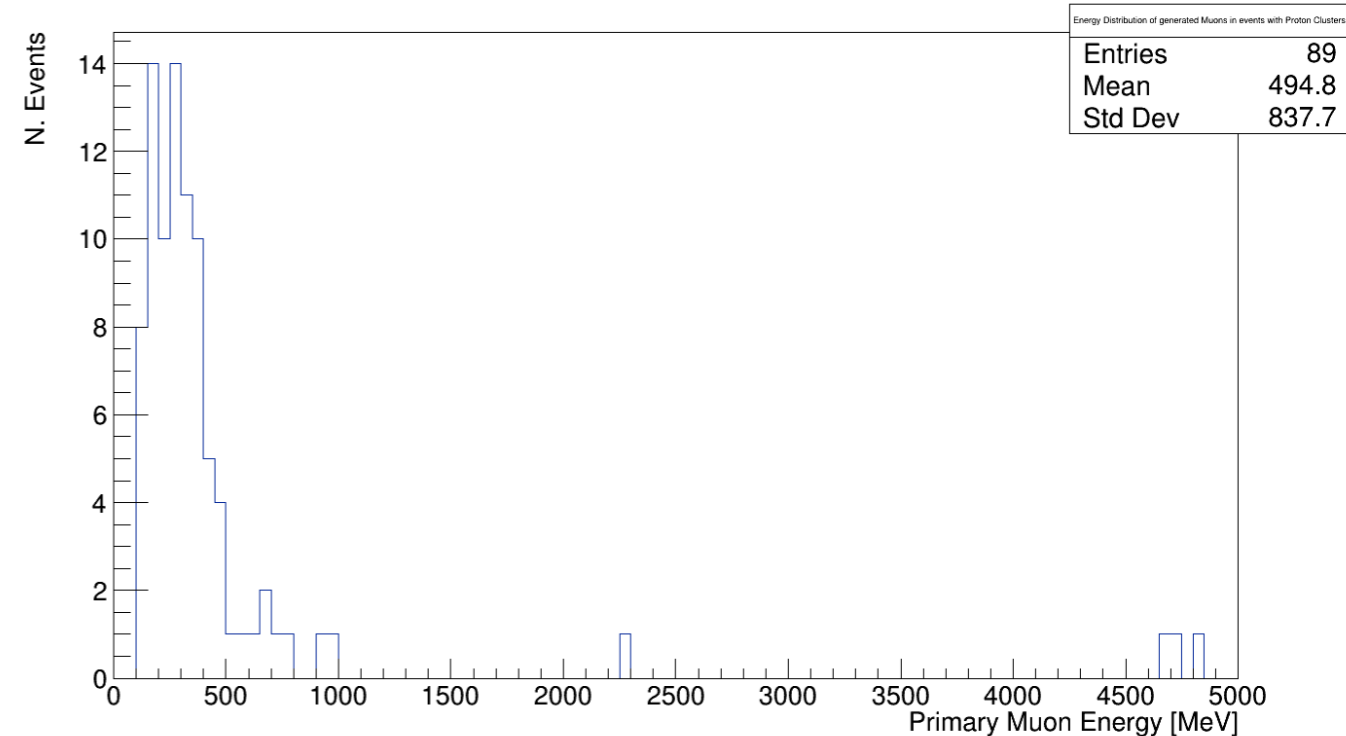
Multiple cluster p: energy

Cluster Energy Distribution for Protons

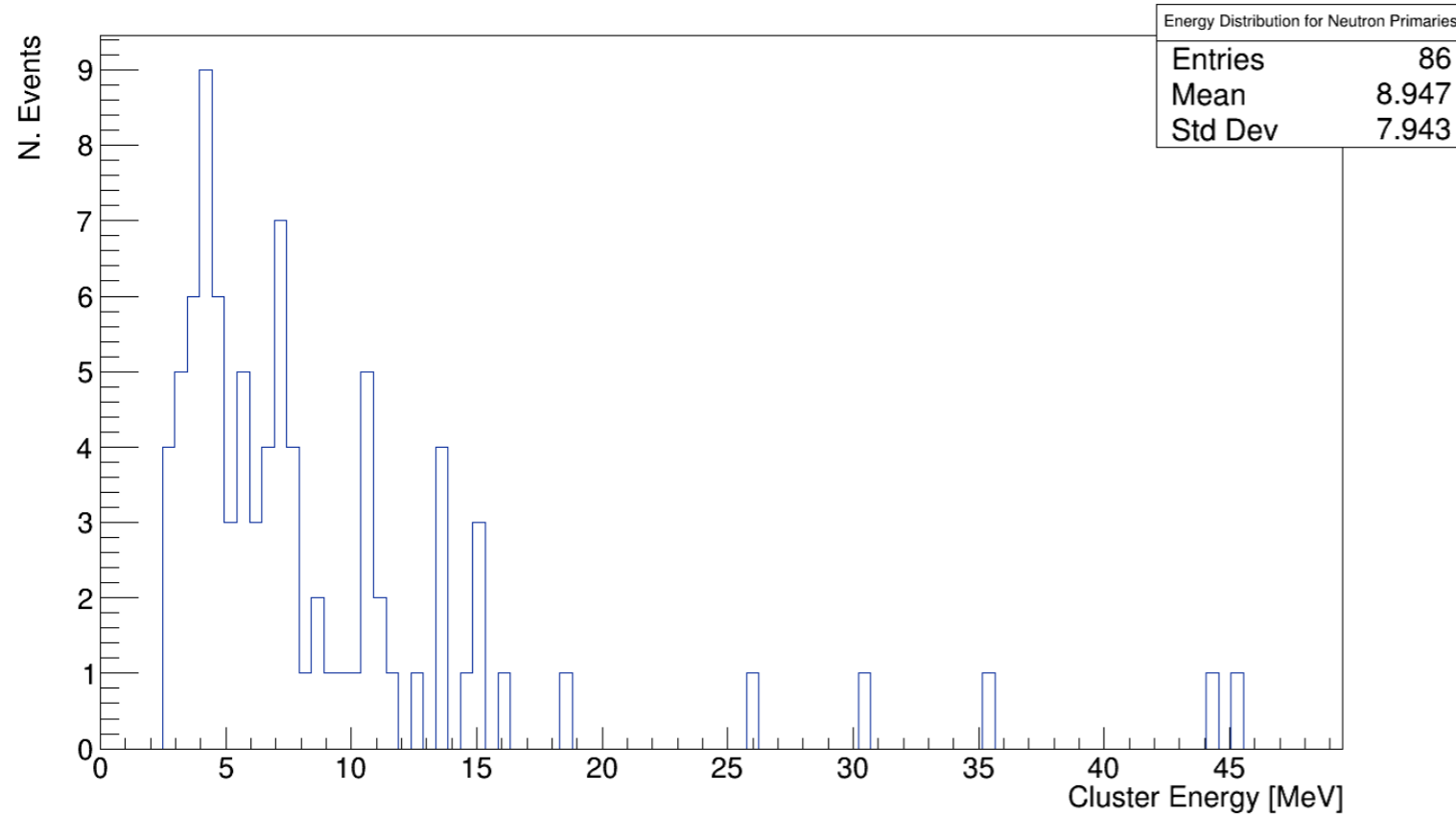Proton cluster energy in events with multiple clusters.

Muon primary energy of the selected events.

Primary Muon Energy Distribution for Protons
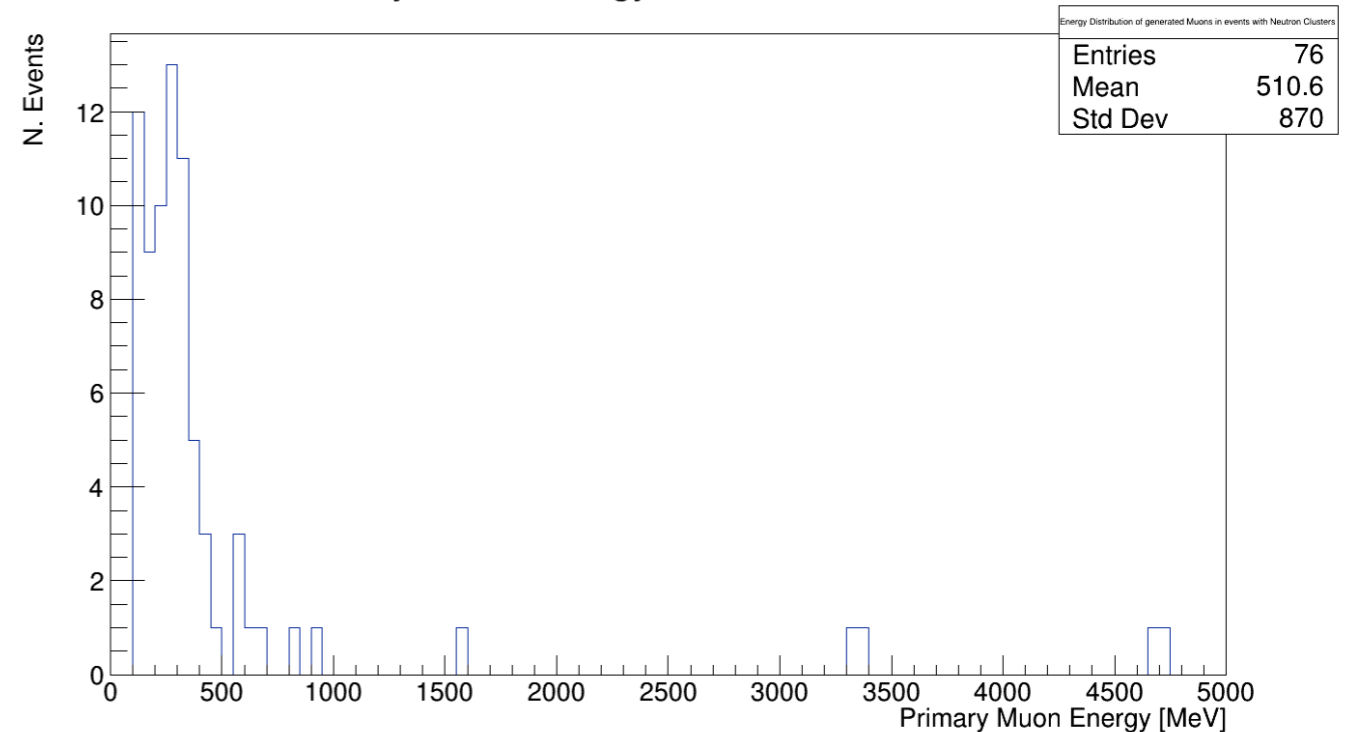
Multiple cluster n: energy

Cluster Energy Distribution for Neutrons

Energy Distribution for Neutron Primaries	
Entries	86
Mean	8.947
Std Dev	7.943

Neutron cluster energy in events with multiple clusters.

Primary Muon Energy Distribution for Neutron

Energy Distribution of generated Muons in events with Neutron Clusters	
Entries	76
Mean	510.6
Std Dev	870

Muon primary energy of the selected events.

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Multiple cluster e^-: energy

Cluster Energy Distribution for Electron Particles
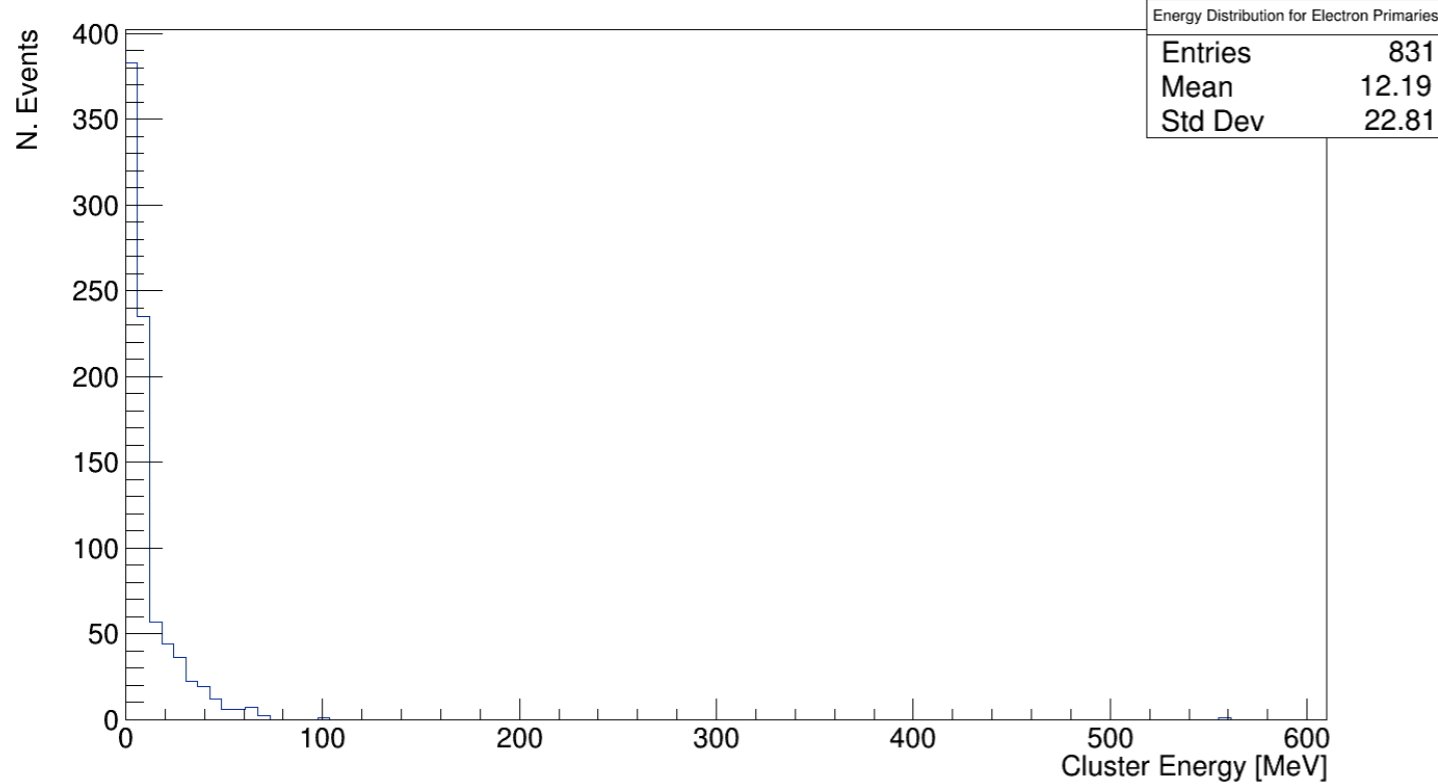
Energy Distribution for Electron Primaries	
Entries	831
Mean	12.19
Std Dev	22.81

e^- cluster energy in events with multiple clusters.

Primary Muon Energy Distribution for Electrons

Energy Distribution of generated Muons in events with Electron Clusters	
Entries	729
Mean	2288
Std Dev	1633

Muon primary energy of the selected events.

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Multiple cluster e^+: energy

Cluster Energy Distribution for Positron Particles

e^+ cluster energy in events with multiple clusters.

Muon primary energy of the selected events.
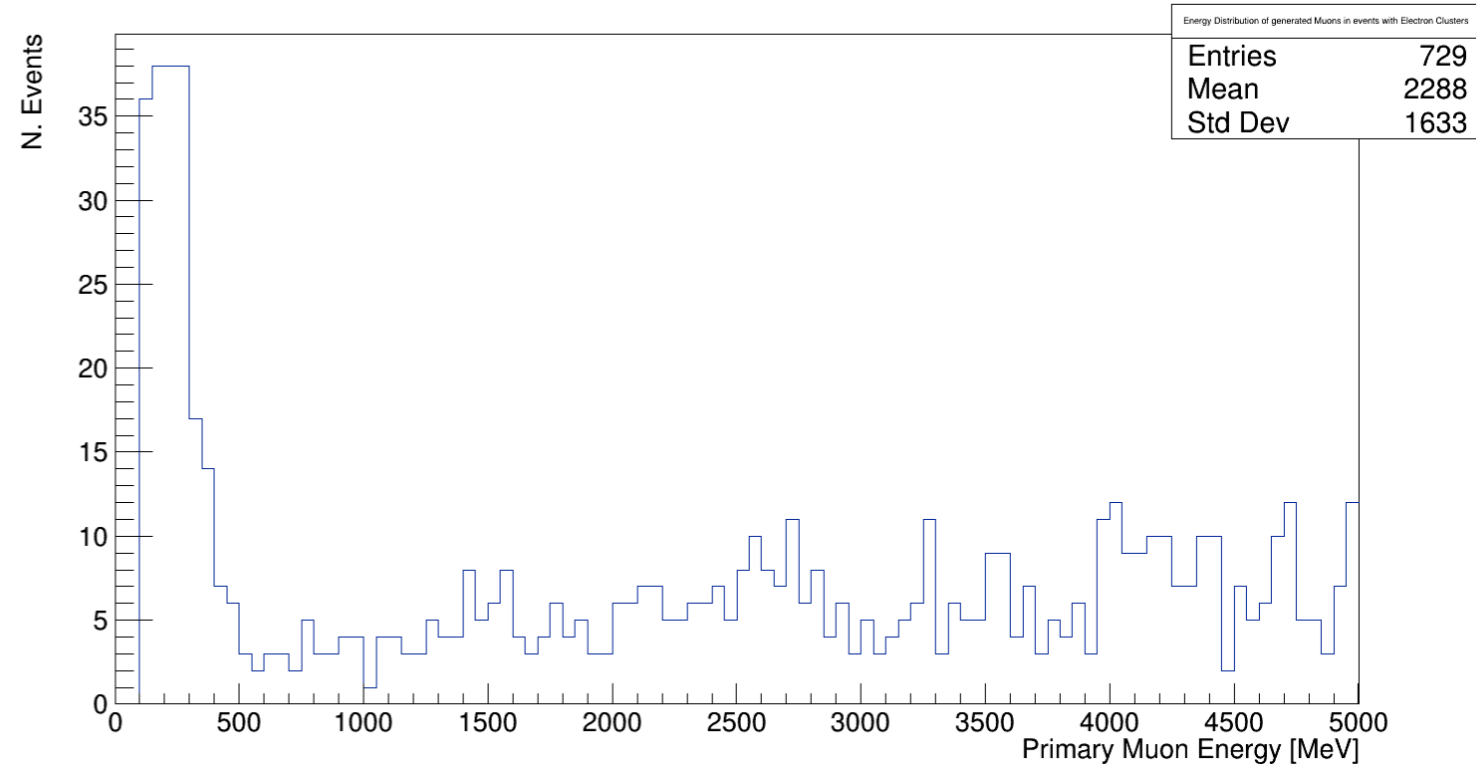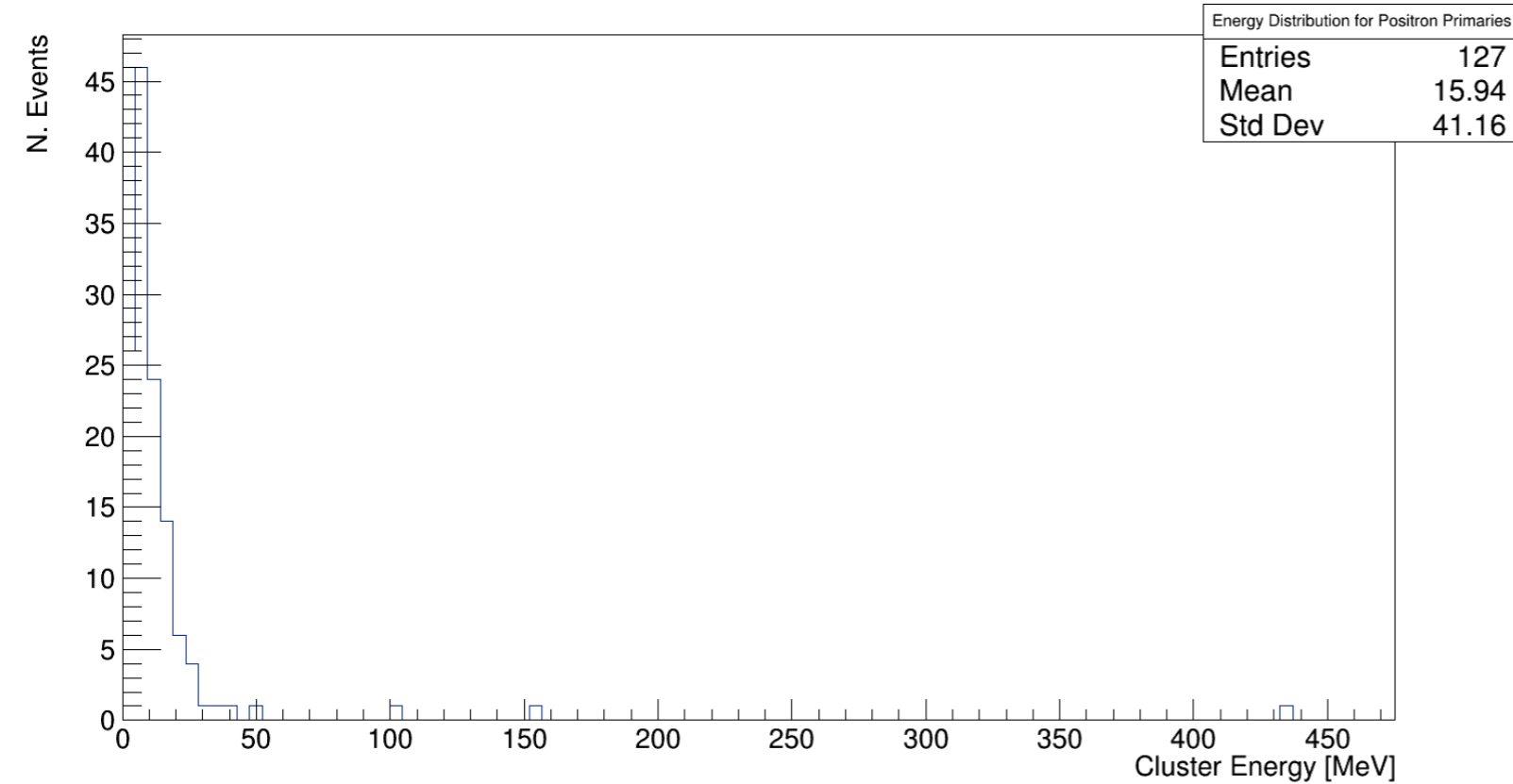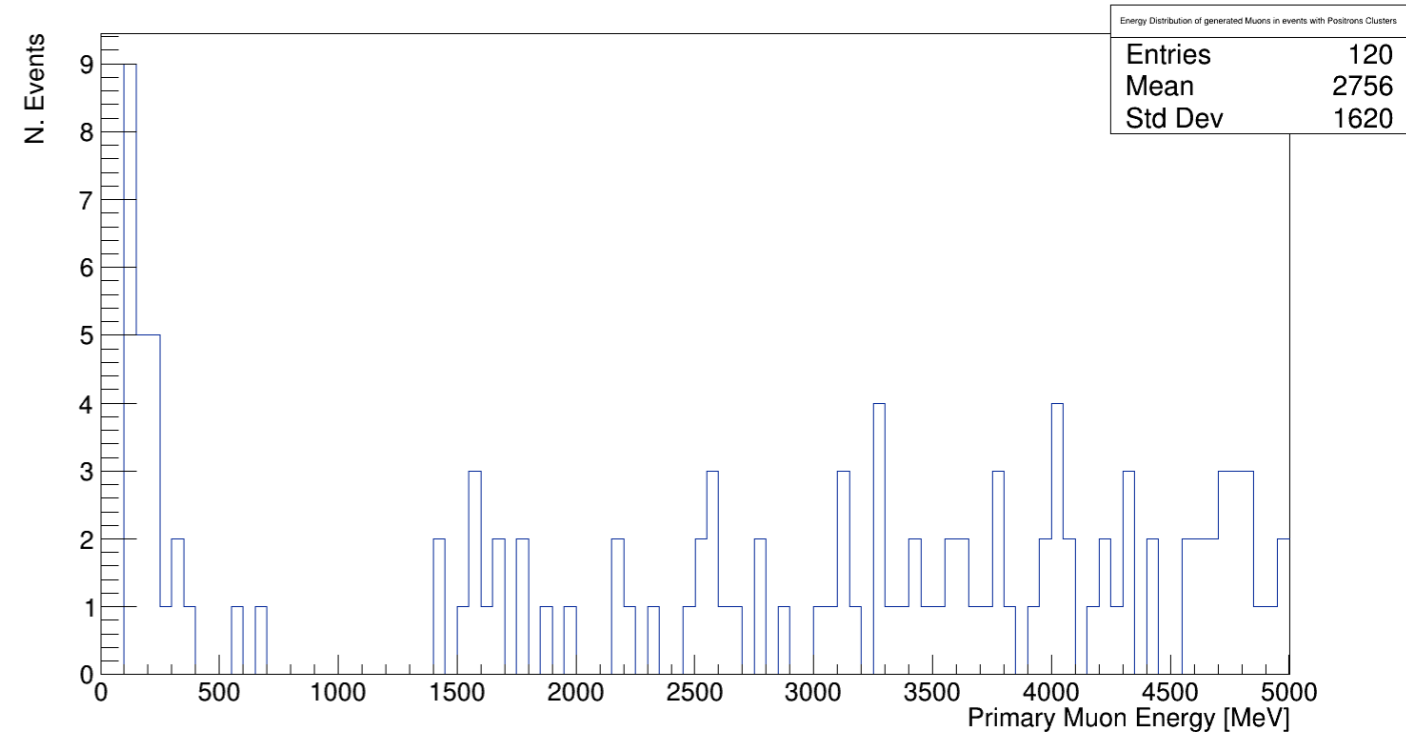
Primary Muon Energy Distribution for Positron

Next steps

- ‣ Look at the clustering algorithm to correct the "multiple muon" events.

- ‣ Analyze the cluster topology as a function of the primary particle associated to the cluster.

- ‣ Scan different energy muon ranges.

- ‣ Generate other particles (electrons (?), pions…).