Jet Energy Resolution Validation

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1 IHEP

Performance for Single μ-

- Single μ- events generated by ParticleGun.
  - At four data points: 1GeV, 5GeV, 20GeV, 100GeV(20000 events at each point).
  - Reconstructed by CEPCSW25.3.7.

- Radiation and Misidentification
  - In single μ- samples, we can find photons and electrons in truth particles(Probably originate from bremsstrahlung or decays).
  - The condition is more complex in misidentification. The muons are mainly identified as Kaons or additional muons.

Radiation

Row	Instance	PFO_E	MCP_E	PFO_PID98	MCP_Pdgid
3947	0	4.9383506	5.0011160	13	13
3947	1		0.2609523		11
3947	2		0.1759054		22
3947	3		0.1319380		11
3947	4		0.0439674		-11
5056	0	4.9765462	5.0011164	13	13
5056	1		0.2889061		11
5056	2		0.1380625		22
5056	3		0.1235175		22
5056	4		0.0137638		11
5056	5		0.1097537		-11
5056	6		0.0533321		11
5056	7		0.0847304		-11

misidentification

Row	Instance	PFO_E	MCP_E	PFO_PID98	MCP_Pdgid
6154	0	4.9915385	5.0011160	13	13
6154	1	0.1880006		130	
2683	0	0.0061209	5.0011162	130	13
2683	1		0.4084821		22
2683	2		0.4066747		11
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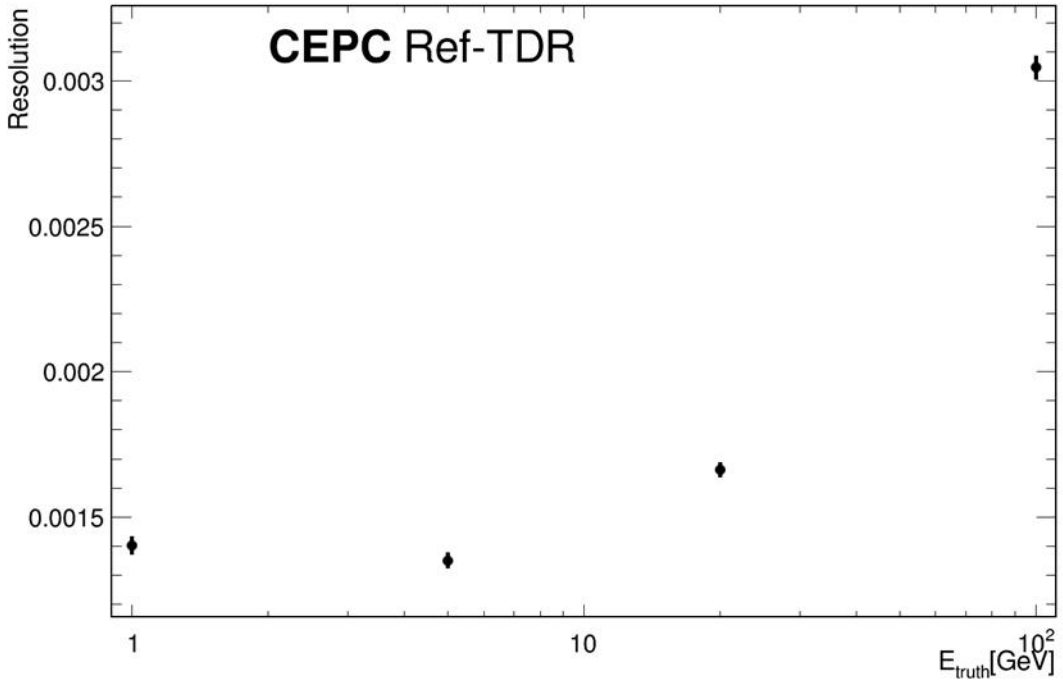
2683	3		0.2395342		22
2683	4		0.1500151		22
2683	5		0.0132165		11
2683	6		0.1367986		-11
2683	7		0.0060356		11
2683	8		0.2334985		-11
12055	0	4.5510788	5.0011162	13	13
12055	1	0.4688858	0.4463900	13	11
12055	2		0.2222753		22
12055	3		0.1421084		11
12055	4		0.0801668		-11

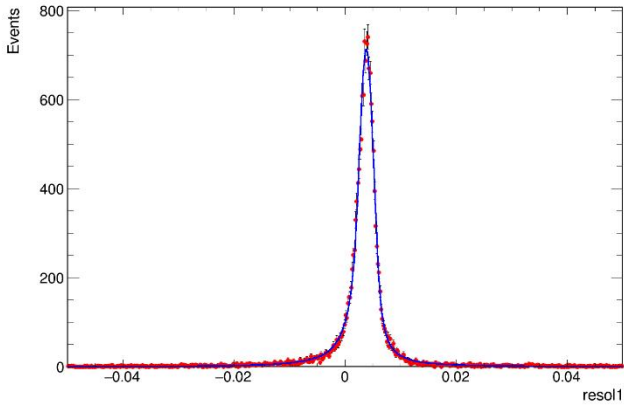
Performance for Single μ-

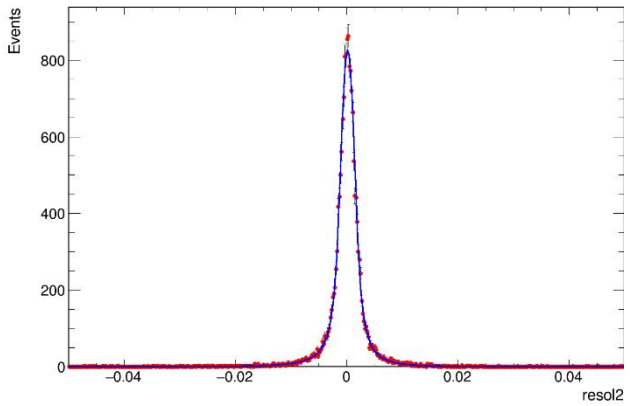
- Reconstruction Efficiency.
  - $\Delta R < 0.04$, $\Delta E/E < 0.03$, PFO with correct ID.

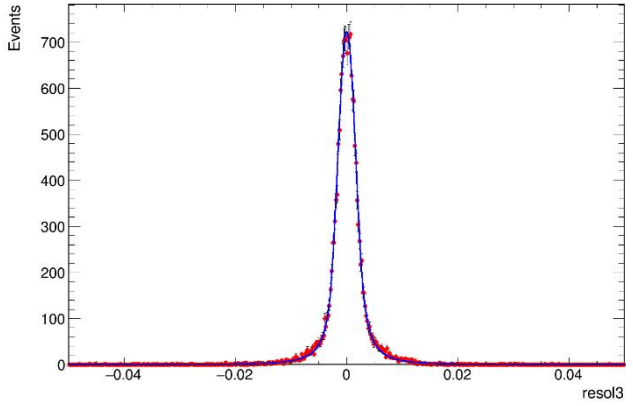
DataPoint	1GeV	5GeV	20GeV	100GeV
Efficiency	92.91%	97.14%	96.52%	95.46%

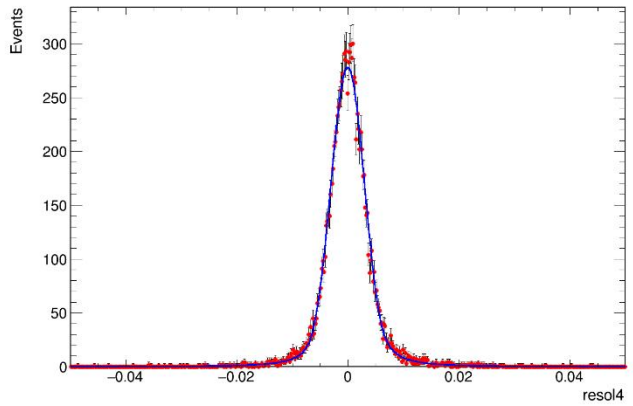
- Energy Resolution
  - ΔE= E(PFO) – E(Truth Particle).
  - Resolution = $\Delta E/E$ (Use TwoSidedCB to fit the $\Delta E/E$).
  - Show a good performance on μ reconstruction.
  - Resolution rises at high energy region.











We are generating single photon samples for further research.