Resolution Study for First Experiment $K^+\Lambda$ channel, low Q^2

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Outline

Trigger and Run Conditions

- Process studied

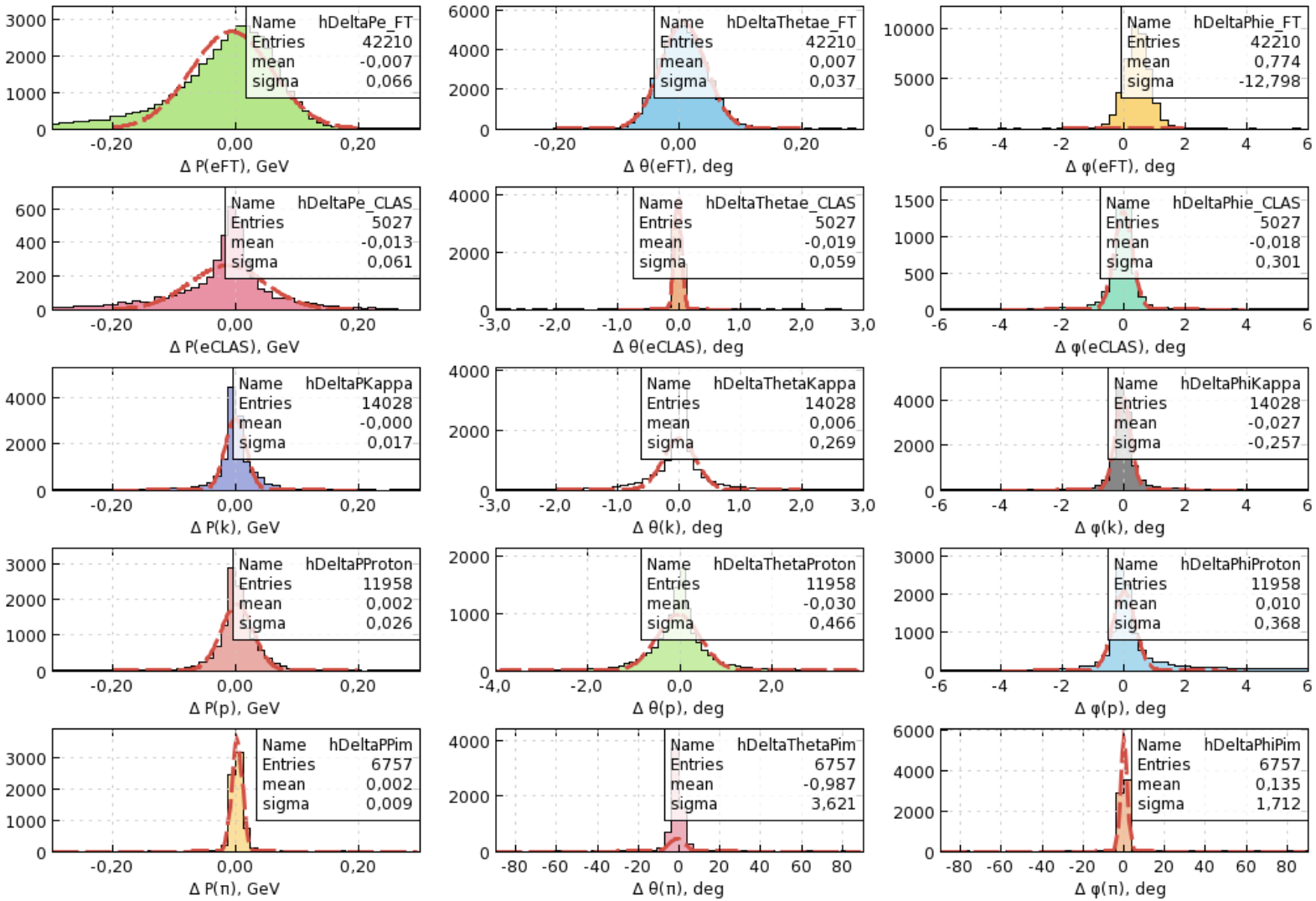
$$e^- p \rightarrow e^- K^+ \Lambda$$

- Trigger Selection:
  - 1 e^- anywhere (maximum acceptance but not realistic)
  - 1 e^- in FT (excessive high rate)
  - 1 e^- in CLAS (Outbending: $Q^2 > \sim 1$ GeV^2)
  - 1 e^- in CLAS or 1 e^- in FT + 1 fwd ($\theta_{had} < 20^\circ$) hadron (p or K^+)
  - 1 e^- in CLAS or 1 e^- in FT + 2 fwd hadrons (p and K^+)
  - 1 e^- in CLAS or 1 e^- in FT + 1 had (p/K^+/π^-) anywhere (fwd + ctl)
- Run Conditions:
  - E_{beam} = 10.6 GeV, Torus Current = 100 % (Outbending, -3375 A), Solenoid = 60 %.
  - E_{beam} = 10.6 GeV, Torus Current = -100 % (Inbending, 3375 A), Solenoid = 60 %.

Resolution

Trigger: 1 e^- anywhere, Fiducial Cuts applied

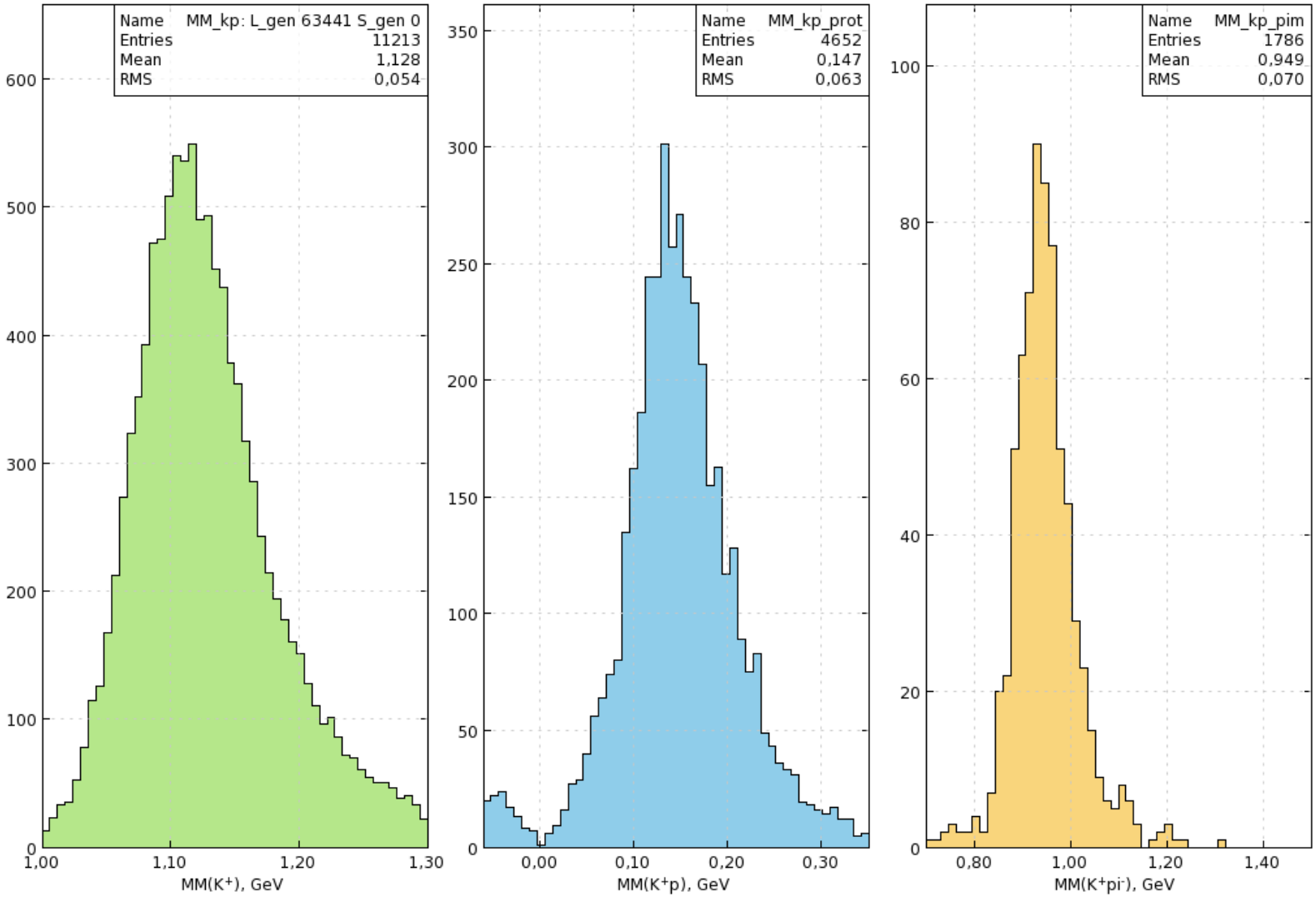
Inclusive electron acceptance: FT: 67 % CLAS: 8 %



MM Reconstruction

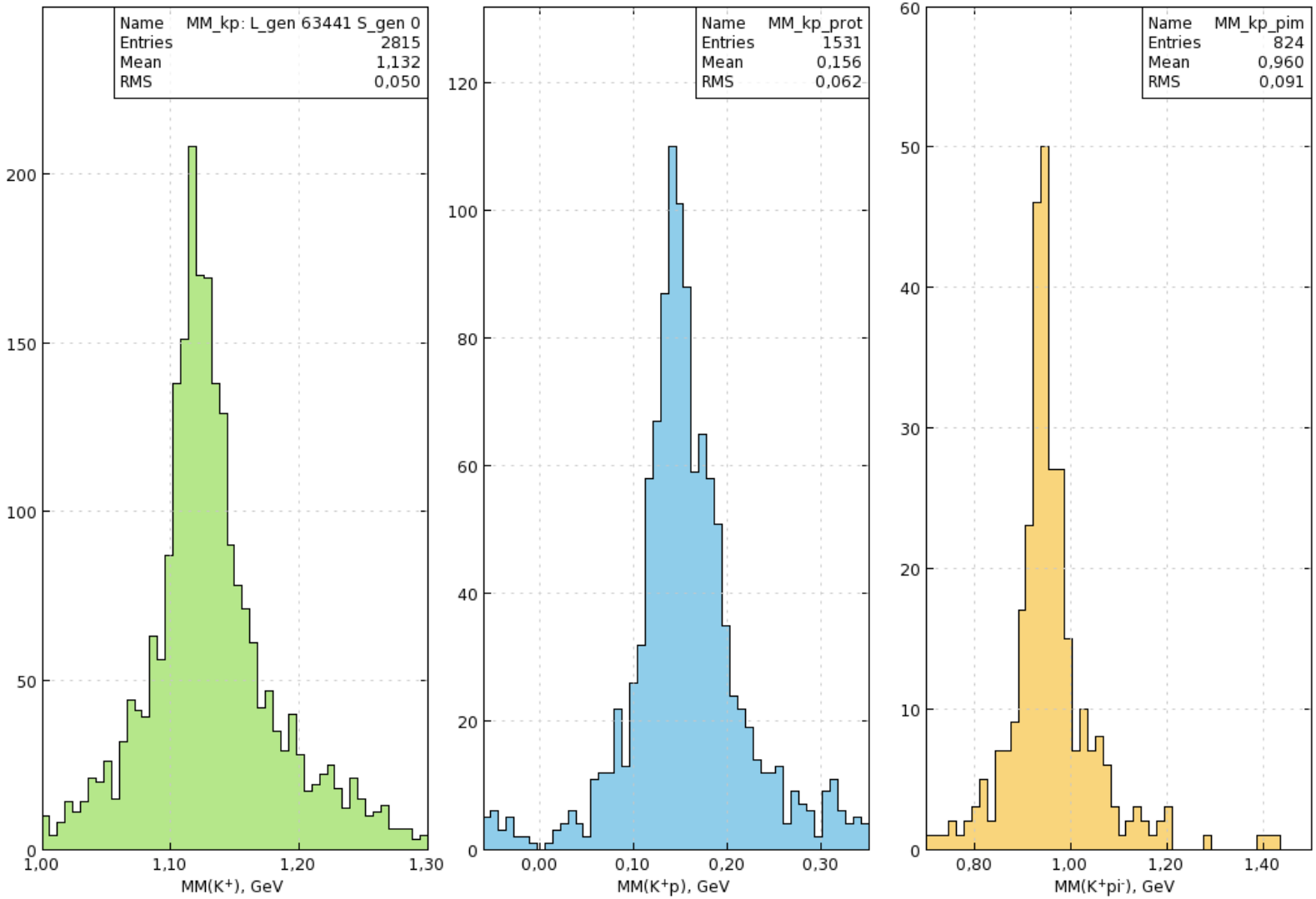
Trigger: 1 e^- in FT ($2.5° < \theta_{e^-} < 4.5°$)

Inclusive electron acceptance: 67 %



Trigger: 1 e^- in CLAS ($\theta_{e^-} > 6.0°$)

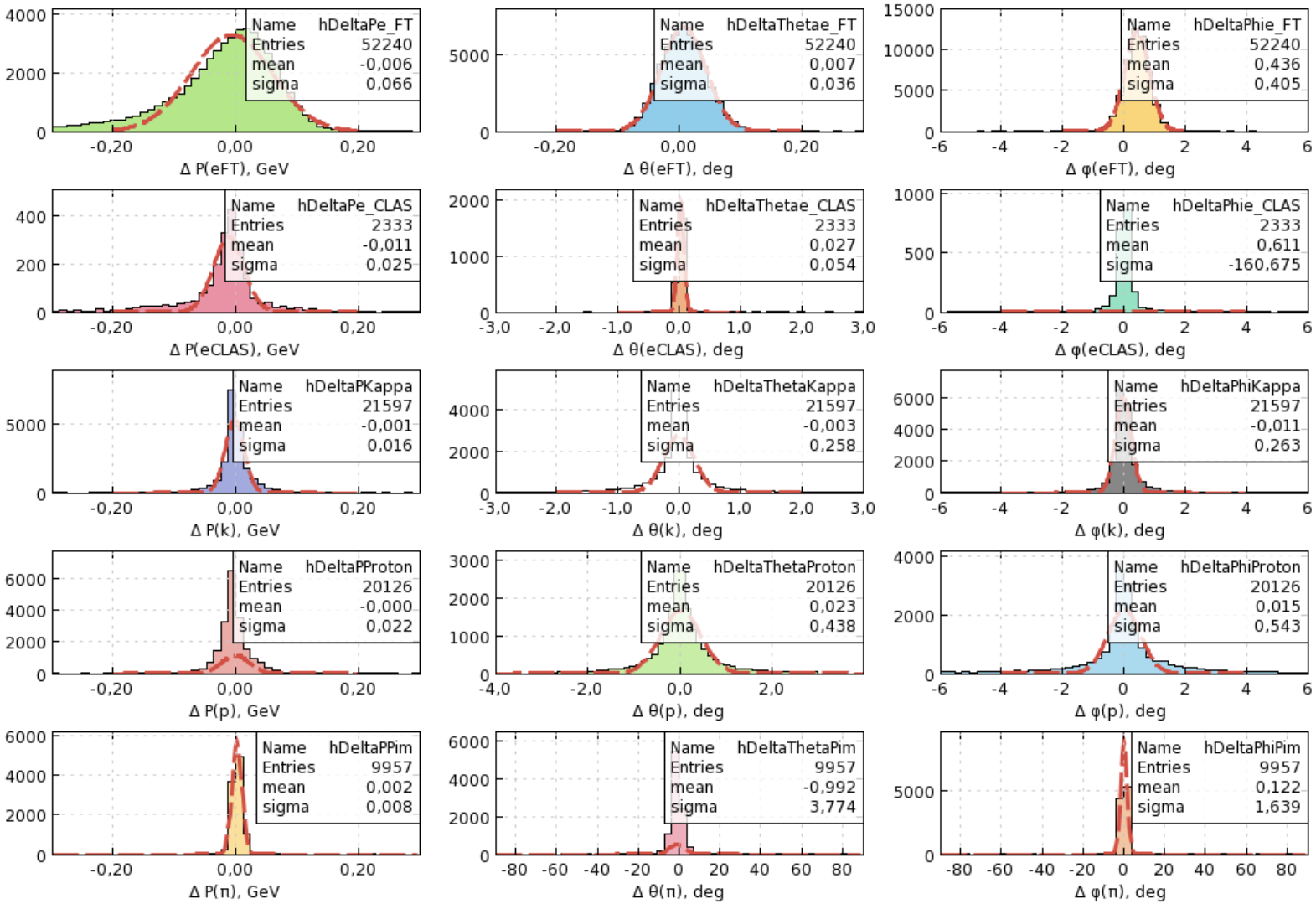
Inclusive electron acceptance: 8 %



Resolution

Trigger: 1 e^- anywhere, Fiducial Cuts applied

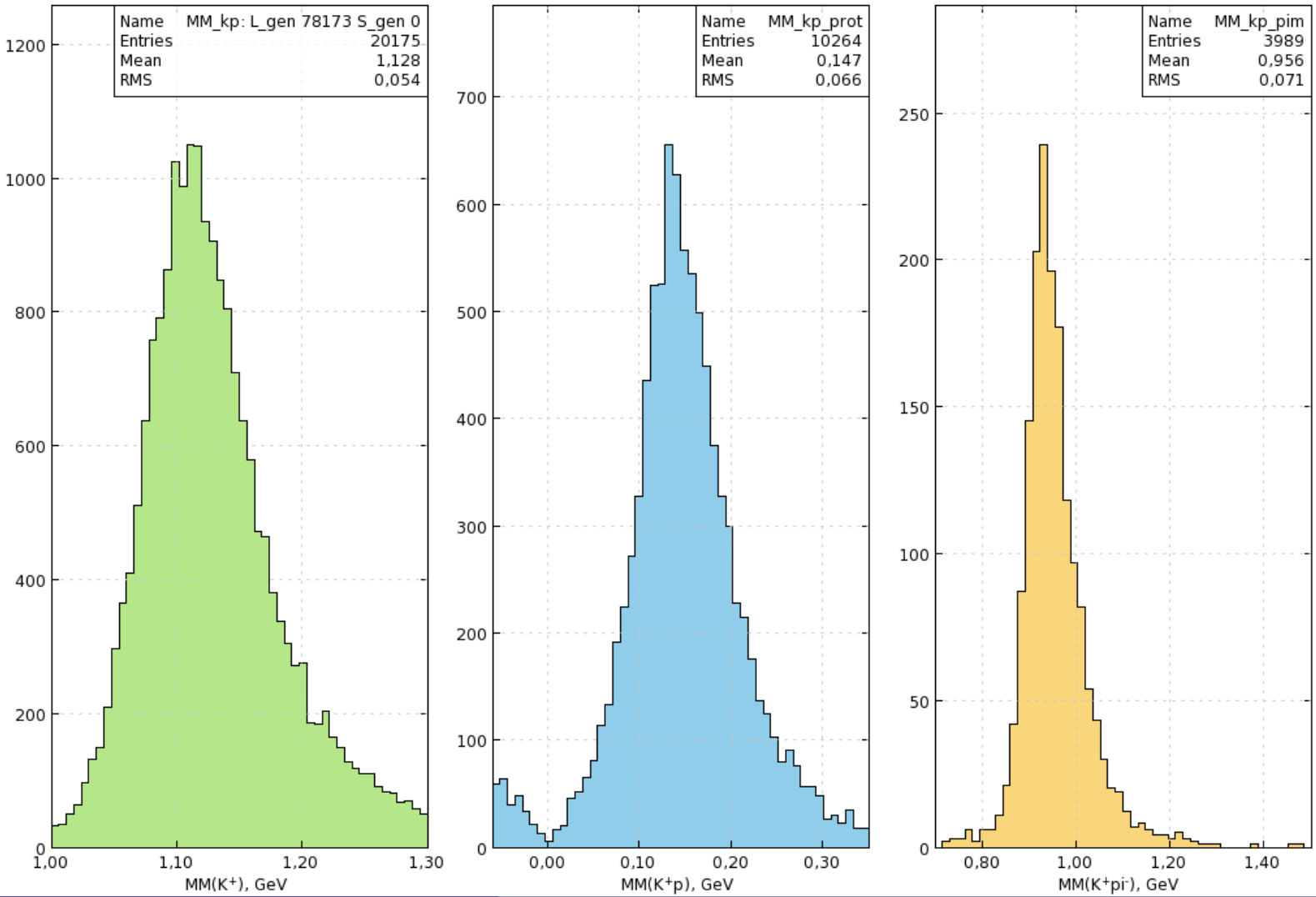
Inclusive electron acceptance: FT: 67 % CLAS: 3%



MM Reconstruction

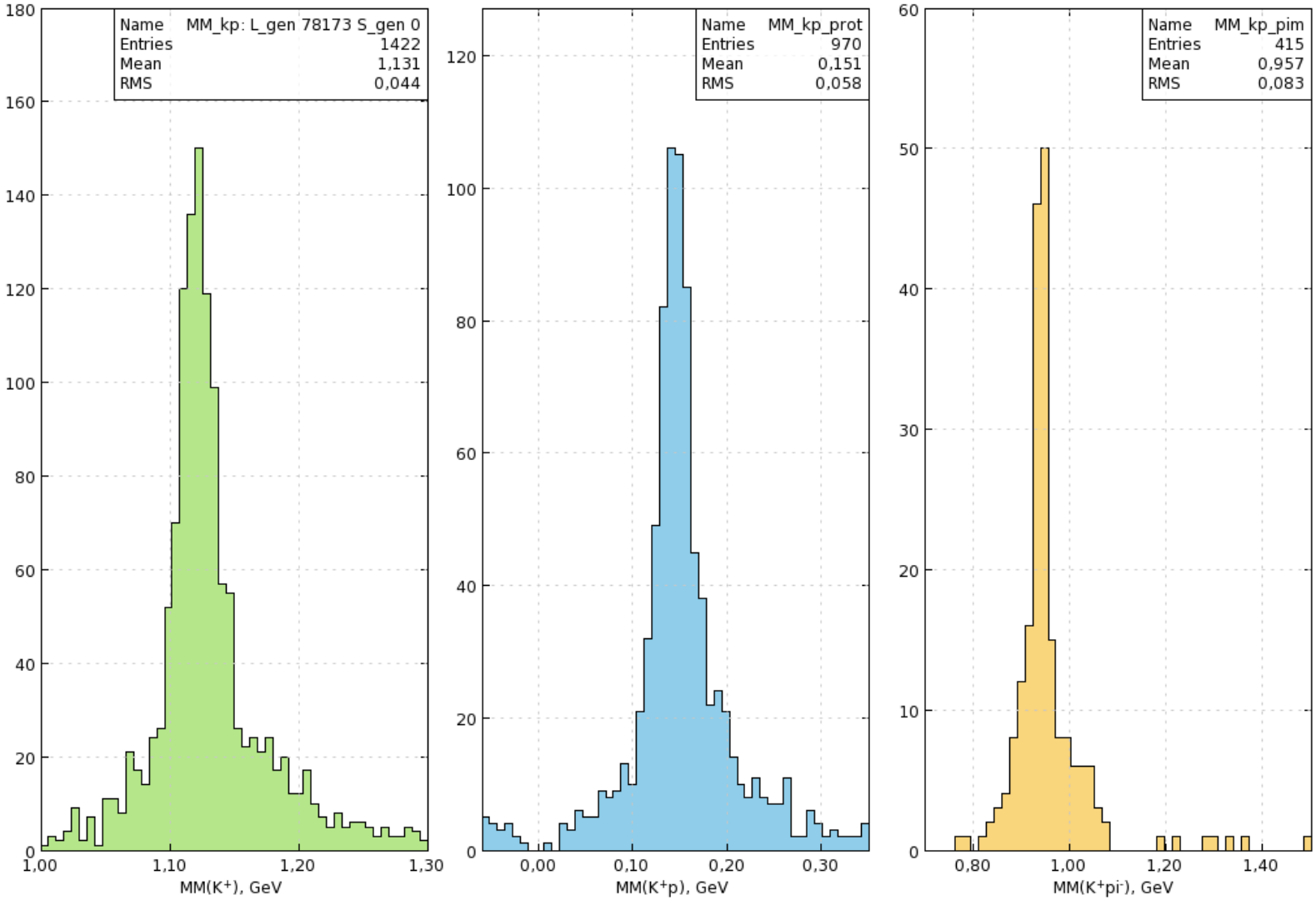
Trigger: 1 e^- in FT ($2.5° < \theta_{e^-} < 4.5°$)

Inclusive electron acceptance: 67% (**Outbending: 67%**)



Trigger: 1 e^- in CLAS ($\theta_{e^-} > 6.0°$)

Inclusive electron acceptance: 3% (**Outbending: 8%**)



Acceptance Table

Trigger	Negative Outbending	Negative Inbending
1 e^- FT	67%	67%
1 e^- CLAS	8%	3%
1 e^- anywhere	75%	70%
1 e^- FT + 1 fwd had	4%	12%
1 e^- FT + 1 ctl had	25%	36%
1 e^- FT + 2 had	0	0
1 e^- CLAS /1 e^- FT + 1 forward had	12%	15%
1 e^- CLAS /1 e^- FT + 1 had (ctl or fwd)	35%	43%

Where:

1 fwd had= 1 forward hadron (p or K^+)

1 ctl had= 1 central hadron (p or K^+)

Acceptance for 1 e^- CLAS /1 e^- FT + 1 had anywhere, Negative Outbending

Acceptance for 1 e^- CLAS /1 e^- FT + 1 had:

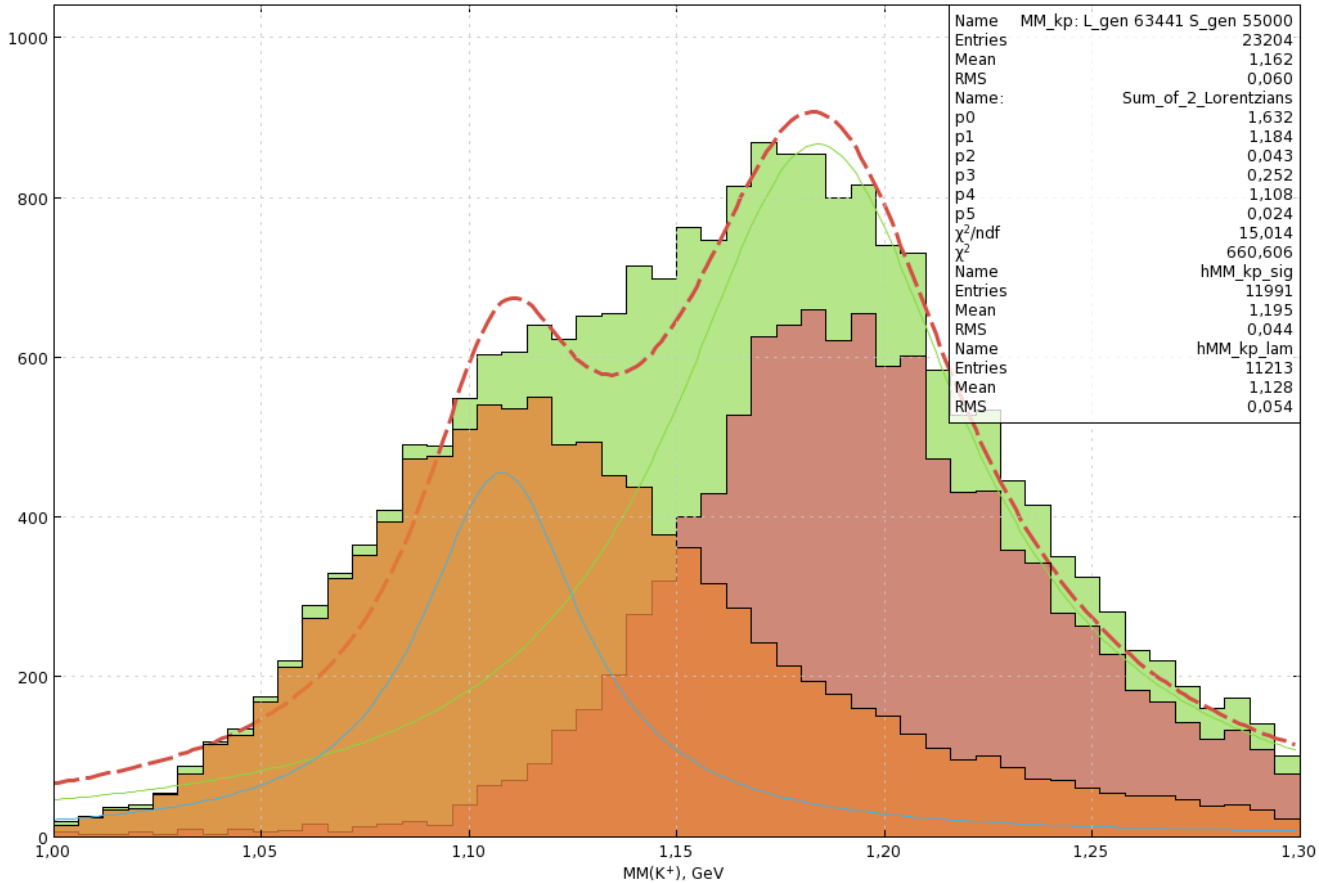
Trigger	pK^+	pπ^-	π^-K^+	pπ^-K^+	1 had
1 e^- CLAS/1 e^- FT + 1 fwd had	4%	2%	2%	1%	12%
1 e^- CLAS/1 e^- FT + 1 ctl had	10%	4%	5%	2%	33%
1 e^- CLAS/1 e^- FT + 1 had (ctl or fwd)	10%	4%	5%	2%	35%

Where:
1 fwd had= 1 forward hadron (p / K^+ / π^-)
1 ctl had= 1 central hadron (p / K^+ / π^-)

Distinguish Σ from Λ: Negative Outbending

Trigger: 1 e^- FT

Λ^0_{mass}: 1115,683 ± 0.006 MeV Σ^0_{mass}: 1192.642 ± 0.024 MeV



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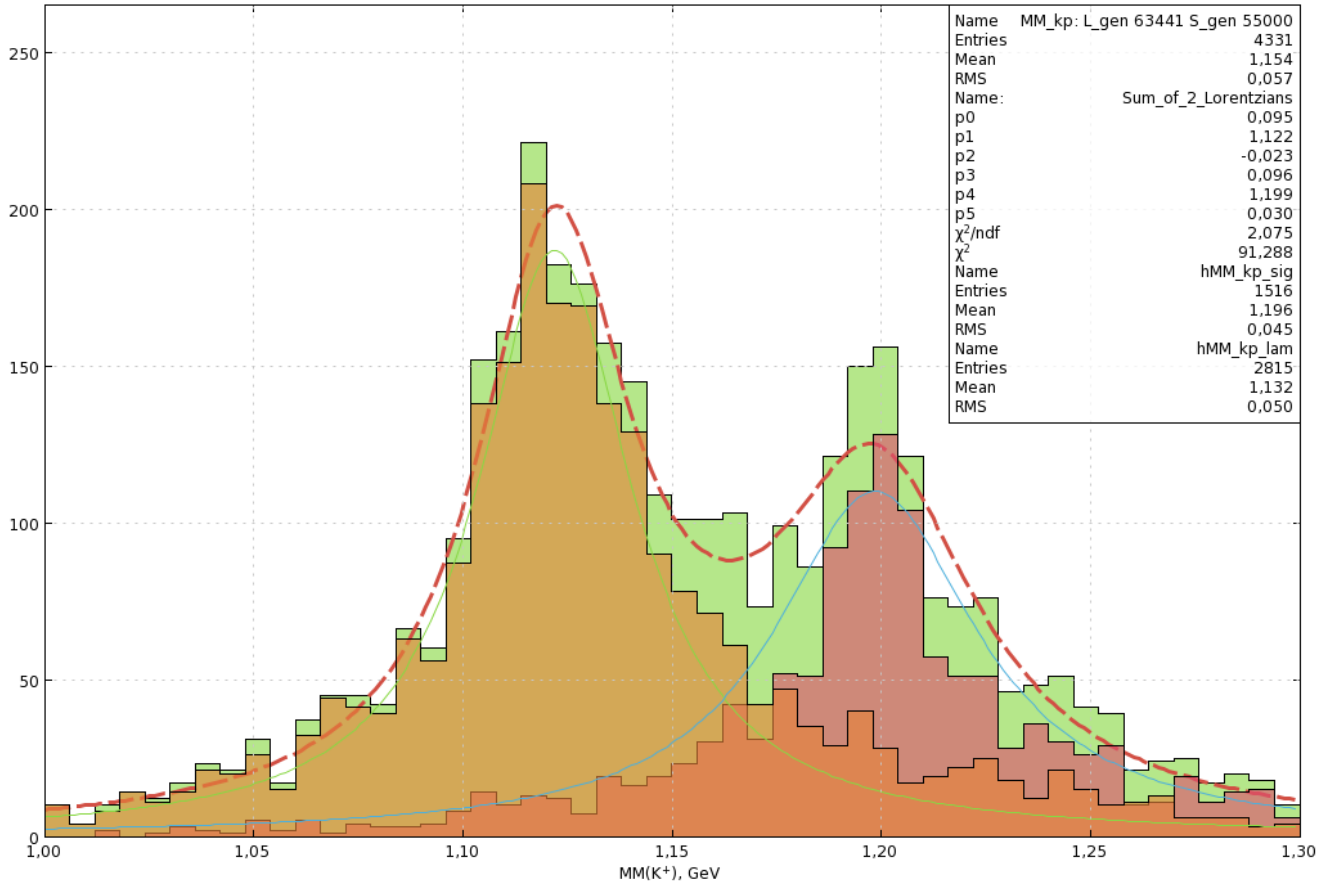

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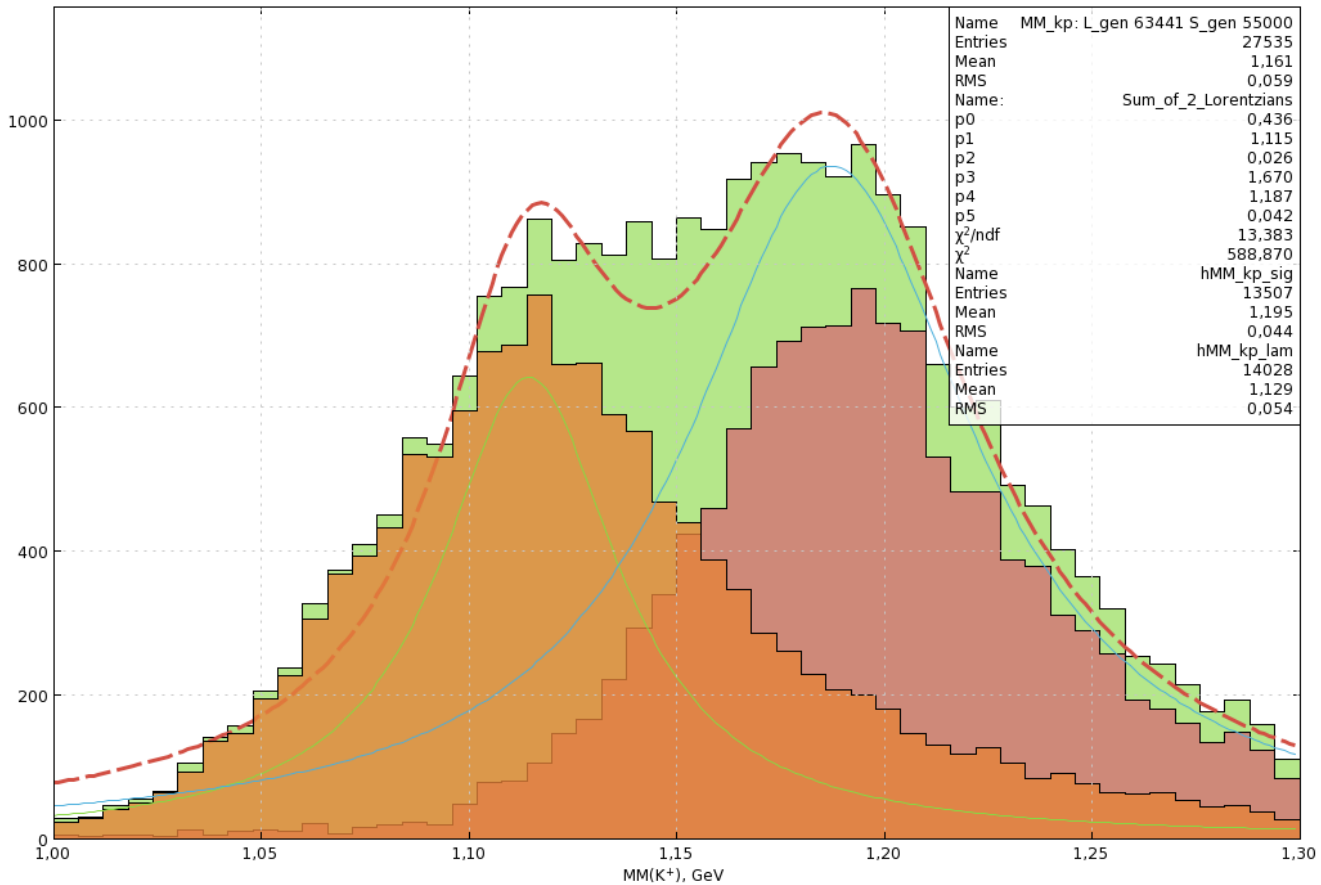

Trigger:
1 e^- in CLAS ($\theta_{e-} > 6.0^\circ$) OR 1 e^- in FT ($2.5^\circ < \theta_{e-} < 4.5^\circ$) + 1 fwd hadron (p or K^+)

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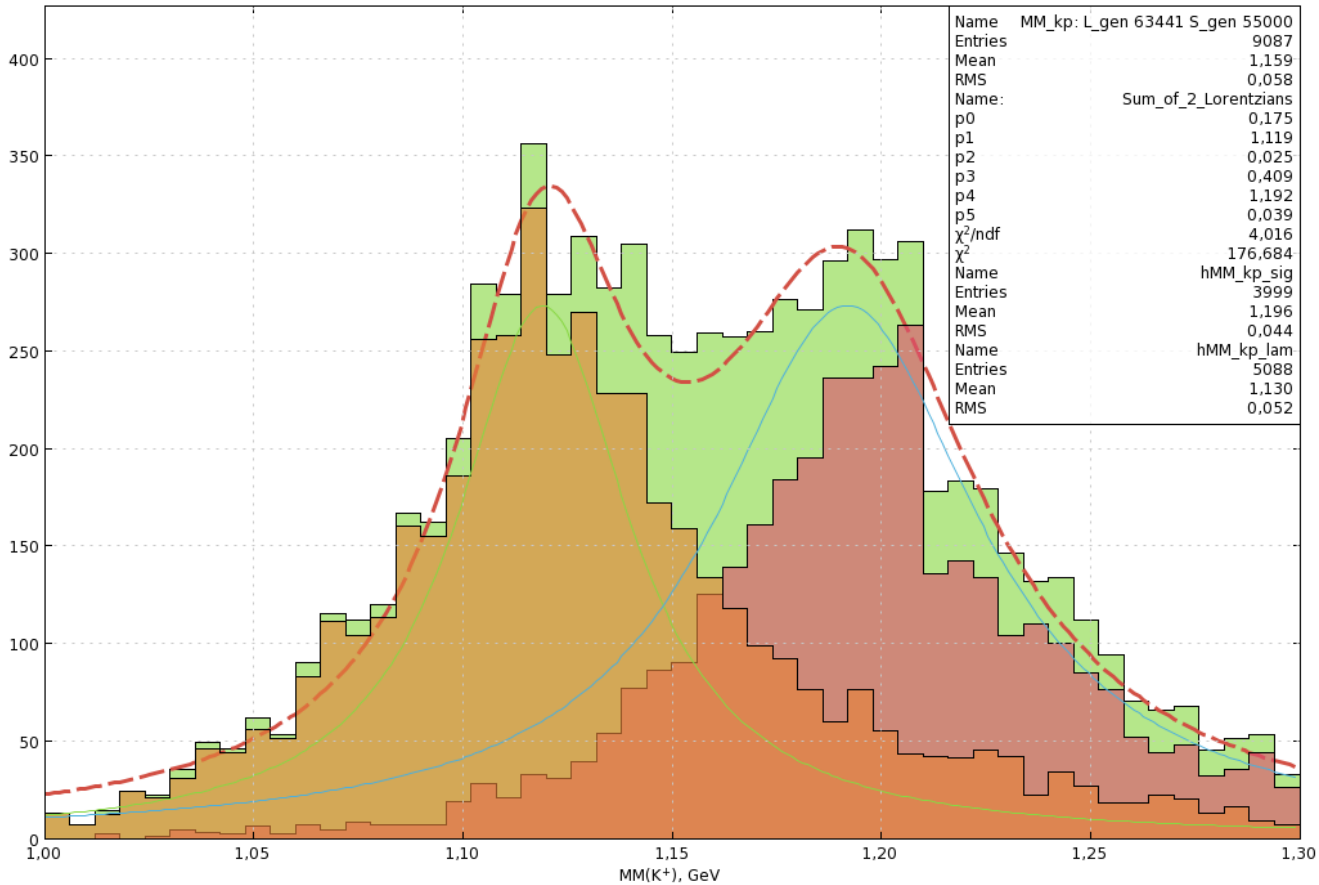
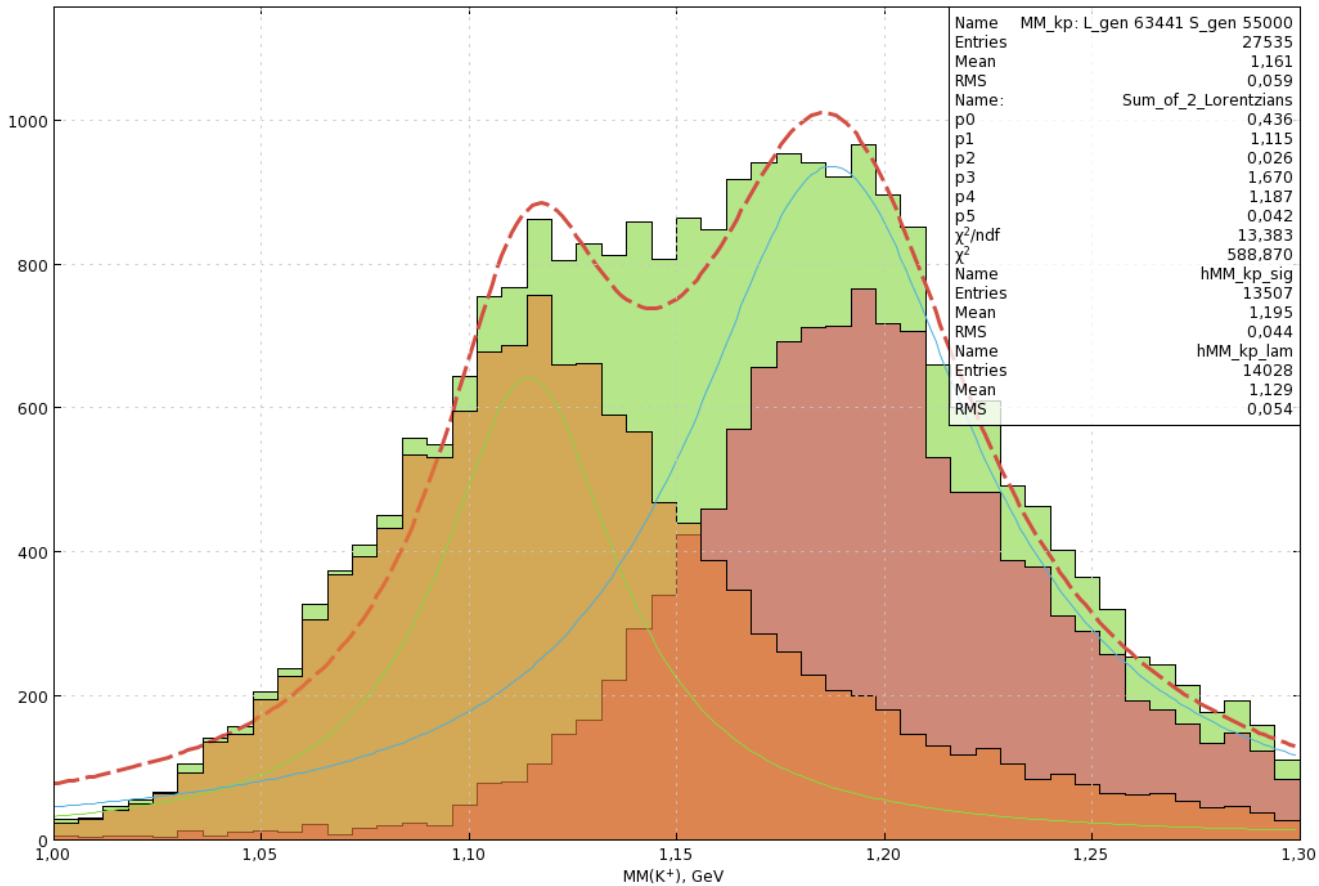


Fitting function: sum of 2 Lorentzians

$$f(x) = \frac{p_0}{(x-p_1)^2 + p_2^2} + \frac{p_3}{(x-p_4)^2 + p_5^2}$$

Trigger:
1 e^- in CLAS ($\theta_{e-} > 6.0^\circ$) OR 1 e^- in FT ($2.5^\circ < \theta_{e-} < 4.5^\circ$) + 1 hadron (p or K^+ or π^-)

Λ^0_{mass}: 1115,683 ± 0.006 MeV Σ^0_{mass}: 1192.642 ± 0.024 MeV



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