On ToF-400 K^+ and $\pi+$ analysis in Ar run

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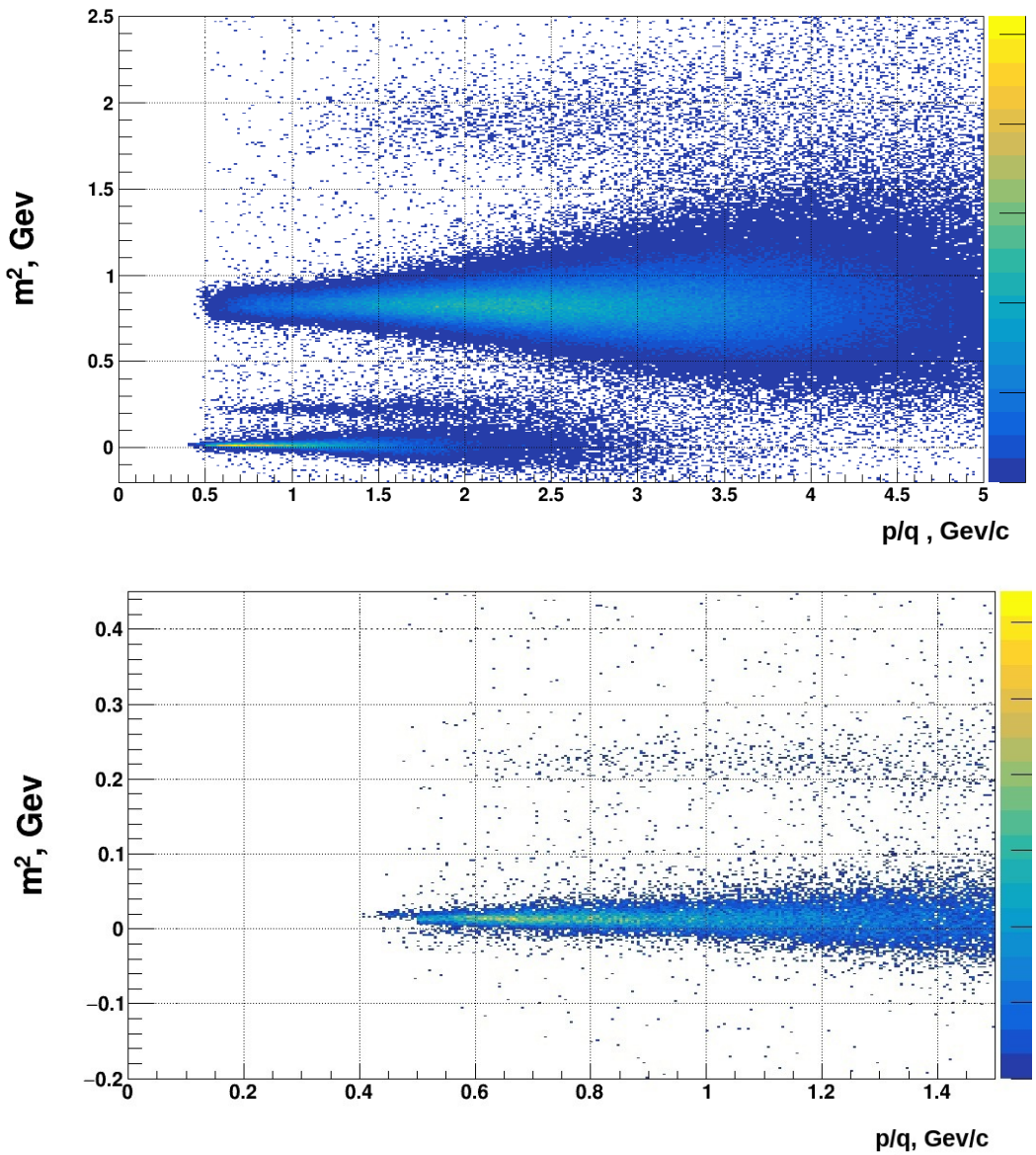
Issues

1. **Estimation of trigger efficiency** for different trigger conditions: (BD>1, BD>2, BD>3, FD>2, FD>3) on ToF-400 in Ar run.
   BD - barrel detector, FD - silicon detector, 1-3 - number of counts.

2. **Identification of K^+ and $\pi+$**
   on ToF-400 in Ar run at momentum: (0.5 < p < 2.3 Gev/c)

2-dimensional Mass square histograms



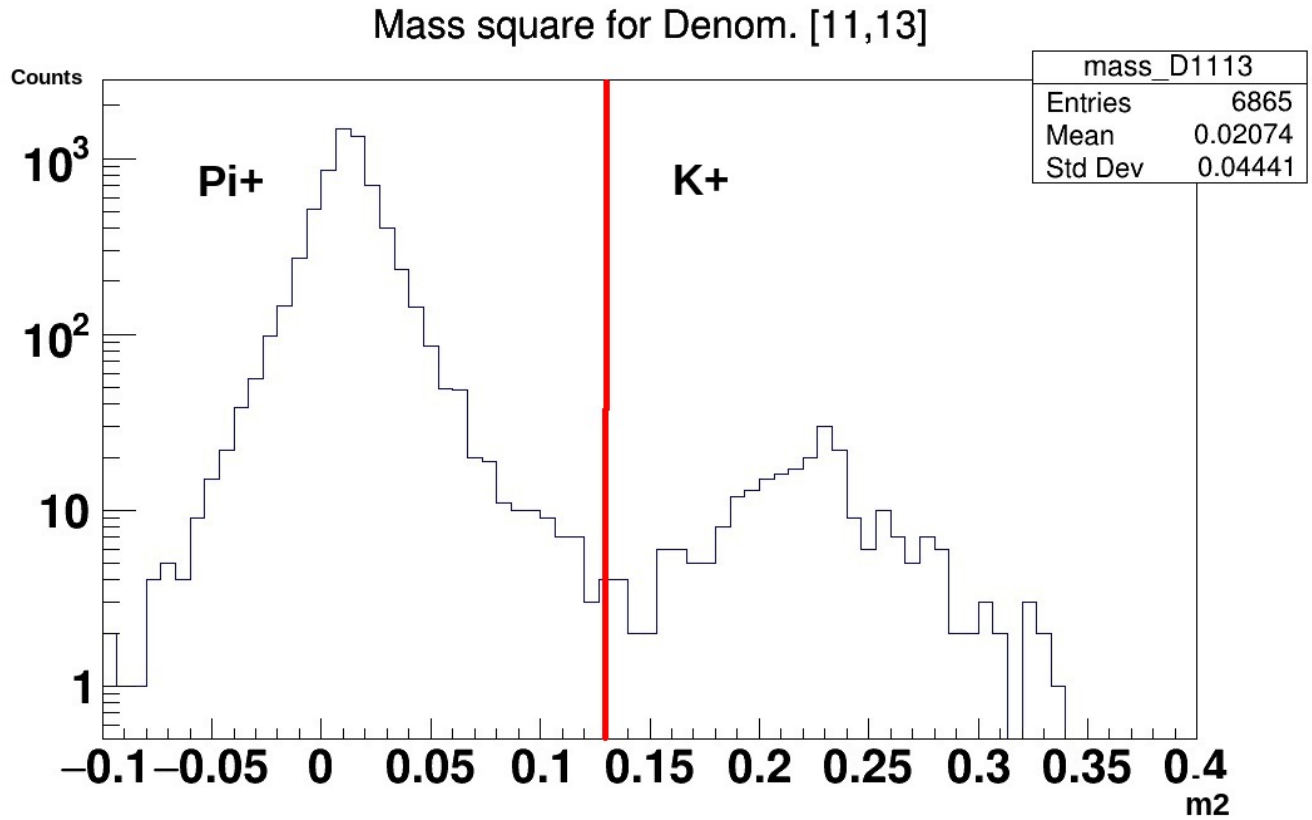
- Momentum for trigger efficiency
  0.5 < p <1.5 GeV/c
- Momentum for particle identification
  0.5 < p <2.3 GeV/c

How to estimate trigger efficiency?

1. To create 1-dimensional mass square histogram according to the number of tracks participated in primary vertex in 2 ways :
   -**Numerator**- with trigger condition.
   -**Denominator**-without trigger condition which efficiency is estimated.

2. To define conditions for particle identification.
3. To find the ratio **Numerator/Denominator**.
4. To estimate binomial error.

Mass square histogram FD>3 for [11,13]

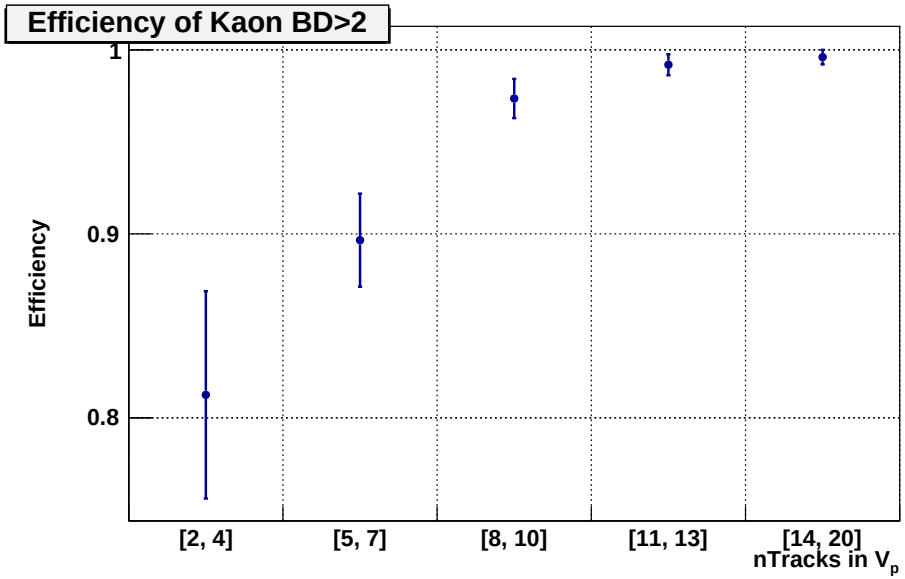


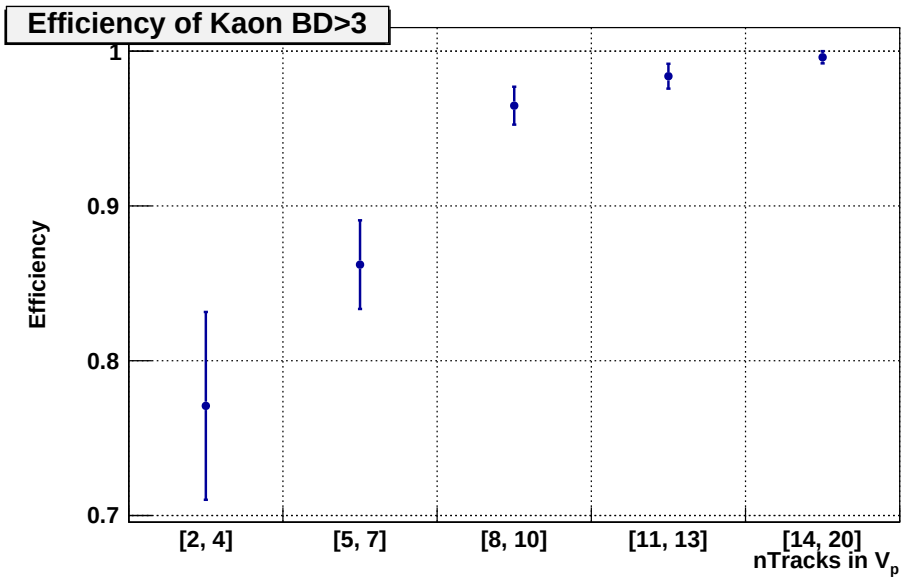
if $(m^2 >$ -0.1) and $(m^2 < 0.13)$ - $\pi+$

if $(m^2 > 0.13)$ and $(m^2 < 0.34)$ - K^+

- The Centrality bins is taken according to number of tracks participated in Vp.

Trigger efficiency for Kaon BD>2, BD>3

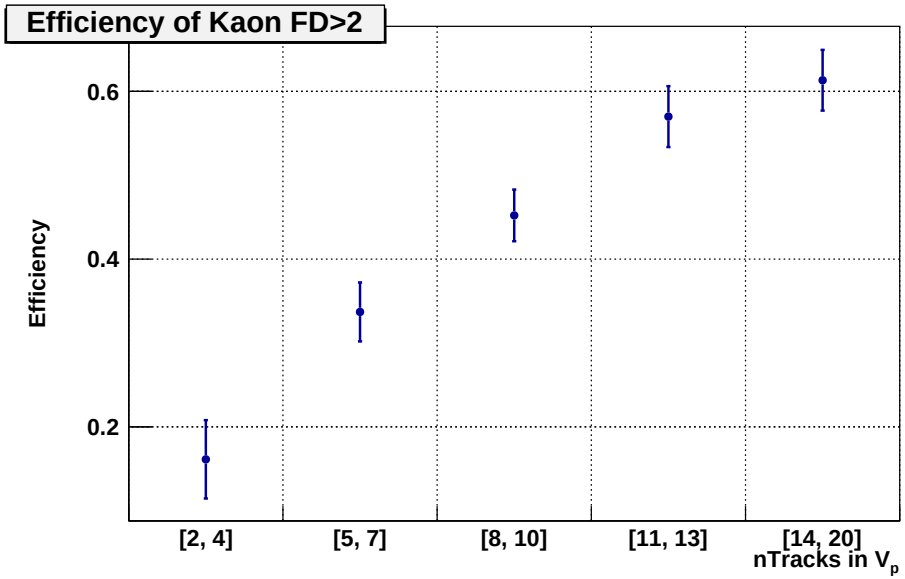


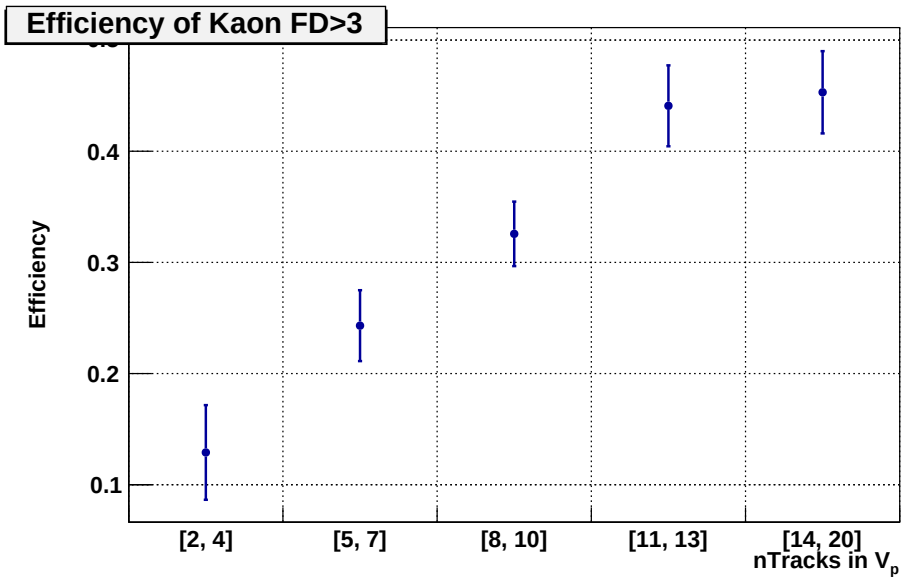


- BD>2
  [2,4]-81±5%
  [5,7]-90±3%
  [8,10]-97±1%
  [11,13]-99,2±0.6%
  [14,20]-99,6±0.4%

- BD>3
  [2,4]-77±6%
  [5,7]-86± 2%
  [8,10]-98±0.8%
  [11,13]-96±1 %
  [14,20]-99.6± 0.3%

Trigger efficiency for Kaon FD>2, FD>3

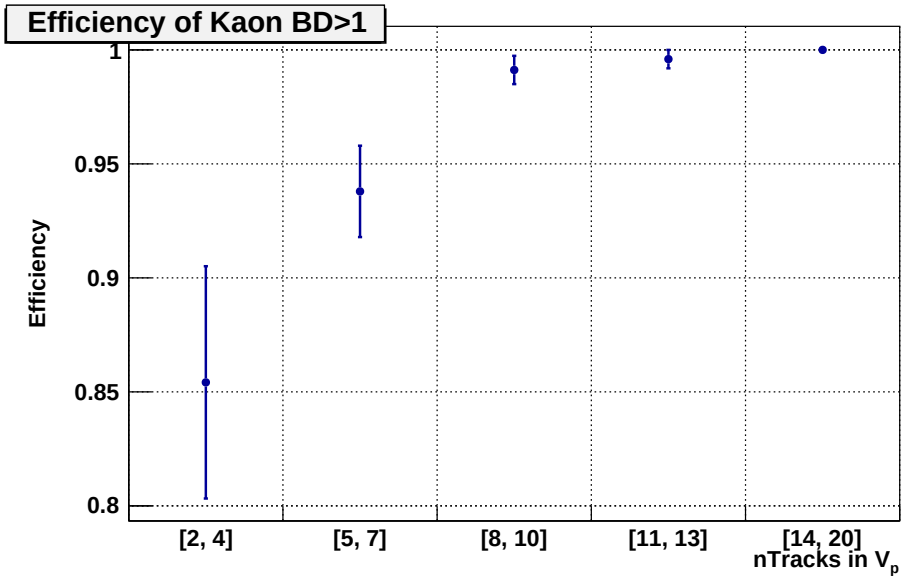




- FD>2
  [2,4]-16±5%
  [5,7]-34±4%
  [8,10]-45±3%
  [11,13]-57±4%
  [14,20]-61±4%

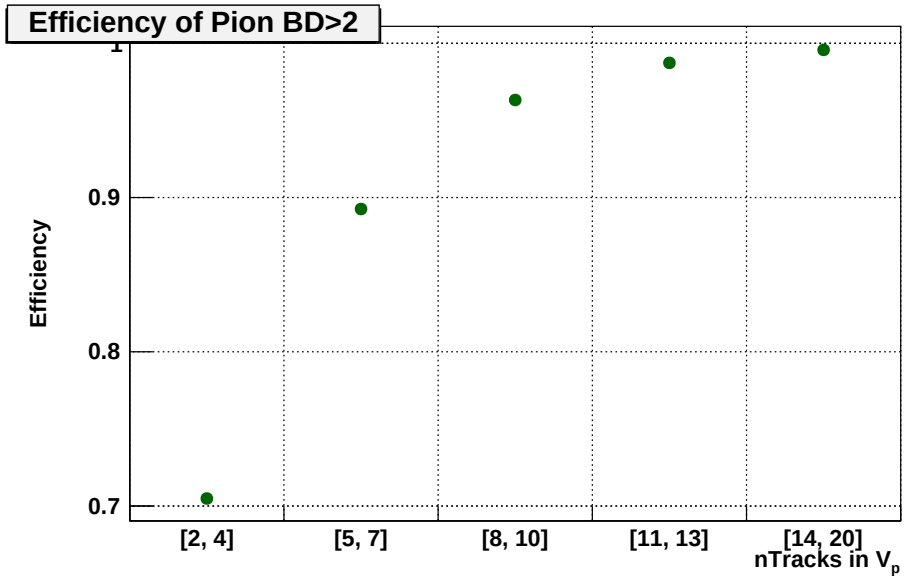
- FD>3
  [2,4]-13±4%
  [5,7]-24±3%
  [8,10]-33±3%
  [11,13]-44±4%
  [14,20]-45±4%

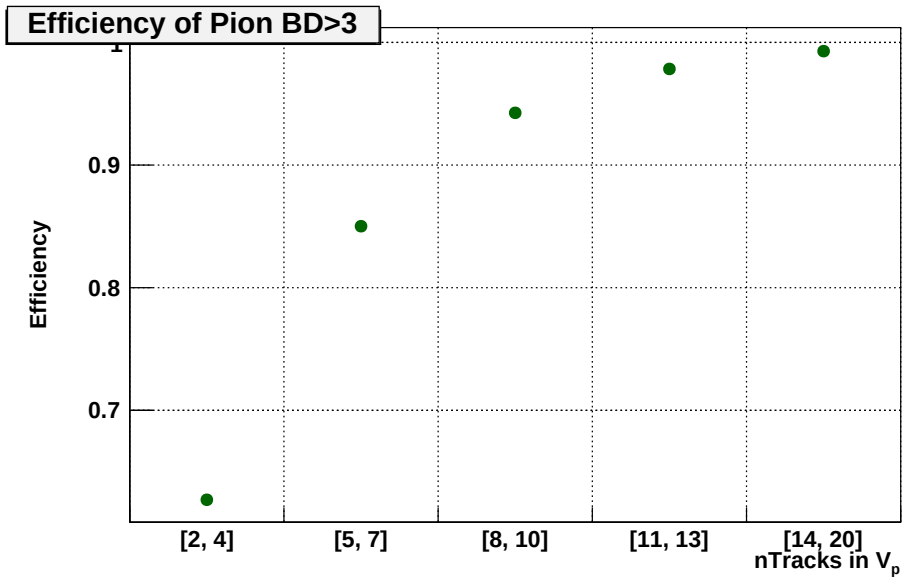
Trigger efficiency for Kaon BD>1



- BD>1
  [2,4]-85±5%
  [5,7]-94±2%
  [8,10]-99.1±0.6%
  [11,13]-99.6±0.4%
  [14,20]-100%

Trigger efficiency for Pion BD>2, BD>3

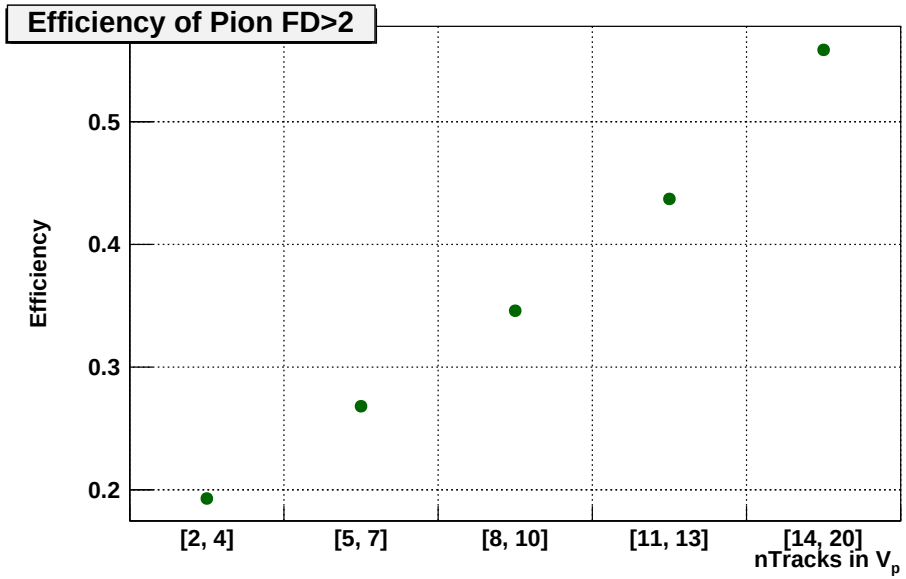


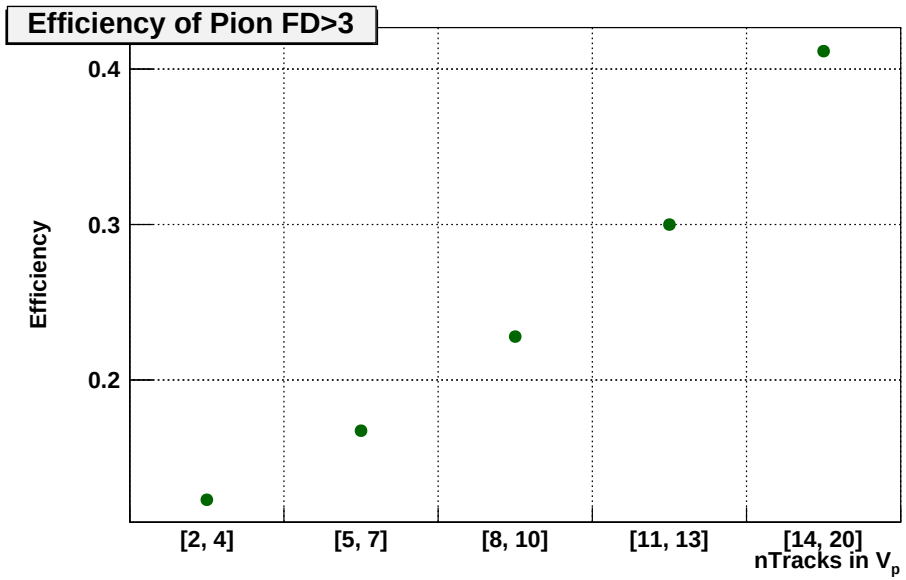


- BD>2
  [2,4]-70±1%
  [5,7]-89.2±0.4 %
  [8,10]-96.3±0.2%
  [11,13]-98.7±0.1%
  [14,20]-99.57±0.07%

- BD>3
  [2,4]-62±1%
  [5,7]-85.1±0.5 %
  [8,10]-94.2±0.2%
  [11,13]-97.8±0.1%
  [14,20]-99.3±0.1%

Trigger efficiency for Pion FD>2, FD>3

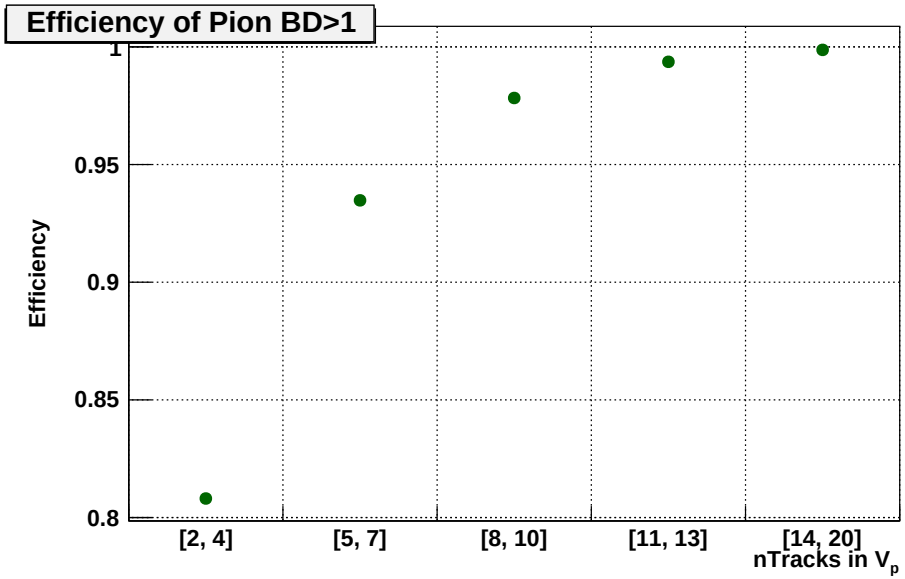




- FD>2
  [2,4]-19.3±0.6%
  [5,7]-26.8±0.4 %
  [8,10]-34.6±0.5%
  [11,13]-43.7±0.6%
  [14,20]-55.8±0.6%

- FD>3
  [2,4]-12.3±0.5%
  [5,7]-16.7±0.4 %
  [8,10]-22.7±0.4%
  [11,13]-29.9±0.5%
  [14,20]-41.1±0.6%

Trigger efficiency for Pion BD>1

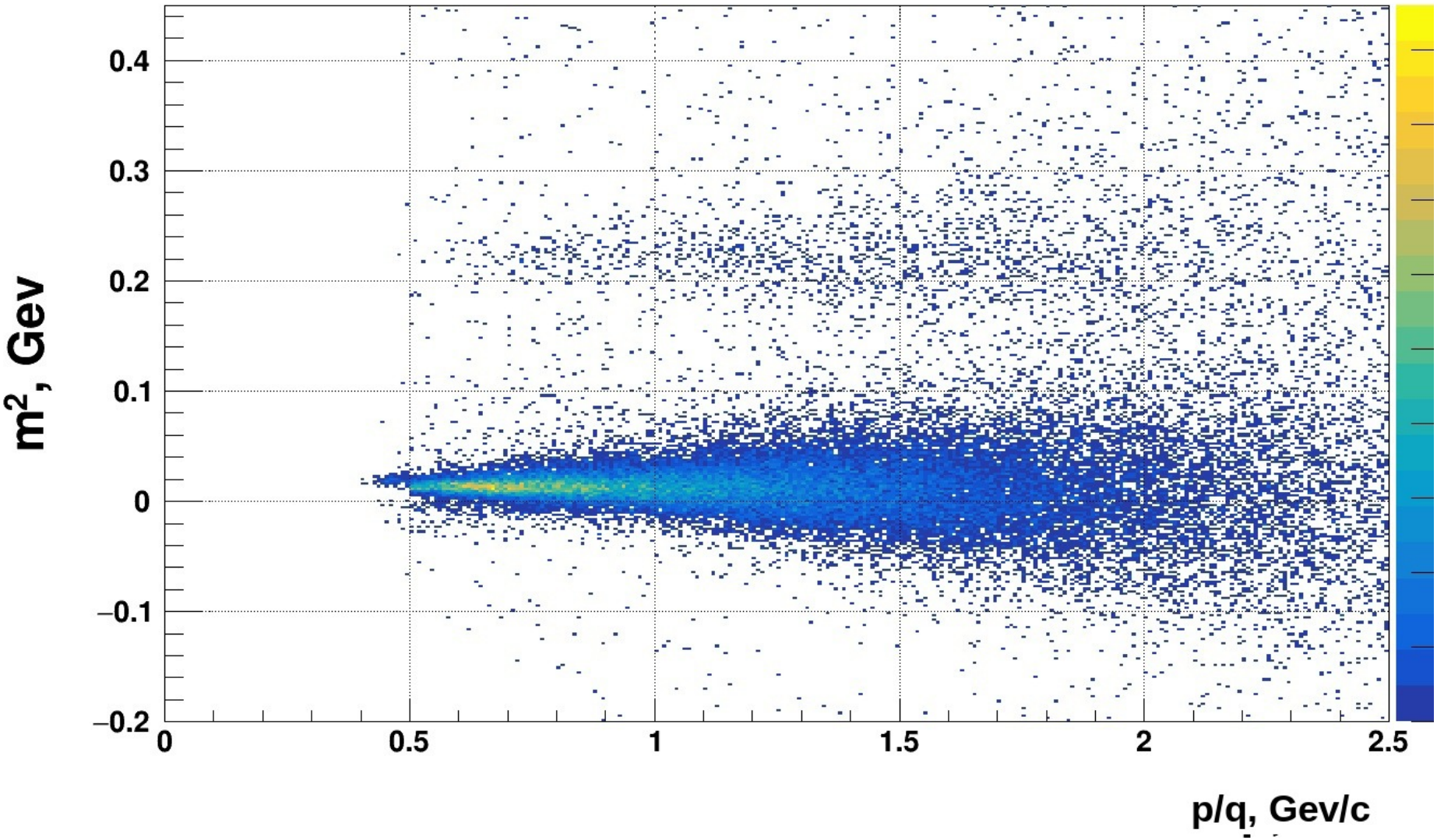


- BD>1
  [2,4]-80±0.8%
  [5,7]-93±0.3%
  [8,10]-98±0.2%
  [11,13]-99.3±0.1%
  [14,20]-99.8±0.04%

Efficiency table ($0.5 < p < 1.5$)

		FD>2	FD>3	BD>3	BD>2	BD>1
K+	[2,4]	24%	13%	77%	81%	85%
	[5,7]	35%	25%	86%	90%	94%
	[8,10]	44%	31%	98%	97%	99.1%
	[11,13]	58%	44%	96%	99.2%	99.6%
	[14,20]	76%	47%	99.6%	100%	100%
Pi+	[2,4]	19%	12%	62%	70%	81%
	[5,7]	27%	17%	85%	89%	93%
	[8,10]	35%	23%	94%	96%	98%
	[11,13]	44%	30%	98%	98%	99.4%
	[14,20]	56%	41%	99%	99%	99.7%

2-dimensional Mass square histogram



Slices Y for various momentum

Signals are fitted with Gaussian distribution

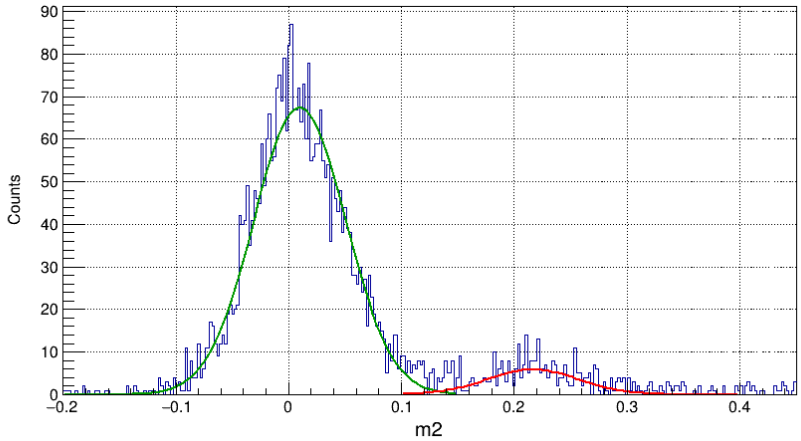


Figure: Slice p = 1.7 Gev/c

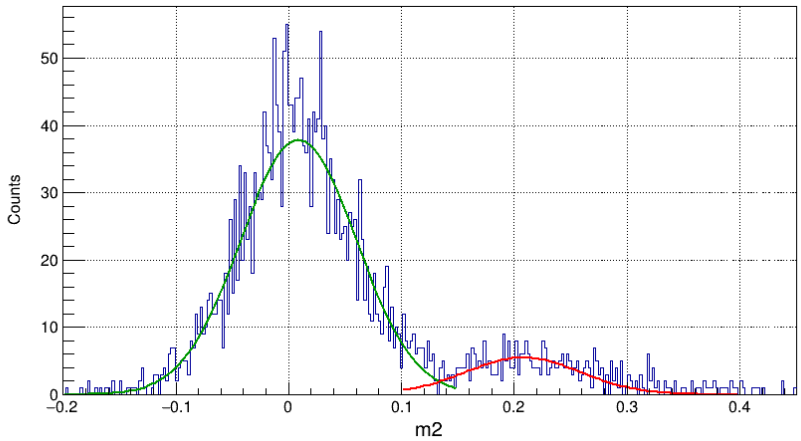


Figure: Slice p = 2.1 Gev/c

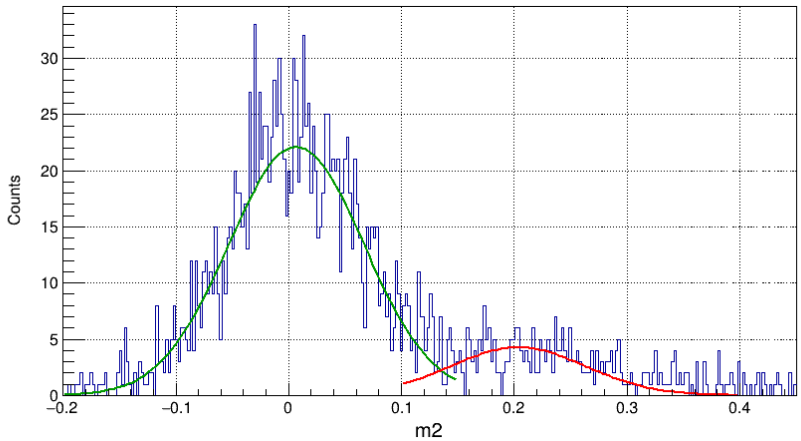


Figure: Slice p = 1.9 Gev/c

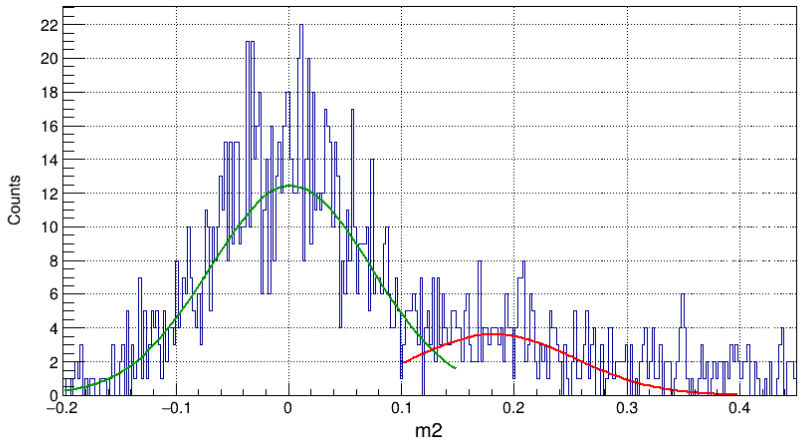
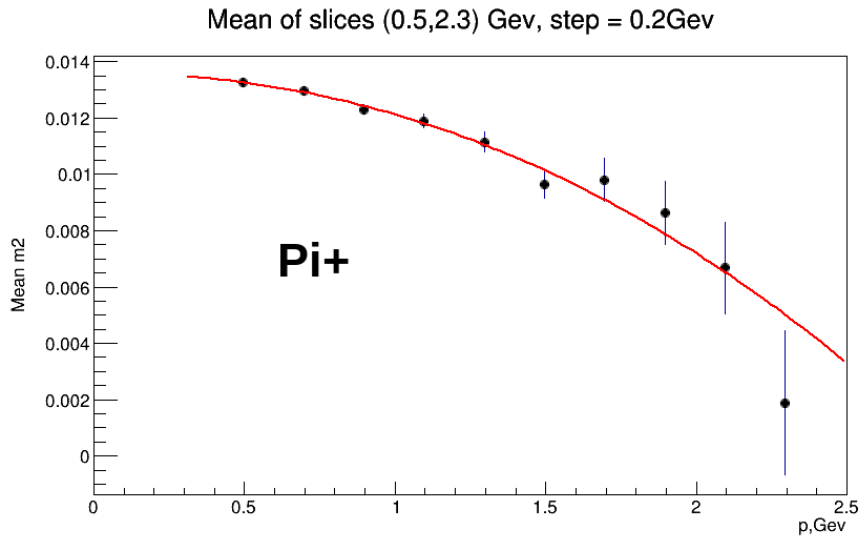
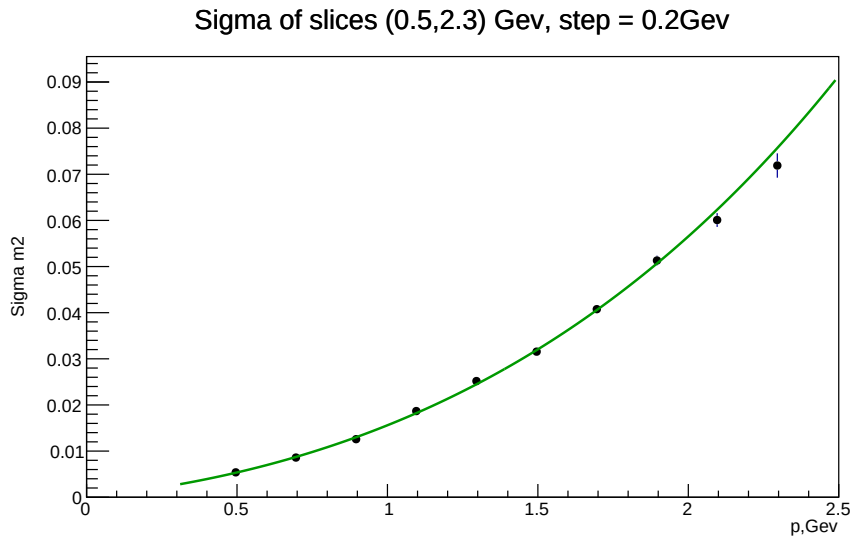
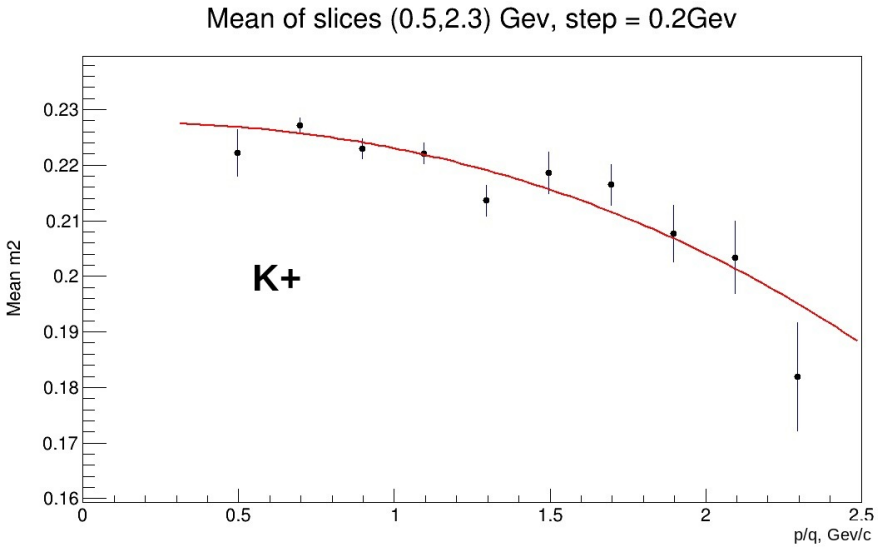


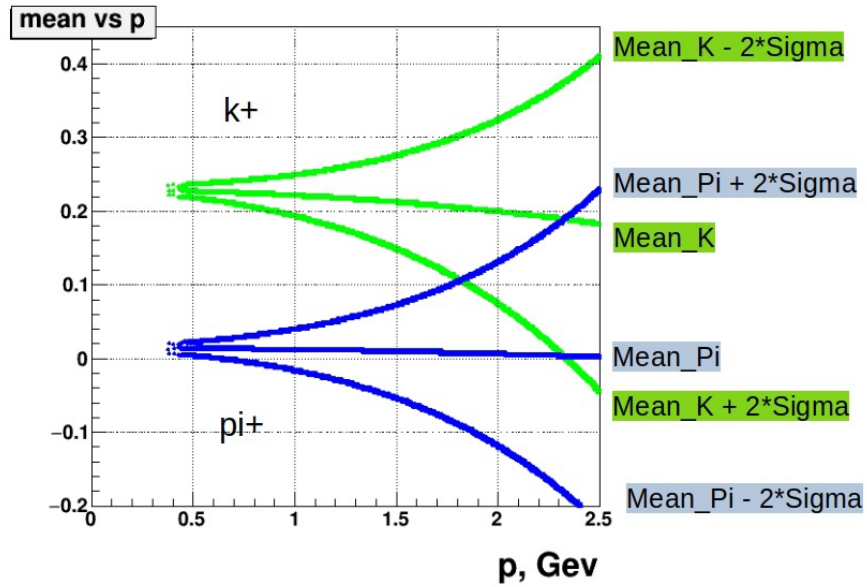
Figure: Slice p = 2.3 Gev/c

Obtained parameters vs momentum



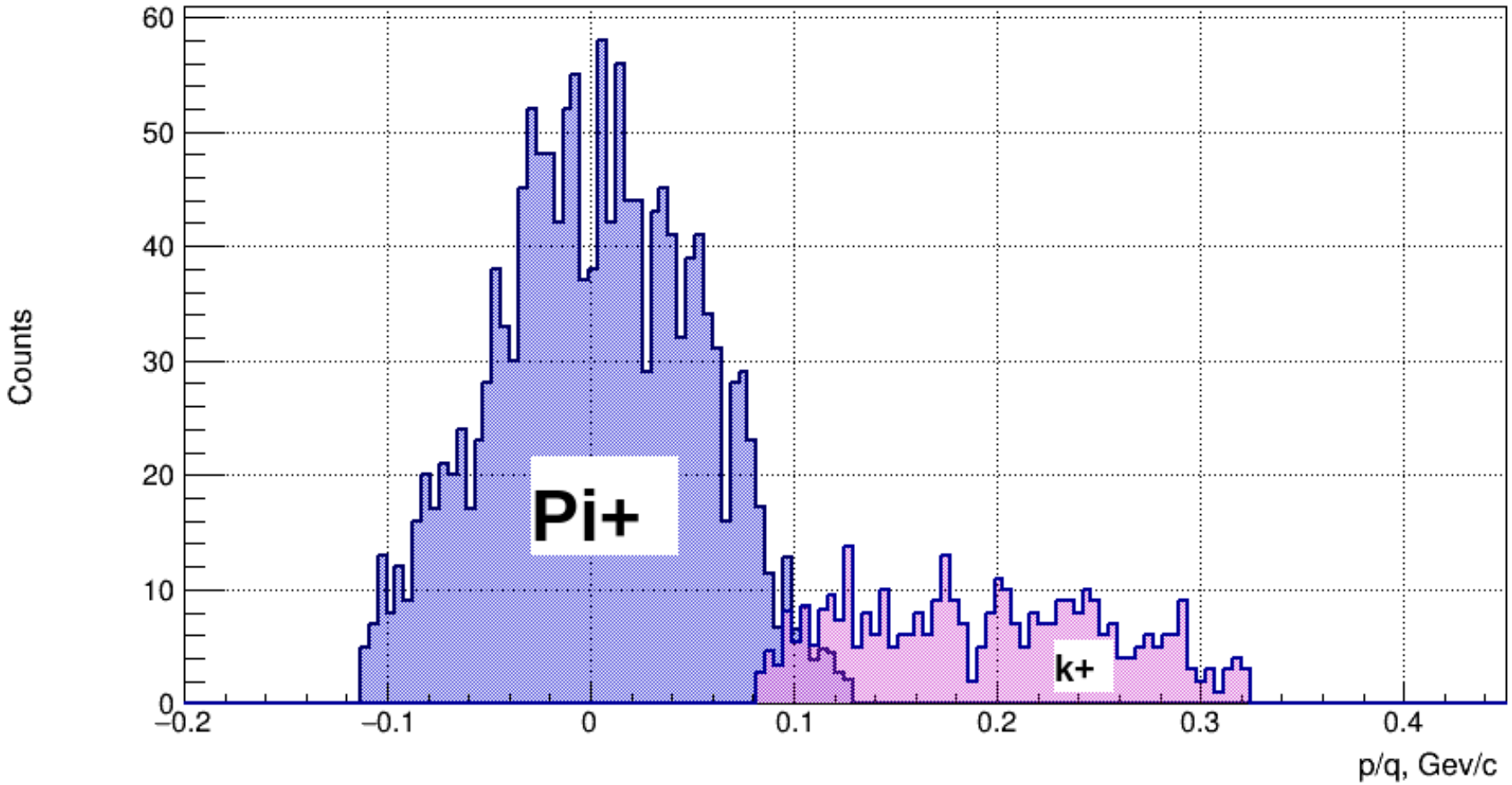






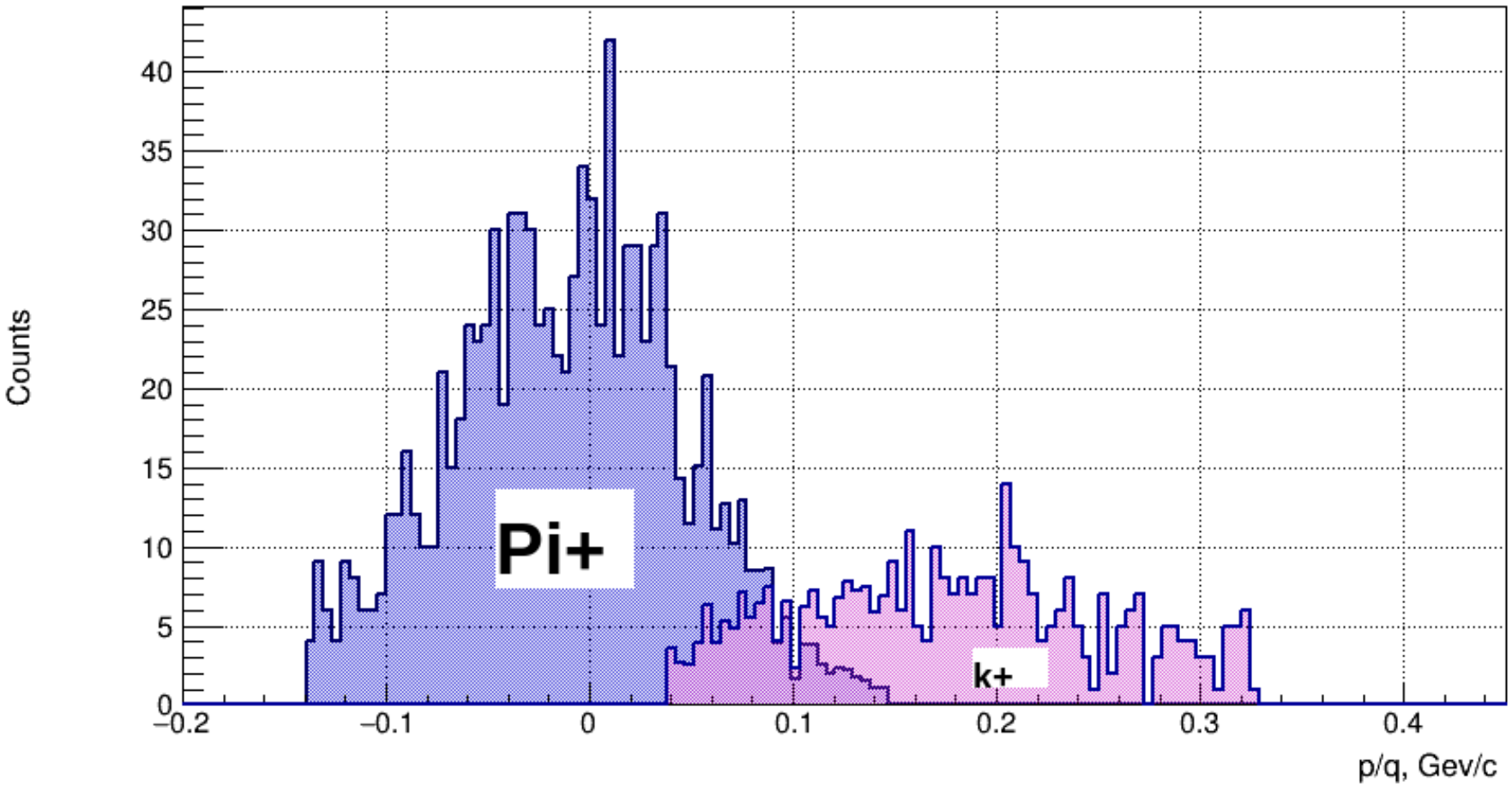
Mass square histogram for K^+ and $\pi+$

P = 2.1 Gev/c



Mass square histogram for K^+ and $\pi+$

P = 2.3 Gev/c



Thank you for your attention!