

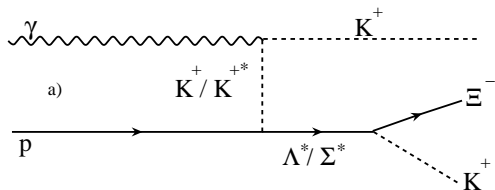
# Cascade Simulations Update

Nathan Sparks

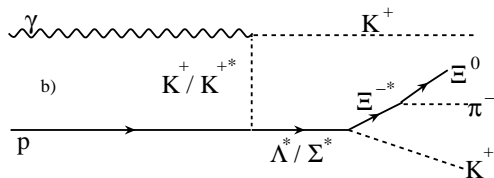
Florida State University, Tallahassee, Florida

September 26, 2011

# Possible Production Mechanism



$K^+(\Xi^- K^+)$ ,  $K^+(\Xi^0 K^0)$ ,  $K^0(\Xi^0 K^+)$



Production of excited states via a

- 1 forward-going  $K^0$  meson  
 $\rightarrow K^0(\Xi^- \pi^+) K^+$ , etc.
- 2 forward-going  $K^+$  meson  
 $\rightarrow K^+(\Xi^- \pi^+) K^0$ ,  
 $K^+(\Xi^0 \pi^-) K^+$ , etc.

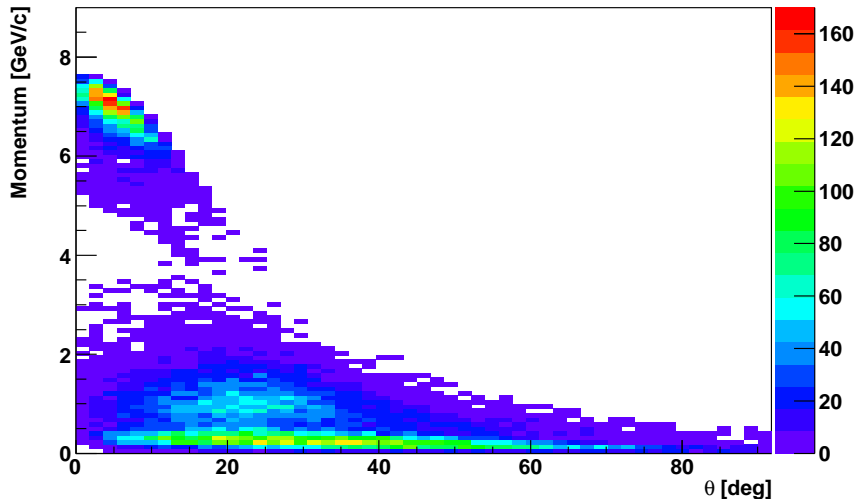
# Procedure

## Photoproduction of $\Xi^-$ (1320) and $\Xi^0$ (1315) using 9 GeV photons

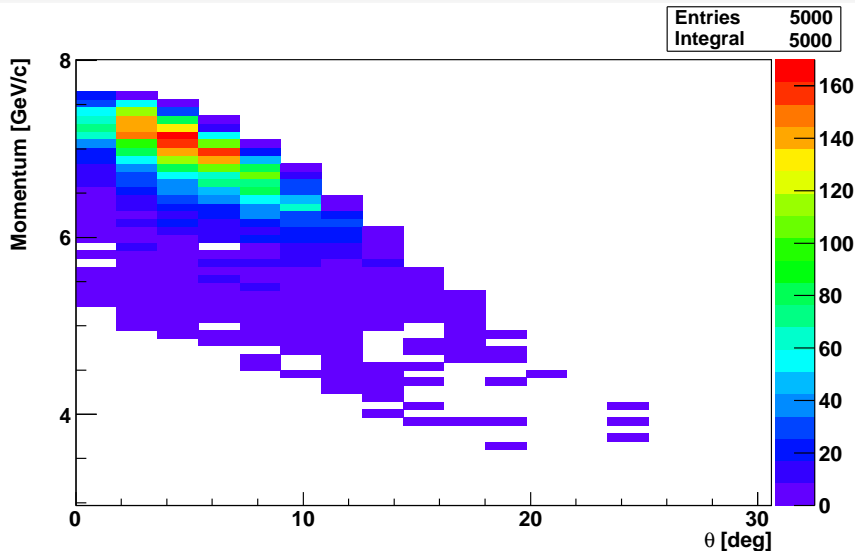
- t-channel production using the genr8 program
- Reactions and decay chains
  - $\gamma p \rightarrow K^+ Y^*$  with  $Y^* \rightarrow K^+ \Xi^-$ ,  $\Xi^- \rightarrow \Lambda \pi^-$ ,  $\Lambda \rightarrow \pi^- p$
  - $\gamma p \rightarrow K^+ Y^*$  with  $Y^* \rightarrow K_S \Xi^0$ ,  $\Xi^0 \rightarrow \Lambda \pi^0$ ,  $\Lambda \rightarrow \pi^- p$ ,  $K_S \rightarrow \pi^+ \pi^-$ ,  $\pi^0 \rightarrow \gamma\gamma$
  - $\gamma p \rightarrow K_S Y^{*+}$  with  $Y^* \rightarrow K^+ \Xi^0$ ,  $\Xi^0 \rightarrow \Lambda \pi^0$ ,  $\Lambda \rightarrow \pi^- p$ ,  $K_S \rightarrow \pi^+ \pi^-$ ,  $\pi^0 \rightarrow \gamma\gamma$
- Excited hyperon parameters:  
 $m(Y^*) = 1960$  MeV and  $\Gamma(Y^*) = 220$  MeV  
from (Guo *et al.*, PRC **76**, 025208 (2007))
- t-channel slope parameter:  $1.4$  (GeV) $^{-2}$
- Swim particles through GlueX detectors using HDGeant (minimal control.in file with HADR==0)

# Generated Distributions

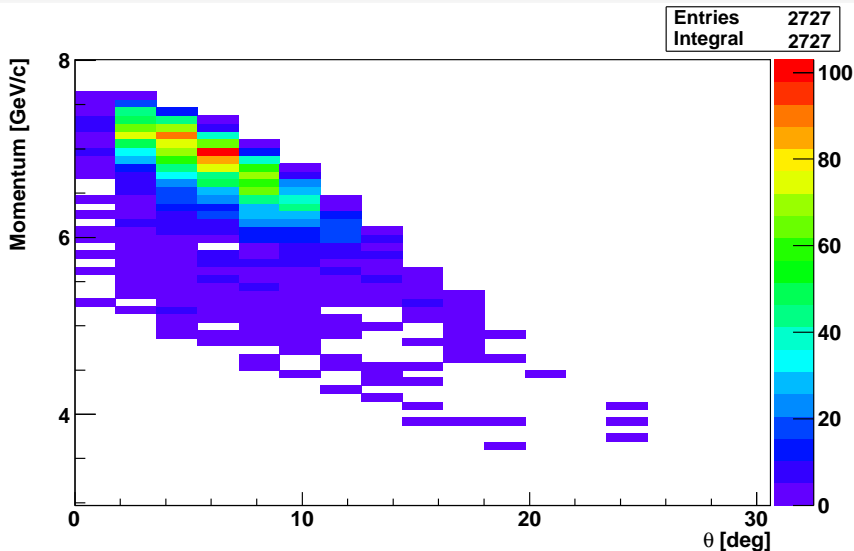
Generated



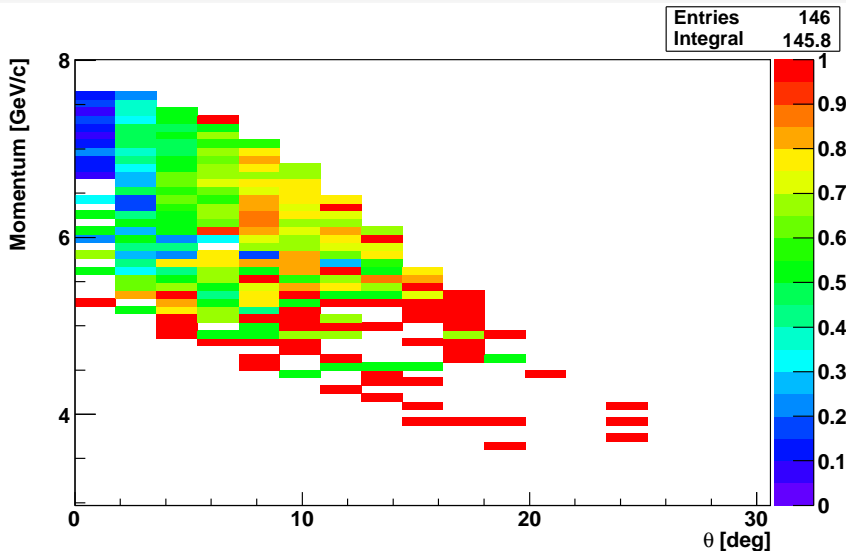
# Generated Faster Kaons



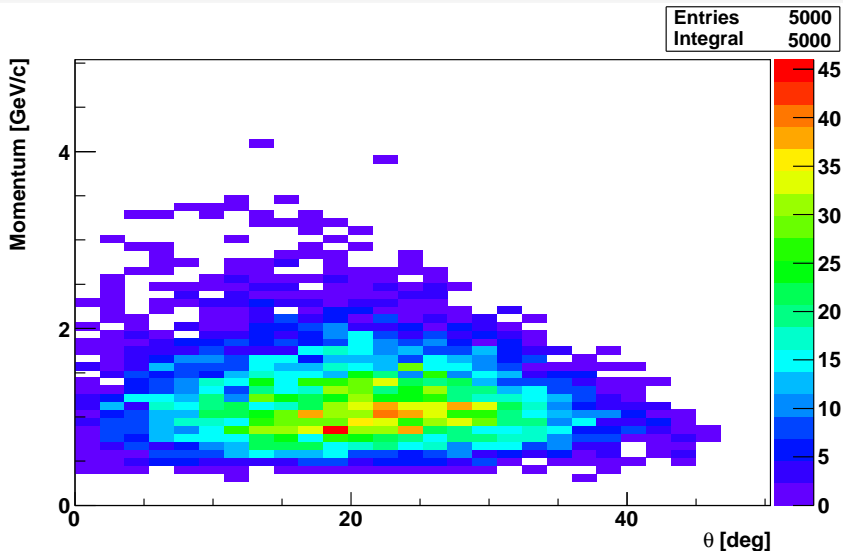
# Accepted Faster Kaons



# Acceptance of Faster Kaons

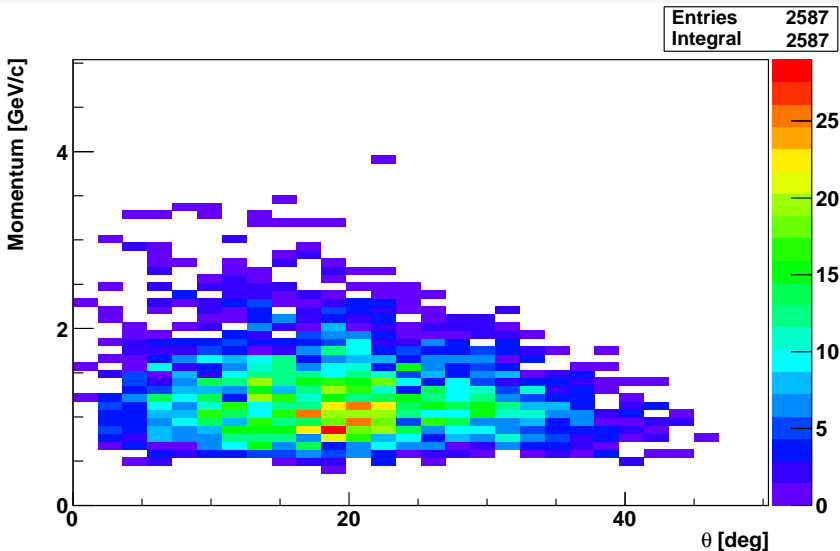


# Generated Protons

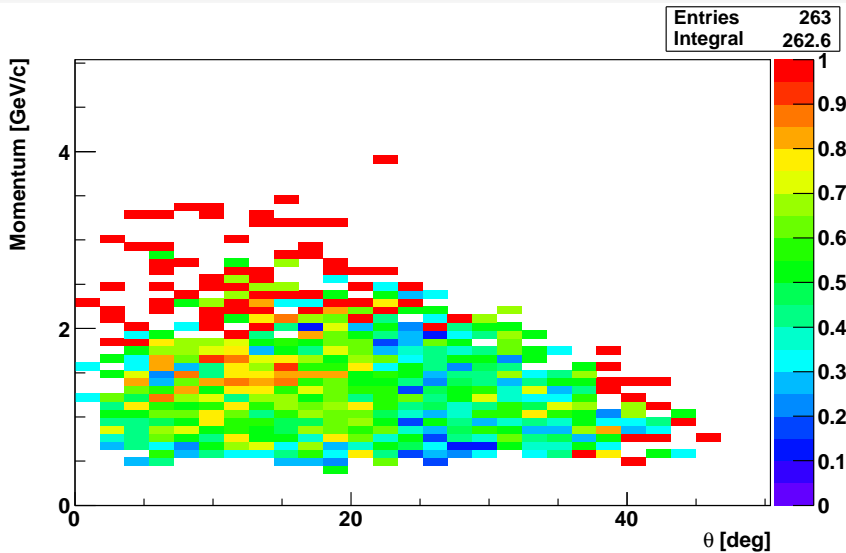




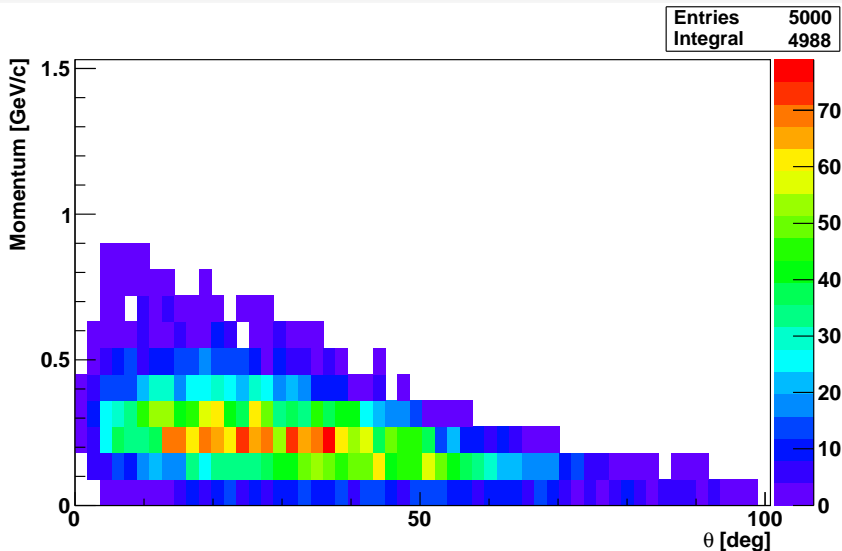
# Accepted Protons



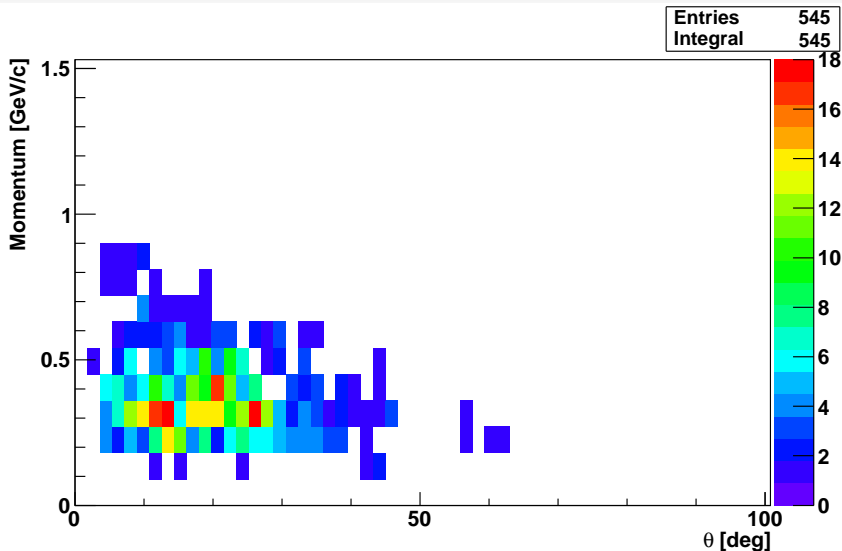
# Acceptance of Protons



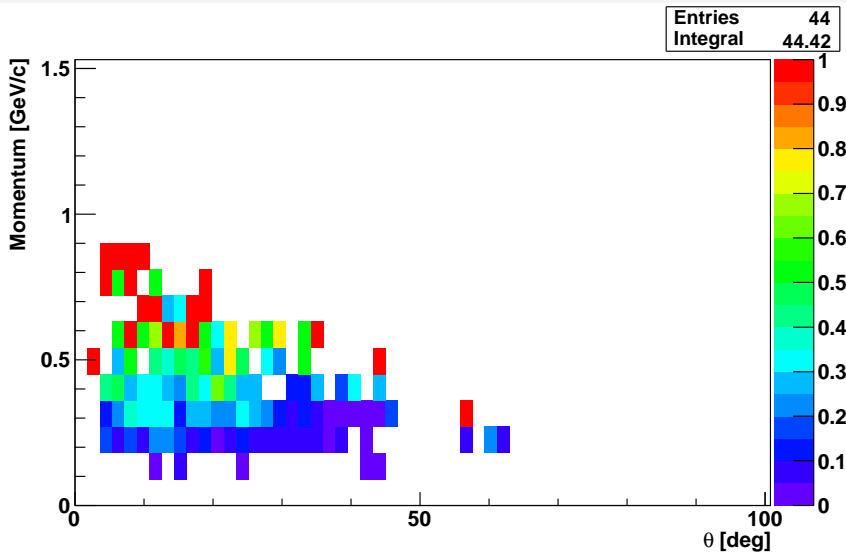
# Generated Pim from Lambda



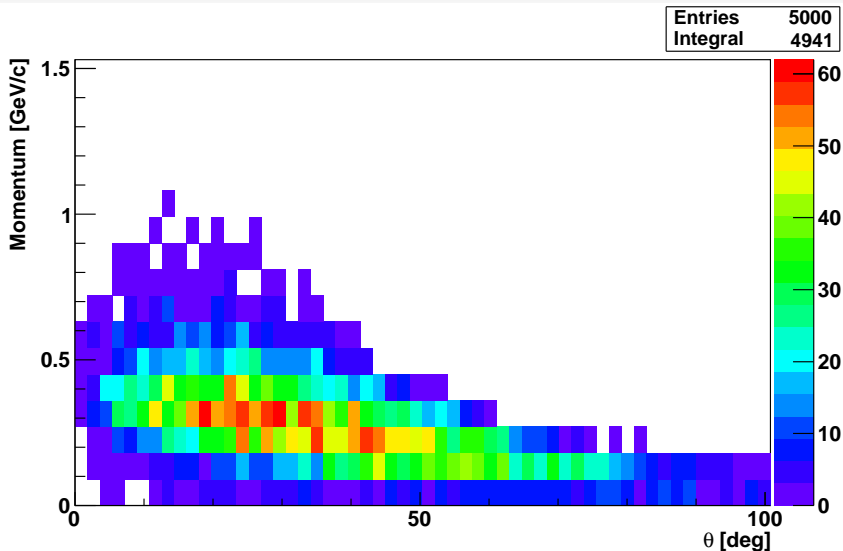
# Accepted Pim from Lambda



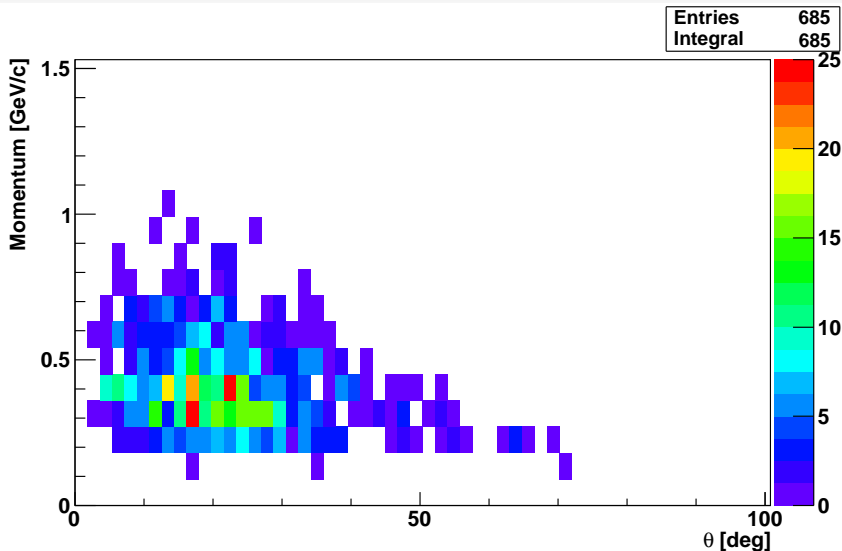
# Acceptance of Pim from Lambda



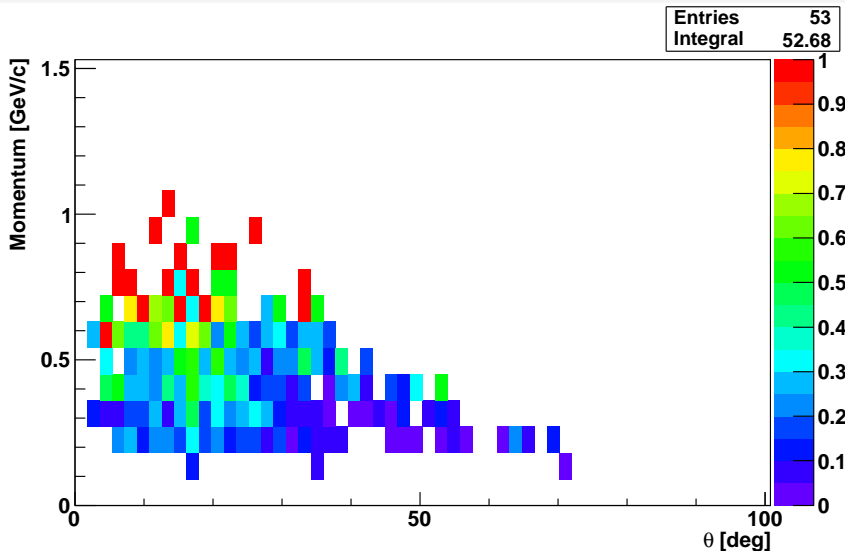
# Generated Pim from Cascade



# Accepted Pim from Cascade

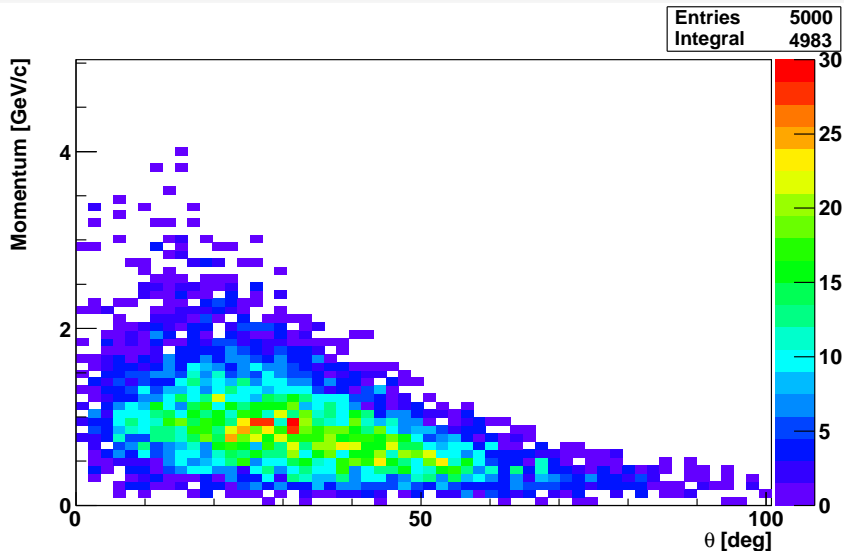


# Acceptance of Pim from Cascade

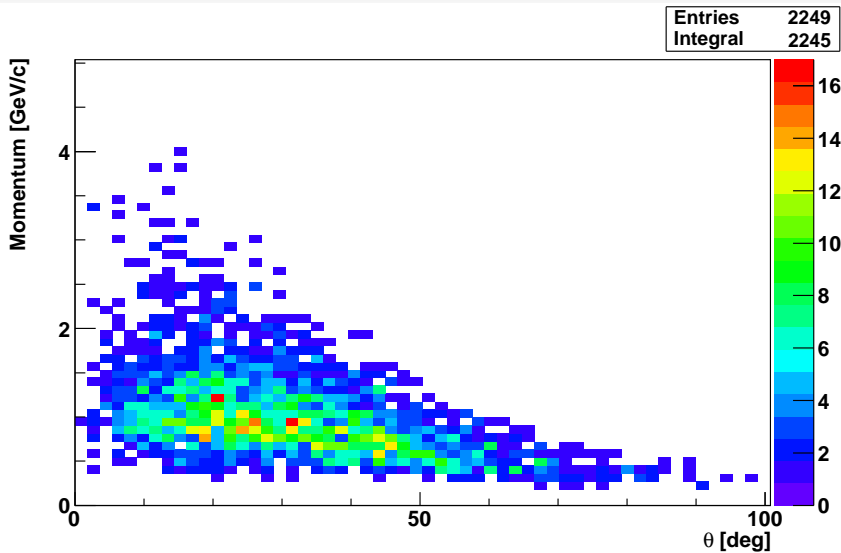




# Generated Slower Kaon



# Accepted Slower Kaons



# Acceptance of Slower Kaons

