

XI Collaboration Meeting  
of the MPD Experiment at the NICA Facility



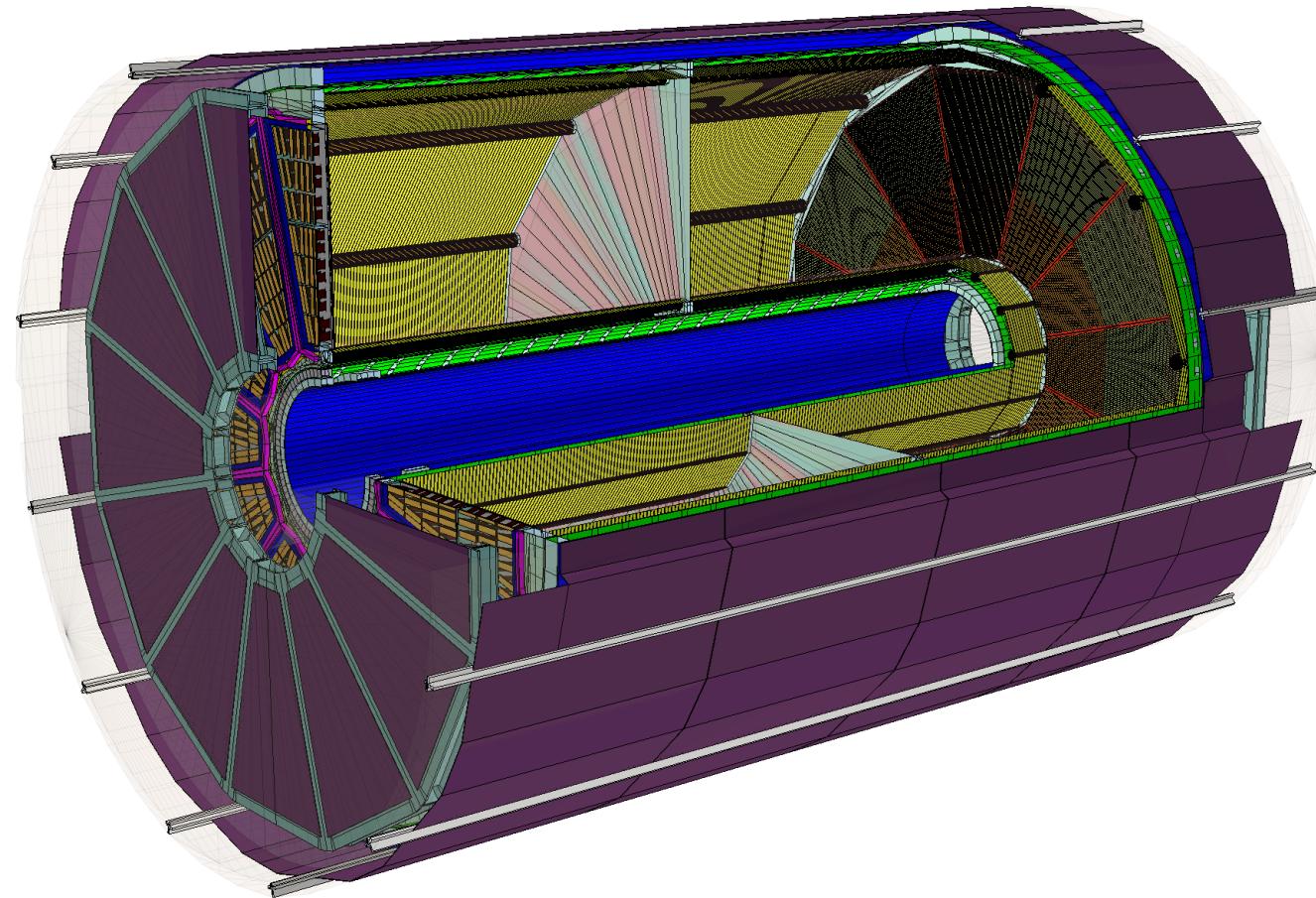
# Particle parameter changing due to TPC construction and materials

**Bychkov Alexander**

**VB LHEP**

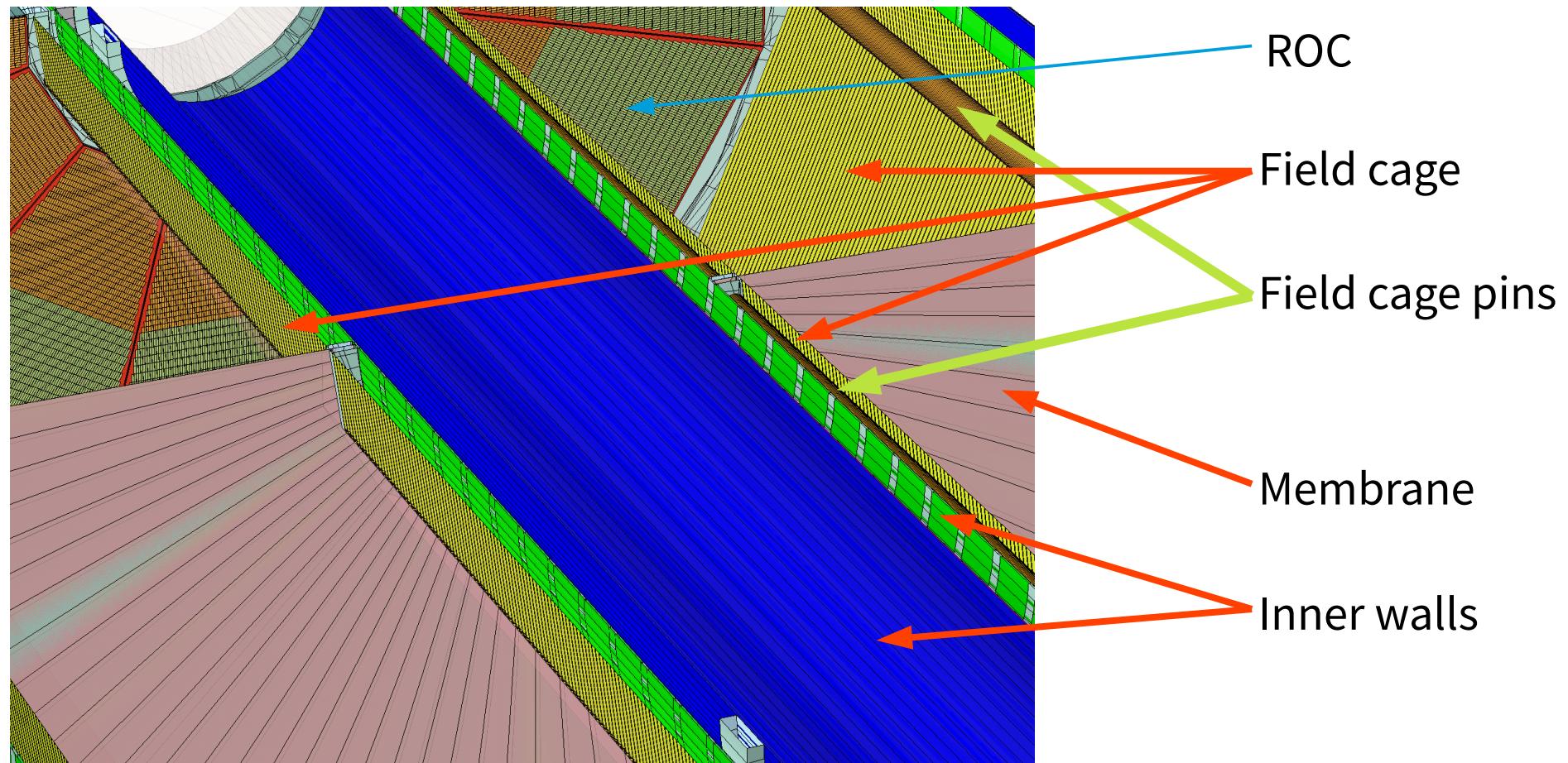
**Apr 19, 2023**

# MPDRoot TPC full geometry



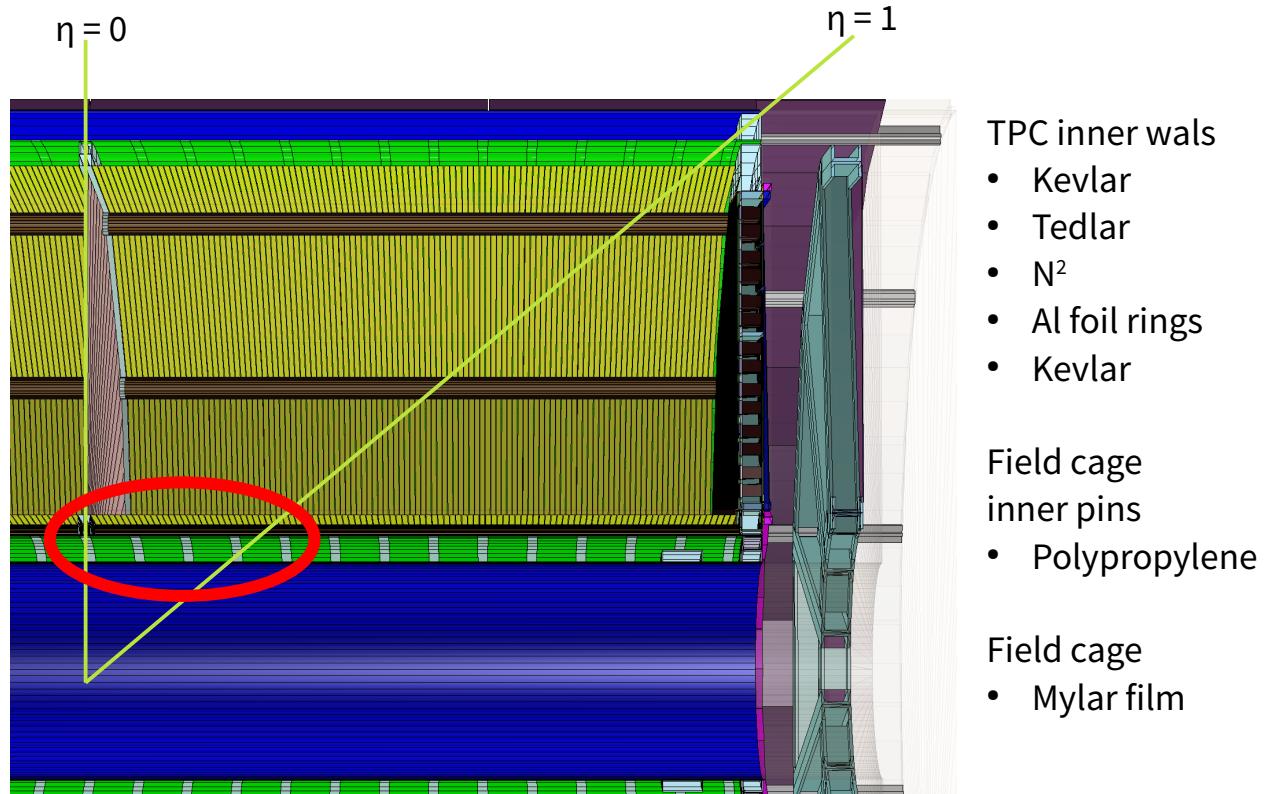
~131 000  
nodes

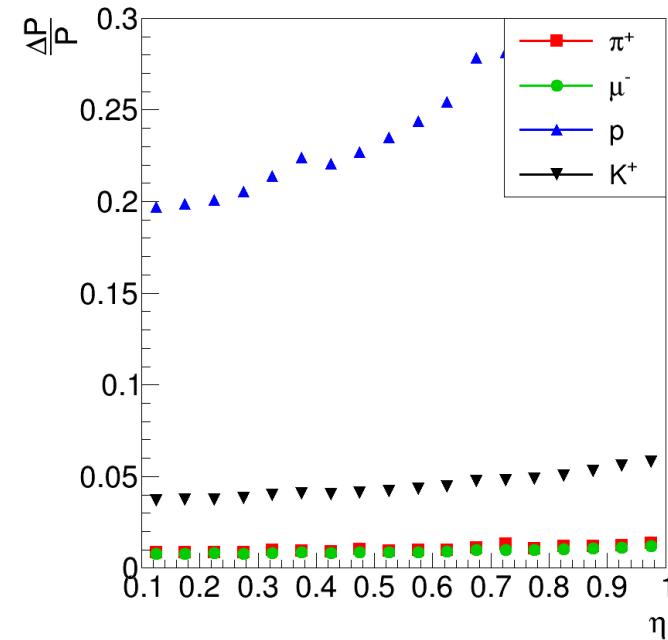
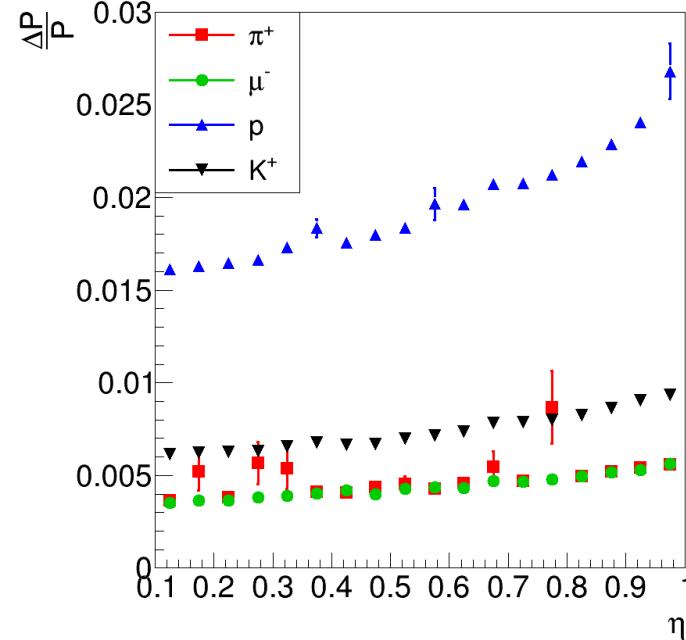
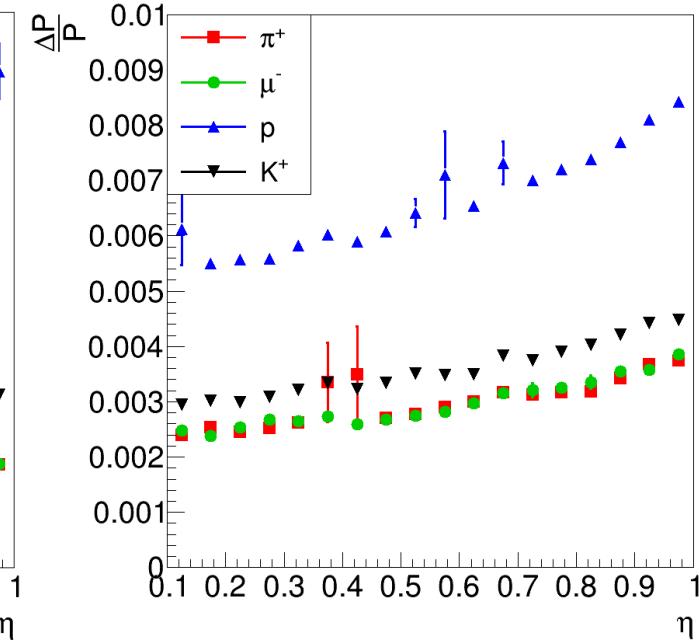
# Inner walls, membrane and fieldcage



# Particle parameters changing after inner walls of TPC

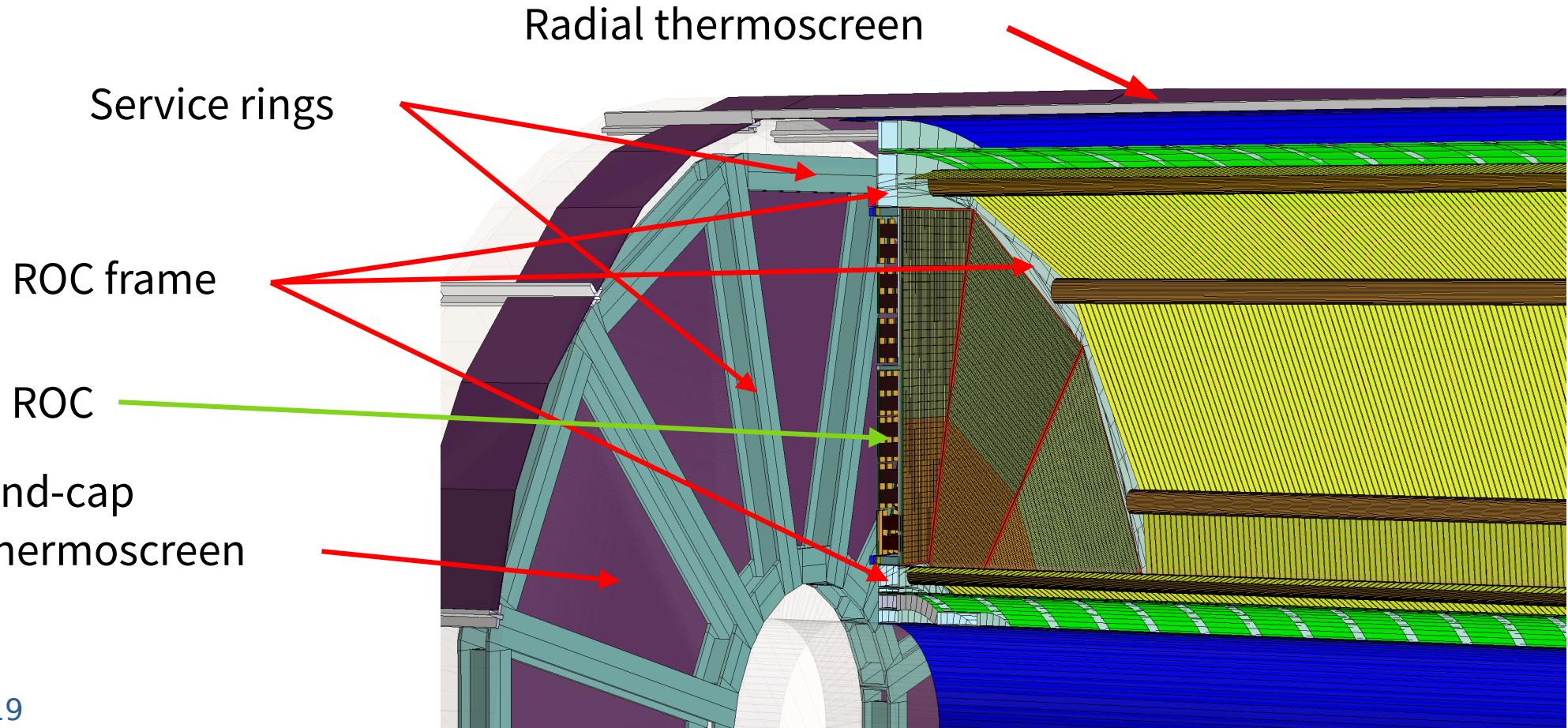
- No magnetic field
- All tracks starts from  $(0, 0, 0)$
- Tracks:  $p, \pi^+, \mu^-, K^+$
- $\Delta P = P_0 - P_{\text{out}}^{\text{inner walls}}$ 
  - $P_0$  – initial momentum
  - $P_{\text{out}}^{\text{inner walls}}$  – momentum after passing inner walls of TPC
- Depends on pseudorapidity



$P_0 = 300 \text{ MeV}$  $P_0 = 600 \text{ MeV}$  $P_0 = 900 \text{ MeV}$ 

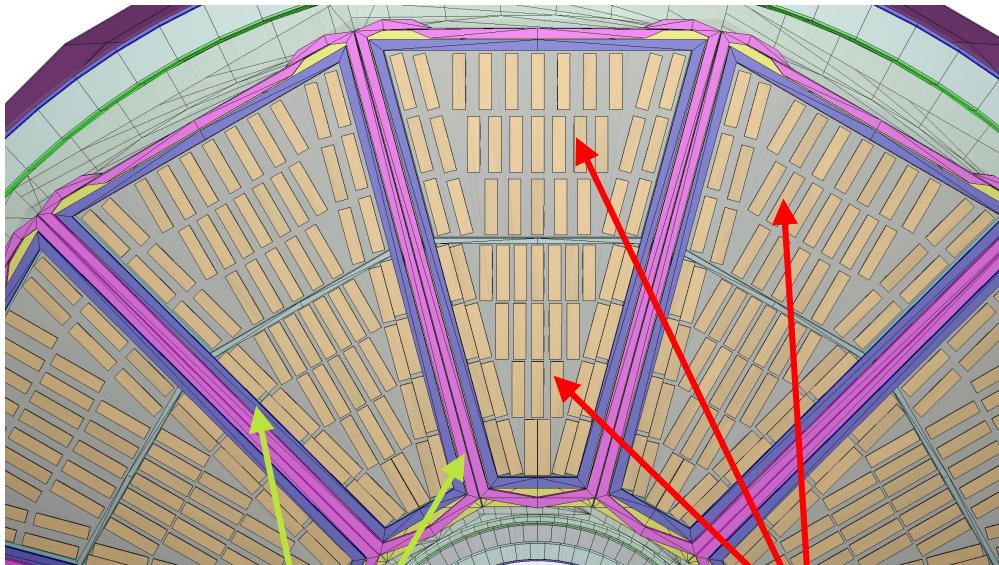
$$\Delta P = P_0 - P_{\text{out}}^{\text{inner walls}}$$

# ROC frame, service rings and thermoscreen



# Read-Out Chambers

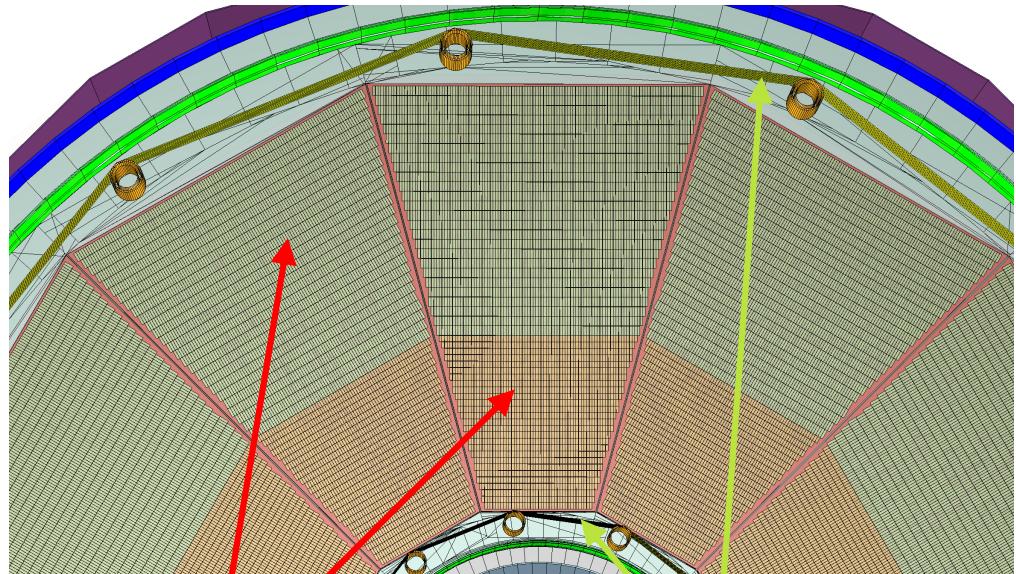
ROC outside view



ROC pressing frames

IO cards

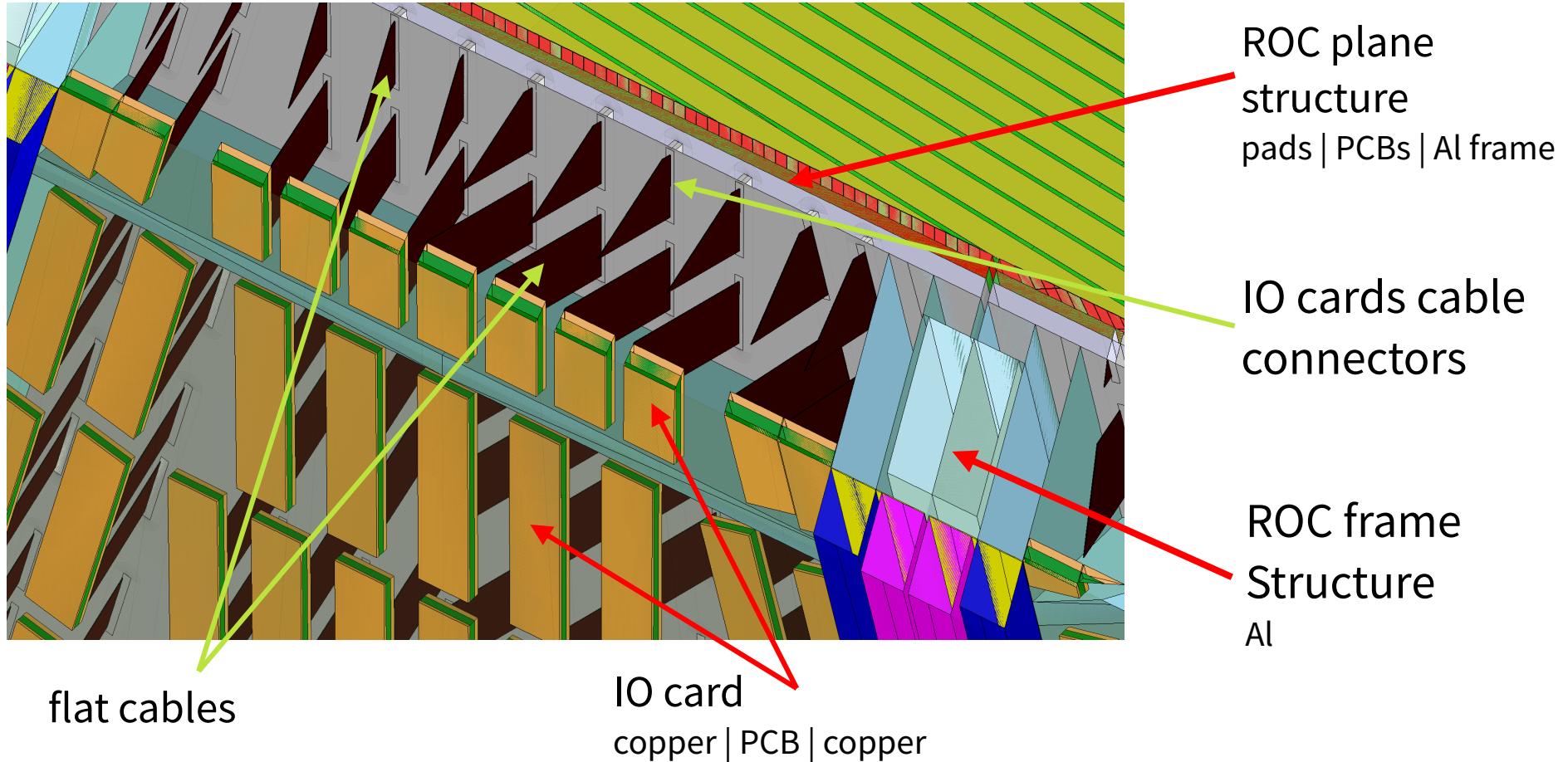
ROC inside view



Pads

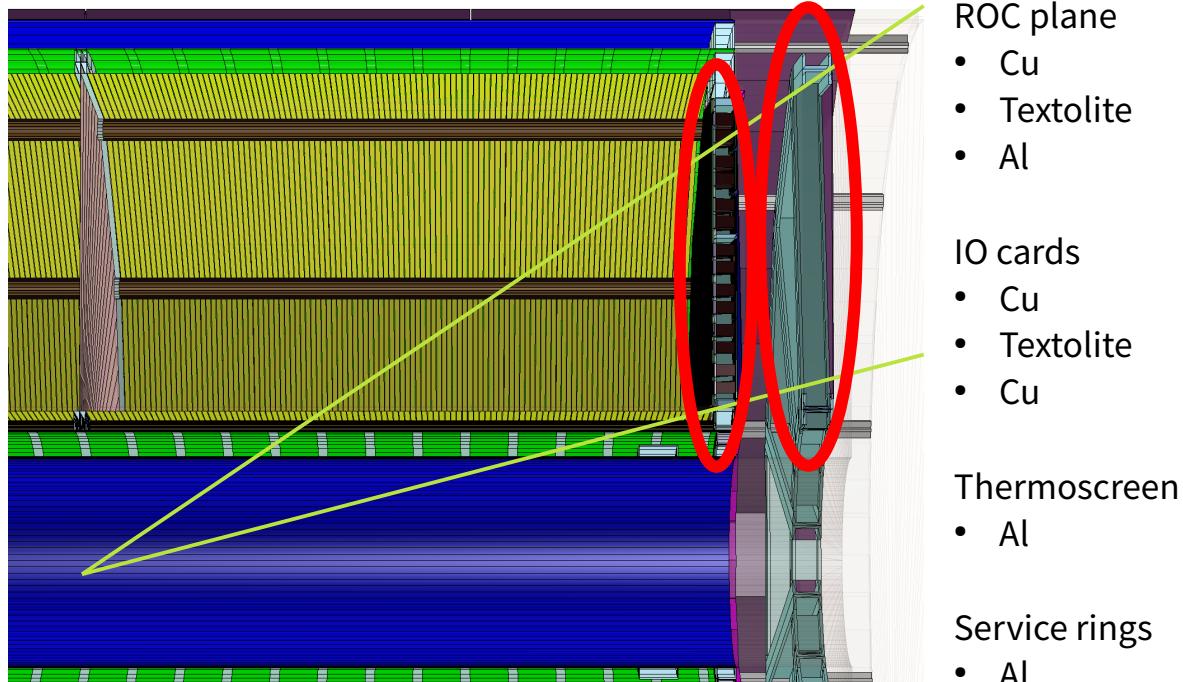
Field cage

# ROC cross section view

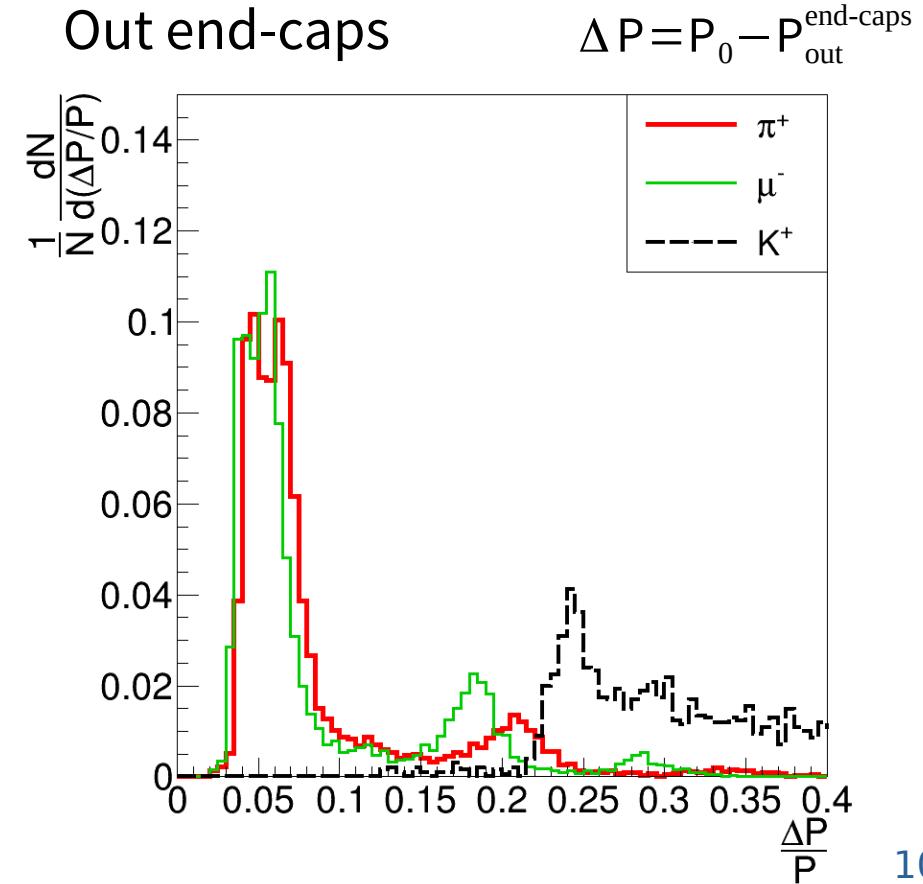
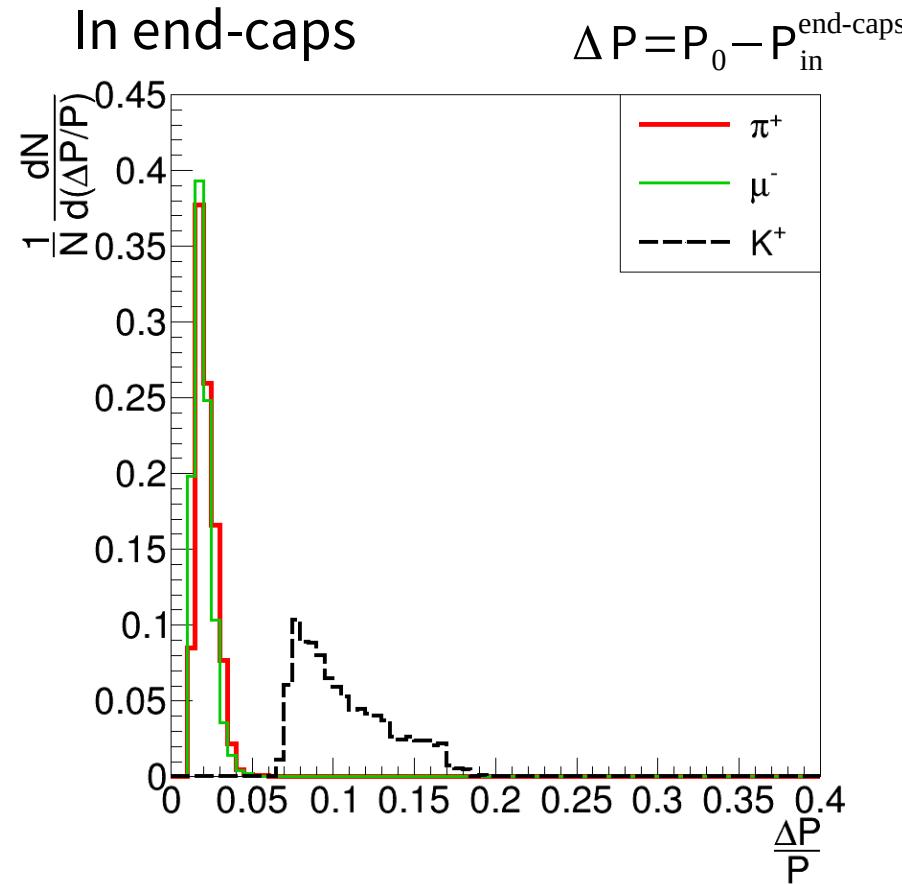


# TPC end-caps particle parameter changing

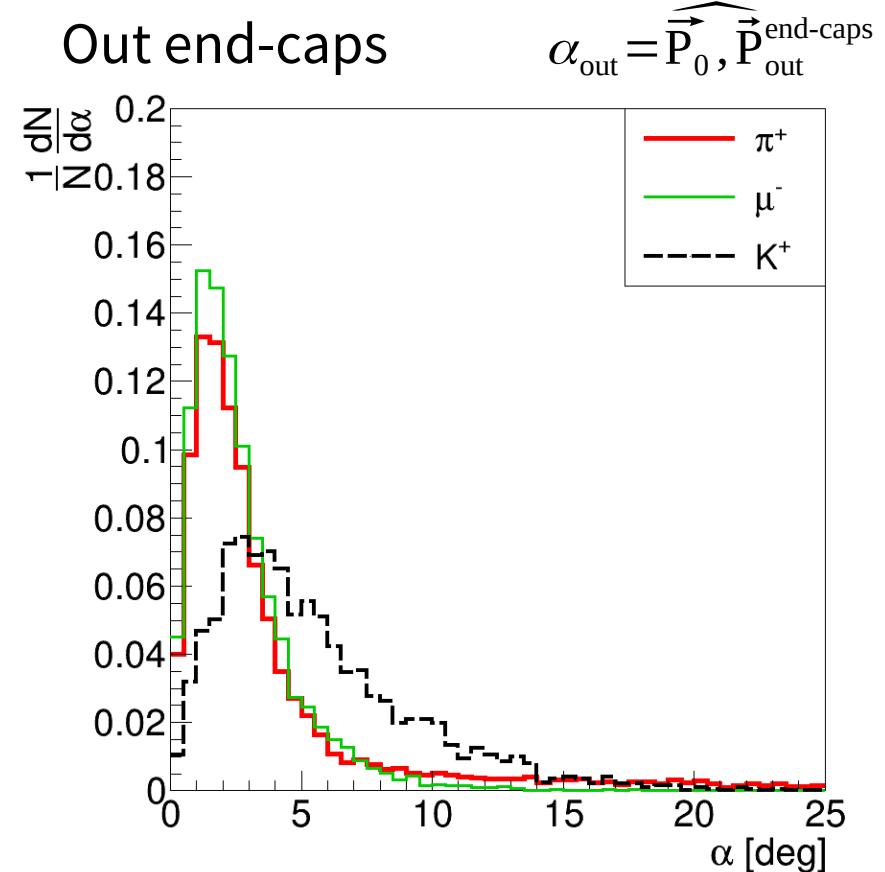
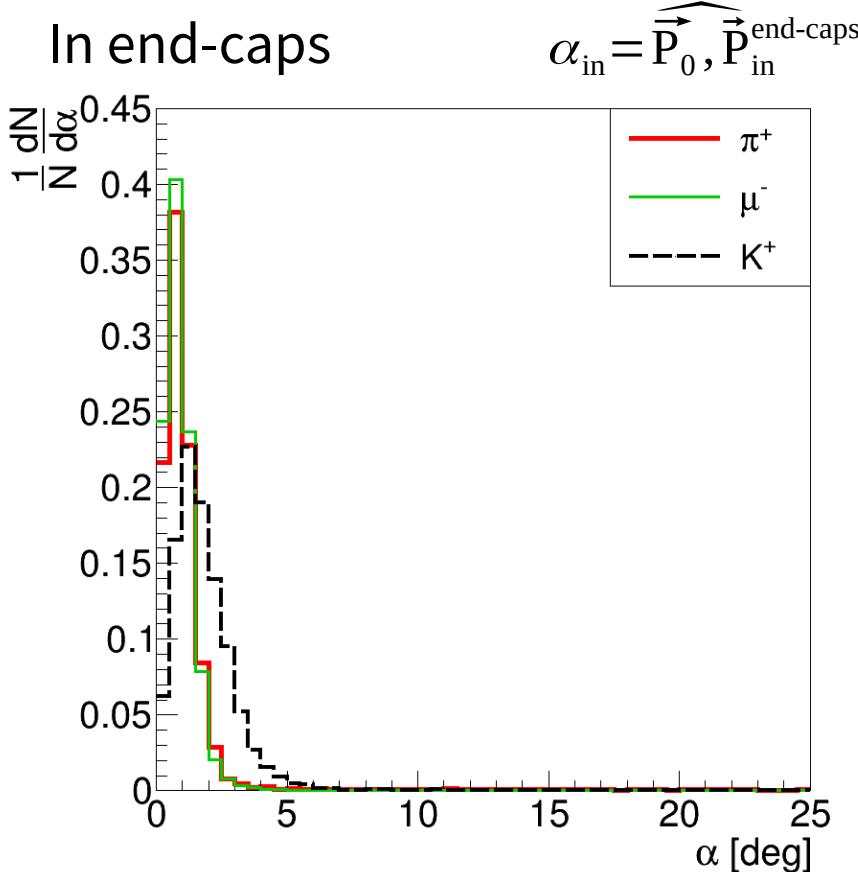
- No magnetic field
- All tracks starts from  $(0, 0, 0)$
- Tracks:  $p, \pi^+, \mu^-, K^+$
- $\Delta P = P_0 - P_{\text{in}}^{\text{end-caps}}, \Delta P = P_0 - P_{\text{out}}^{\text{end-caps}}$ 
  - $P_0$  – initial momentum
  - $P_{\text{in}}^{\text{end-caps}}, P_{\text{out}}^{\text{end-caps}}$  – momentum in/out TPC end-caps
- $\alpha_{\text{in}} = \widehat{\vec{P}_0}, \widehat{\vec{P}_{\text{in}}^{\text{end-caps}}}, \alpha_{\text{out}} = \widehat{\vec{P}_0}, \widehat{\vec{P}_{\text{out}}^{\text{end-caps}}}$



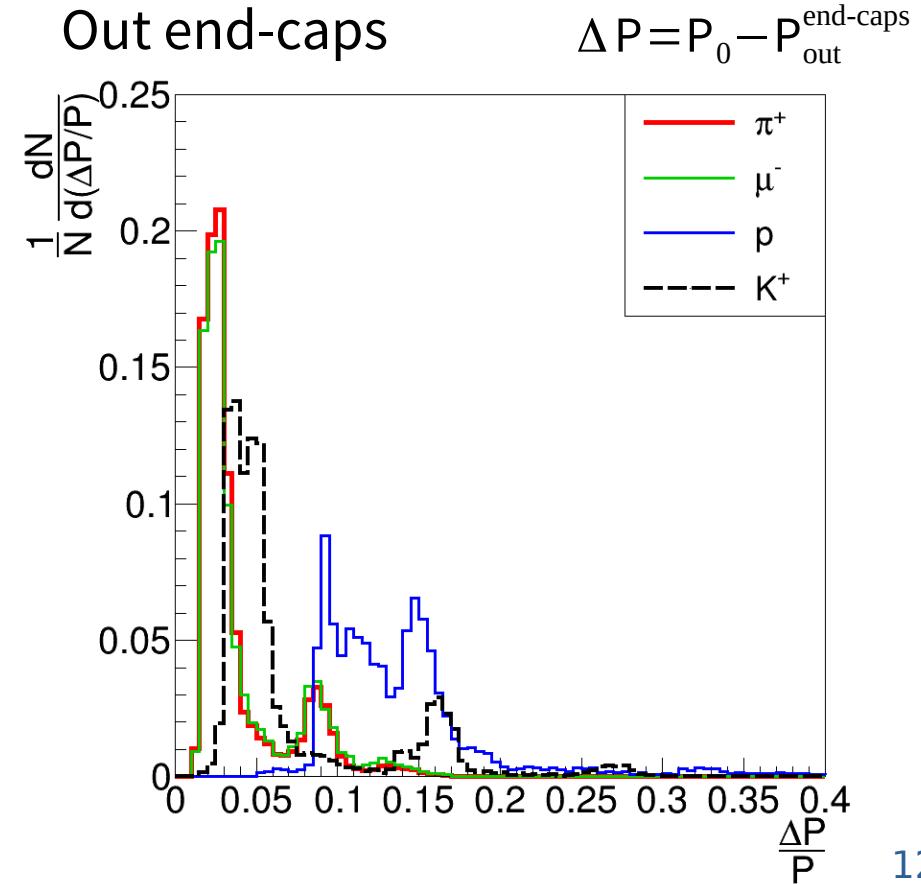
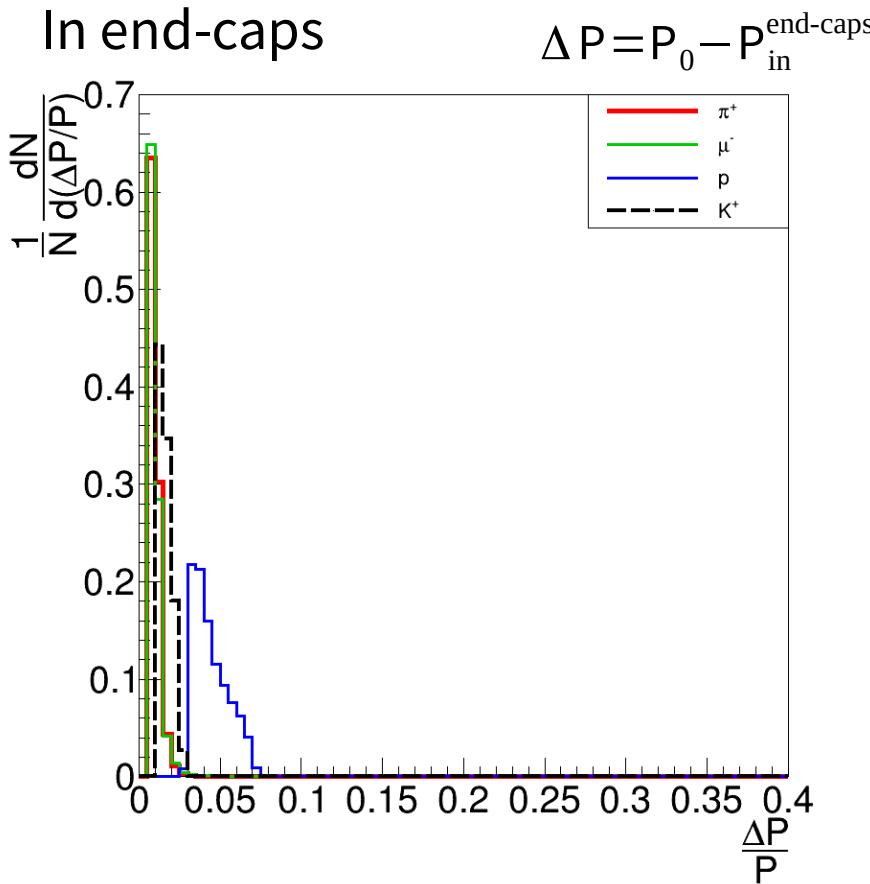
# Momentum losses, $P_0 = 300$ MeV



# Direction changes, $P_0 = 300$ MeV



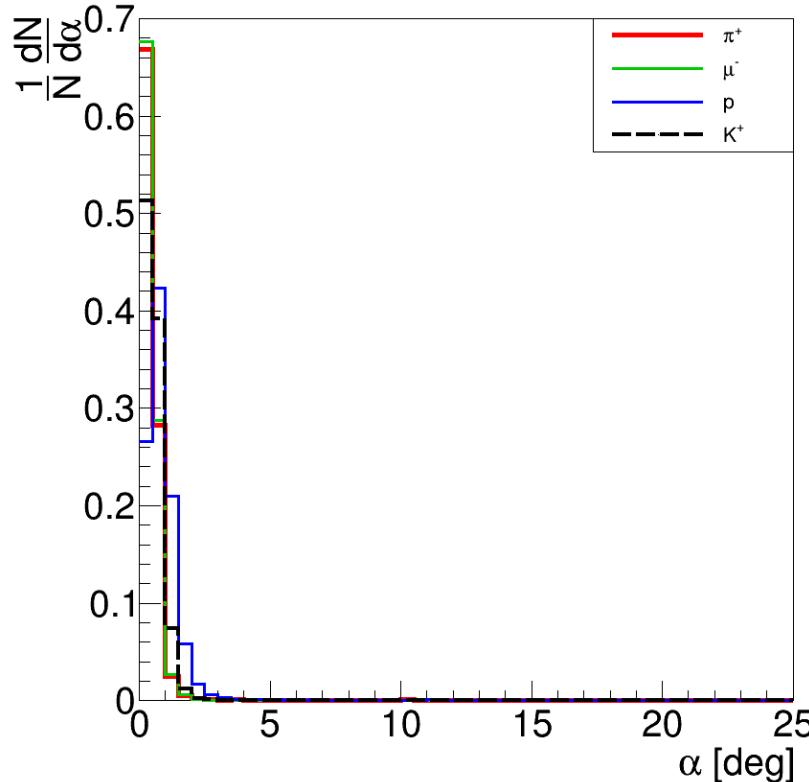
# Momentum losses, $P_0 = 600$ MeV



# Direction changes, $P_0 = 600$ MeV

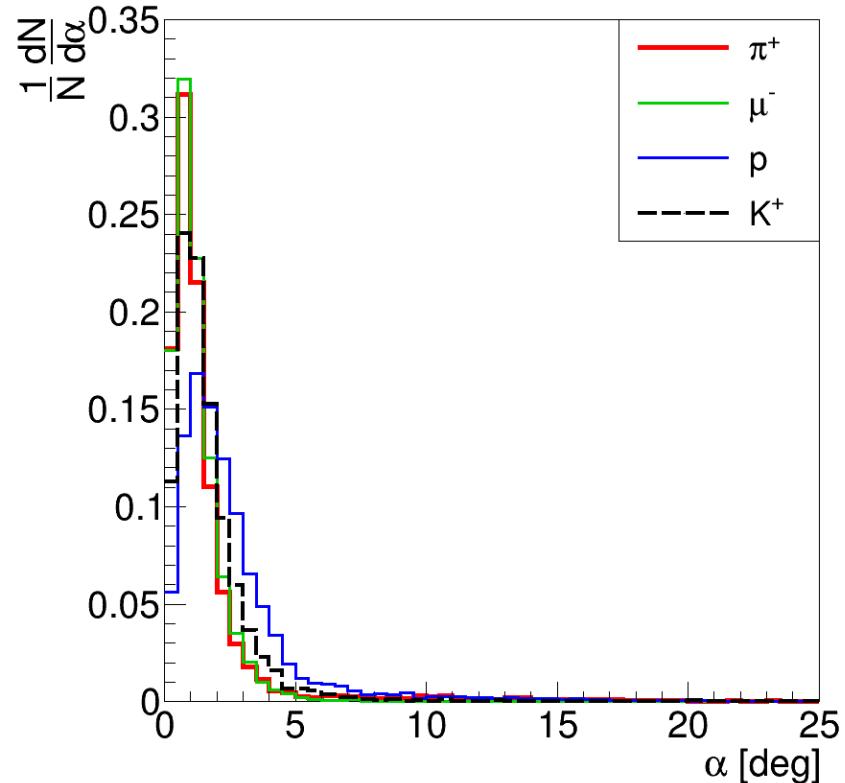
In end-caps

$$\alpha_{\text{in}} = \widehat{\vec{P}_0}, \widehat{\vec{P}}_{\text{in}}^{\text{end-caps}}$$

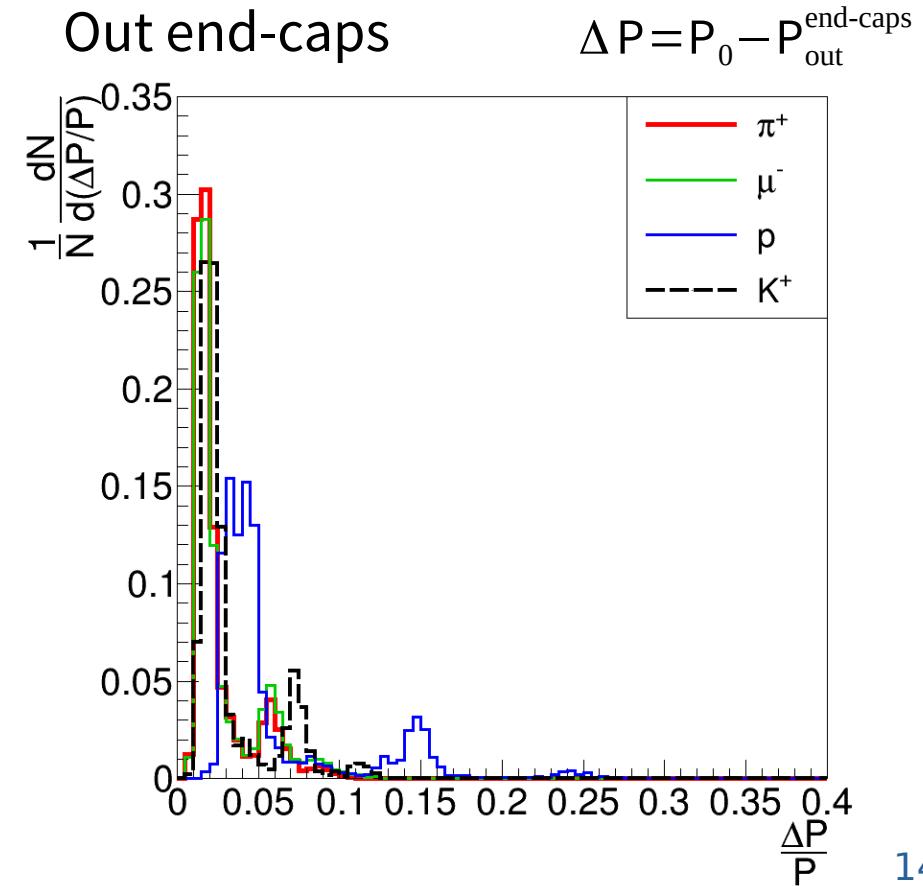
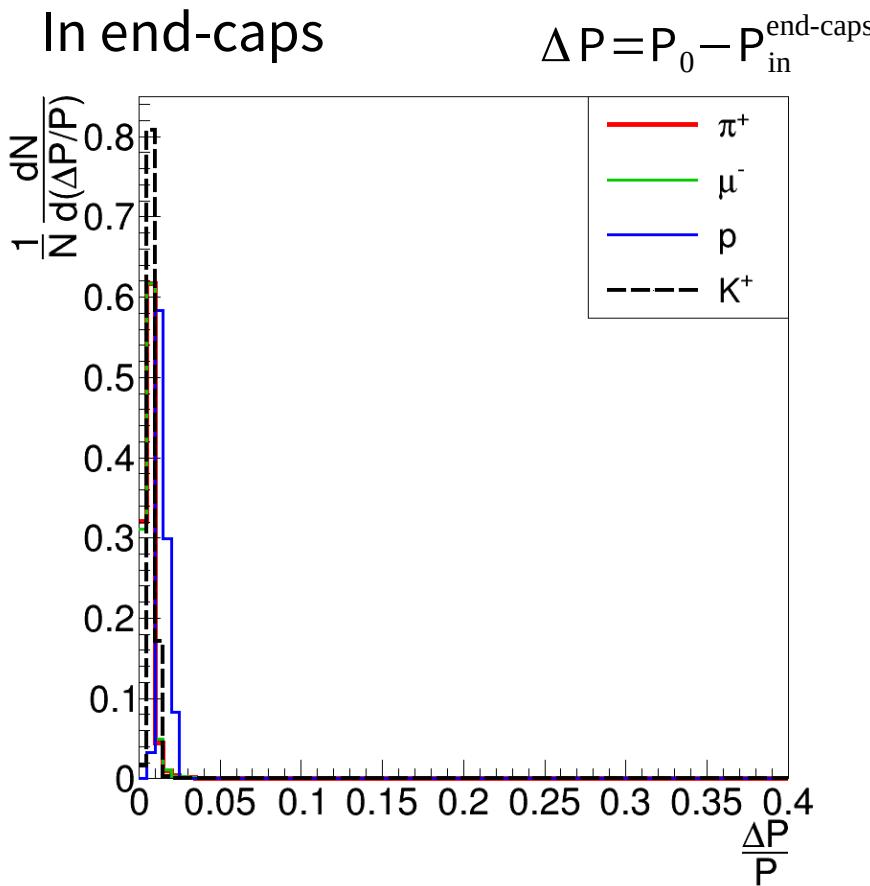


Out end-caps

$$\alpha_{\text{out}} = \widehat{\vec{P}_0}, \widehat{\vec{P}}_{\text{out}}^{\text{end-caps}}$$



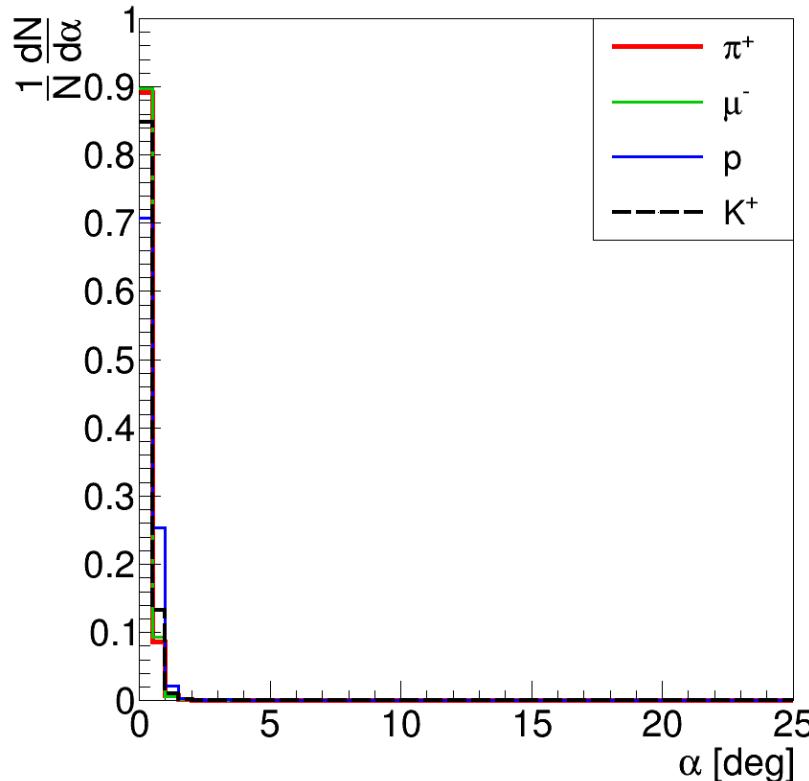
# Momentum losses, $P_0 = 900$ MeV



# Direction changes, $P_0 = 600$ MeV

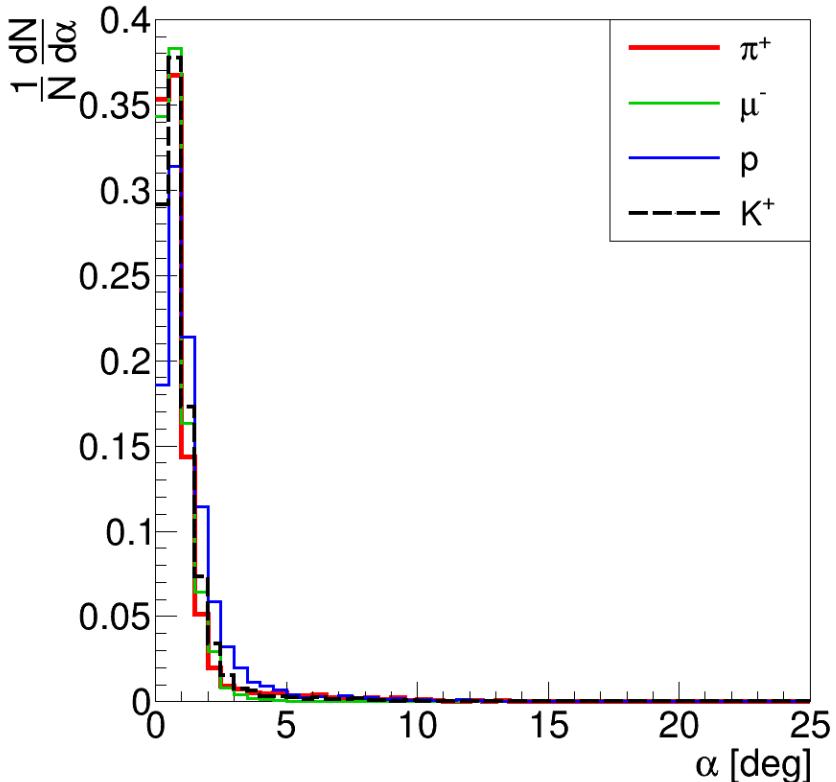
In end-caps

$$\alpha_{\text{in}} = \widehat{\vec{P}_0}, \widehat{\vec{P}}_{\text{in}}^{\text{end-caps}}$$



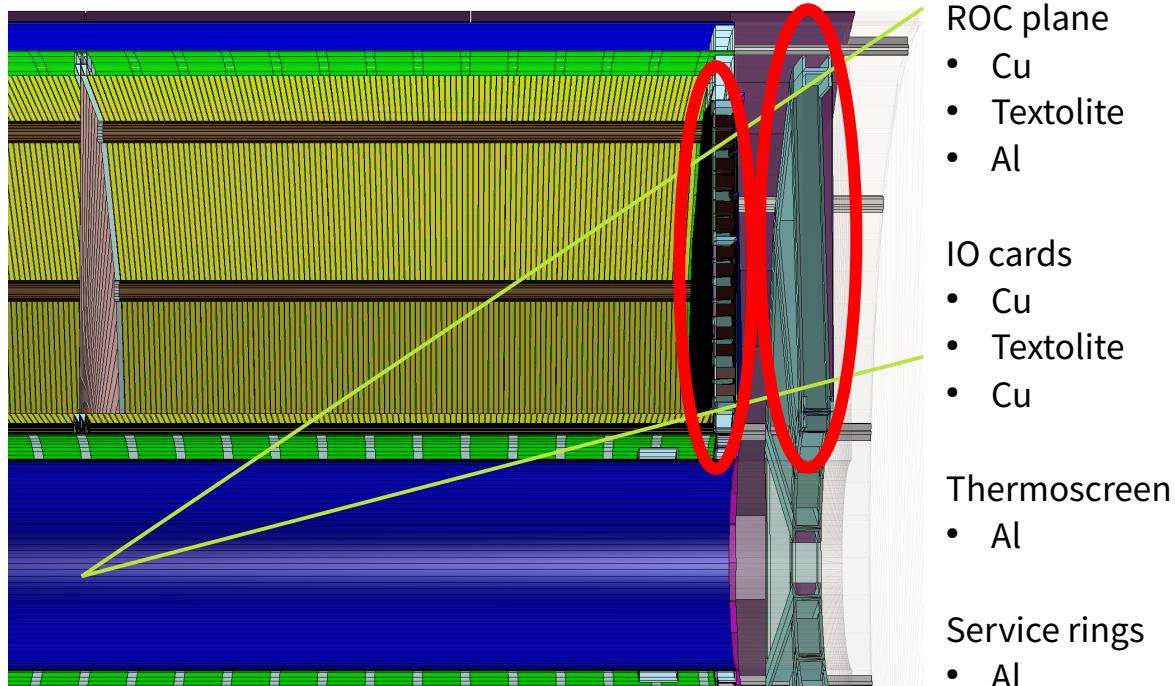
Out end-caps

$$\alpha_{\text{out}} = \widehat{\vec{P}_0}, \widehat{\vec{P}}_{\text{out}}^{\text{end-caps}}$$



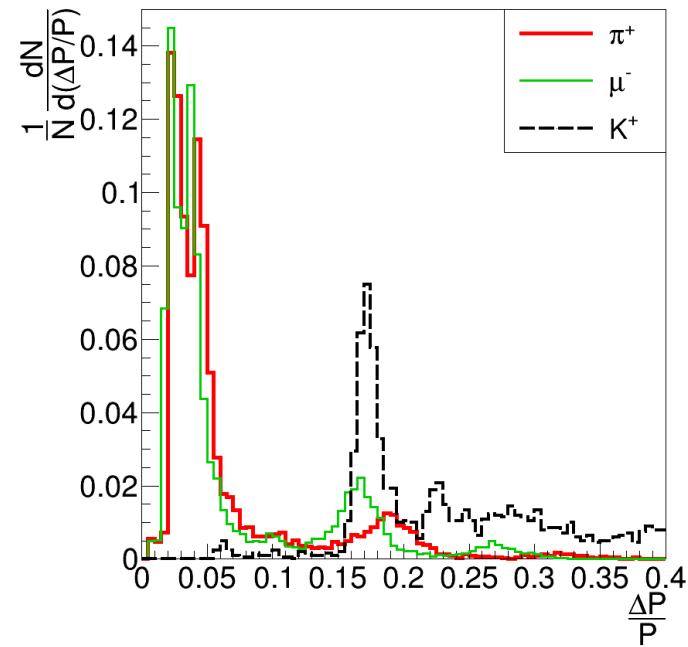
# TPC end-caps particle parameter changing (2)

- No magnetic field
- All tracks starts from  $(0, 0, 0)$
- Tracks:  $p, \pi^+, \mu^-, K^+$
- $\Delta P = P_{\text{in}}^{\text{end-caps}} - P_{\text{out}}^{\text{end-caps}}$ 
  - $P_{\text{in}}^{\text{end-caps}}, P_{\text{out}}^{\text{end-caps}}$  – momentum in/out TPC end-caps
- $\alpha = \overrightarrow{P}_{\text{in}}^{\text{end-caps}}, \overrightarrow{P}_{\text{out}}^{\text{end-caps}}$

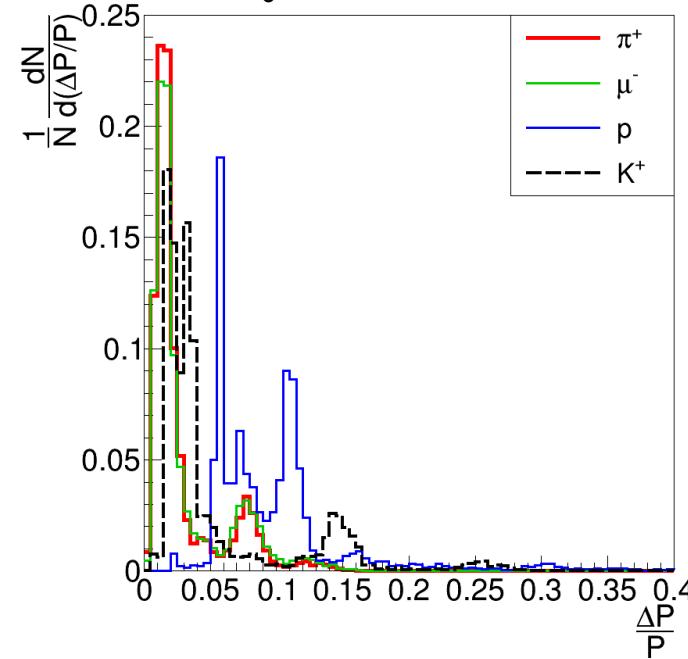


# Momentum losses

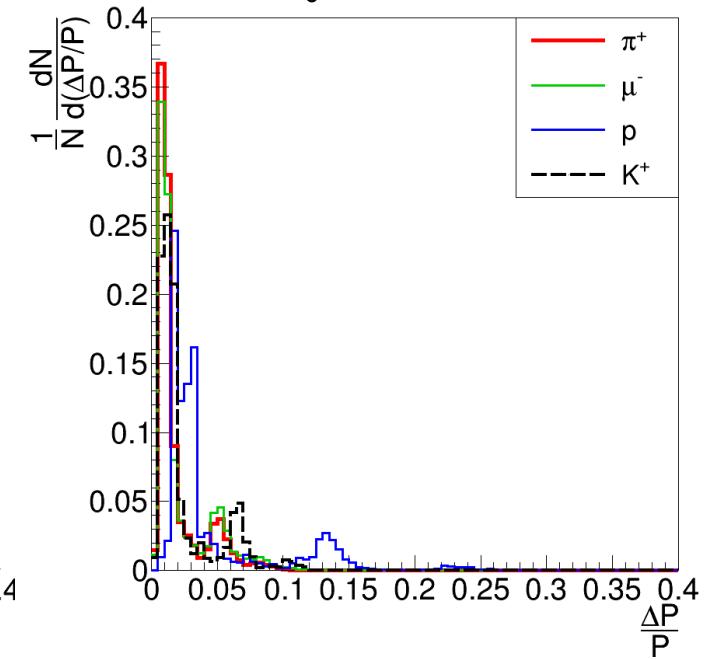
$P_0 = 300 \text{ MeV}$



$P_0 = 600 \text{ MeV}$



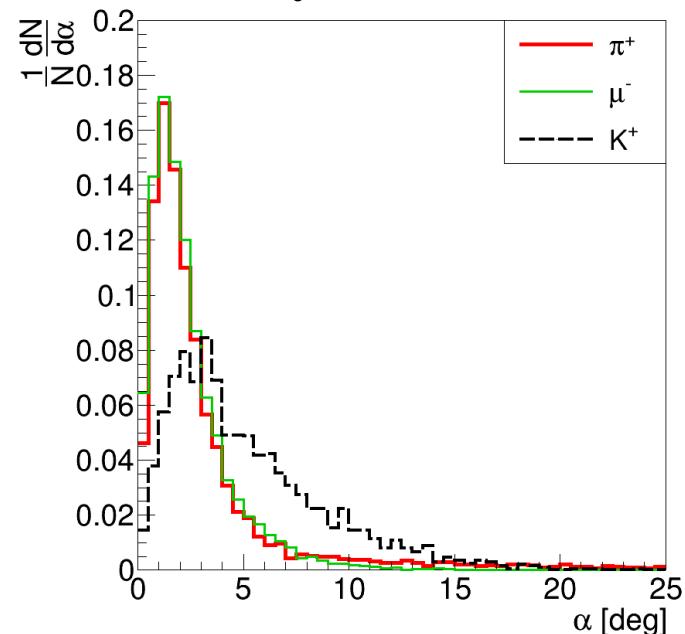
$P_0 = 900 \text{ MeV}$



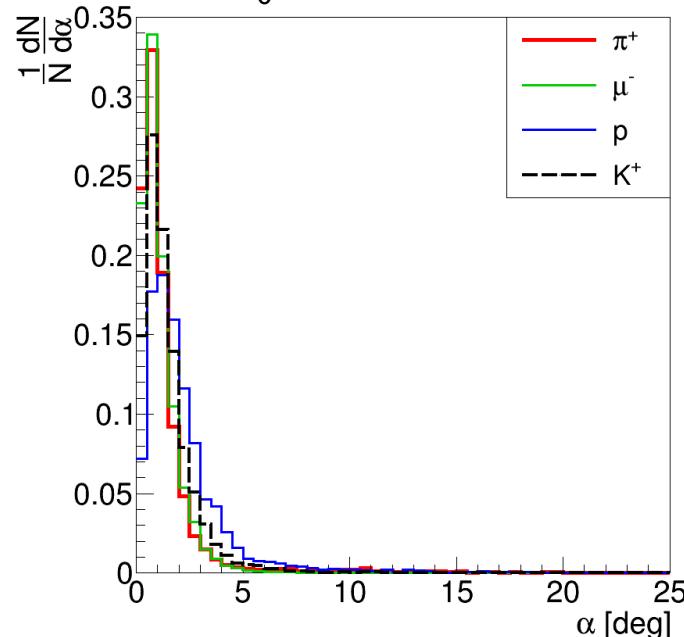
$$\Delta P = P_{\text{in}}^{\text{end-caps}} - P_{\text{out}}^{\text{end-caps}}$$

# Direction changes

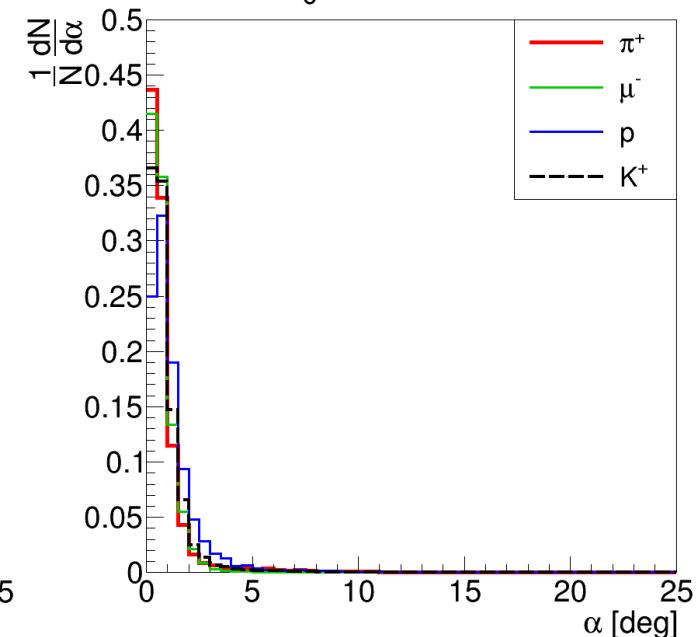
$P_0 = 300 \text{ MeV}$



$P_0 = 600 \text{ MeV}$



$P_0 = 900 \text{ MeV}$



$$\alpha = \widehat{\vec{P}_{\text{in}}^{\text{end-caps}}}, \widehat{\vec{P}_{\text{out}}^{\text{end-caps}}}$$



**Thank you  
for attention**