

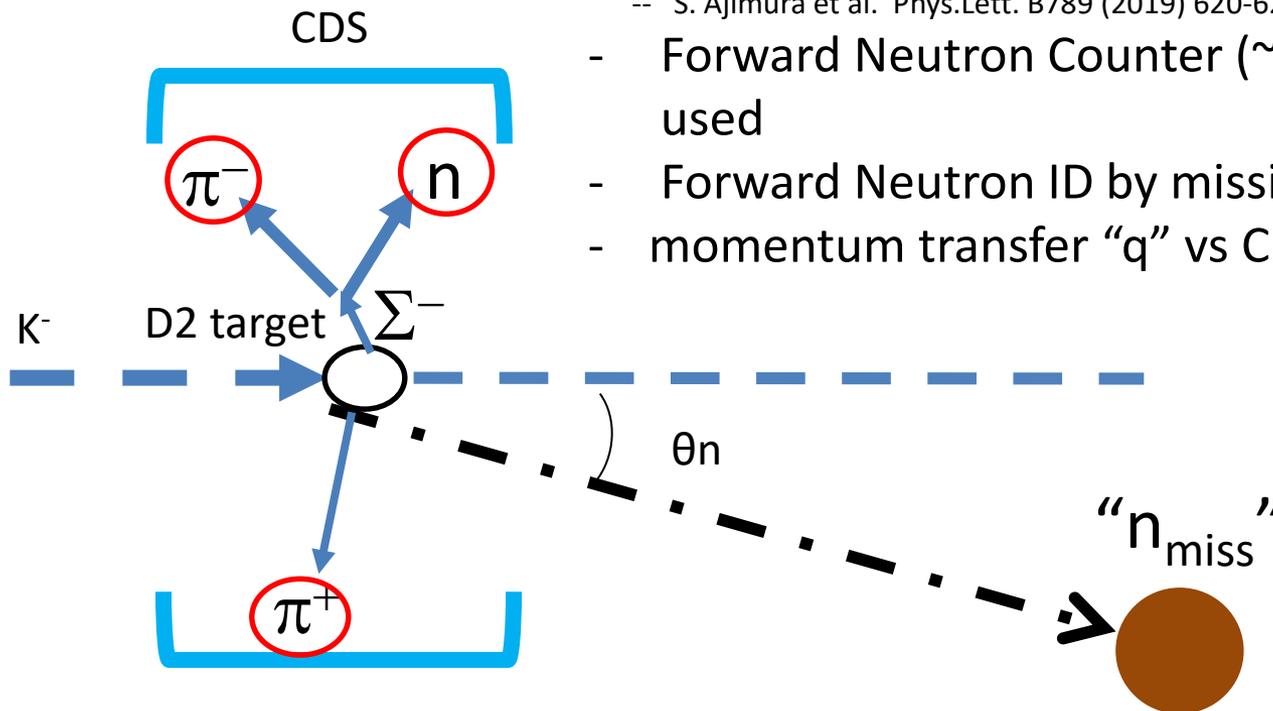
J-PARC E31実験における $\Lambda(1405)$ 生成の 運動量移行依存性

浅野秀光 (理化学研究所)
for the J-PARC E31 collaboration

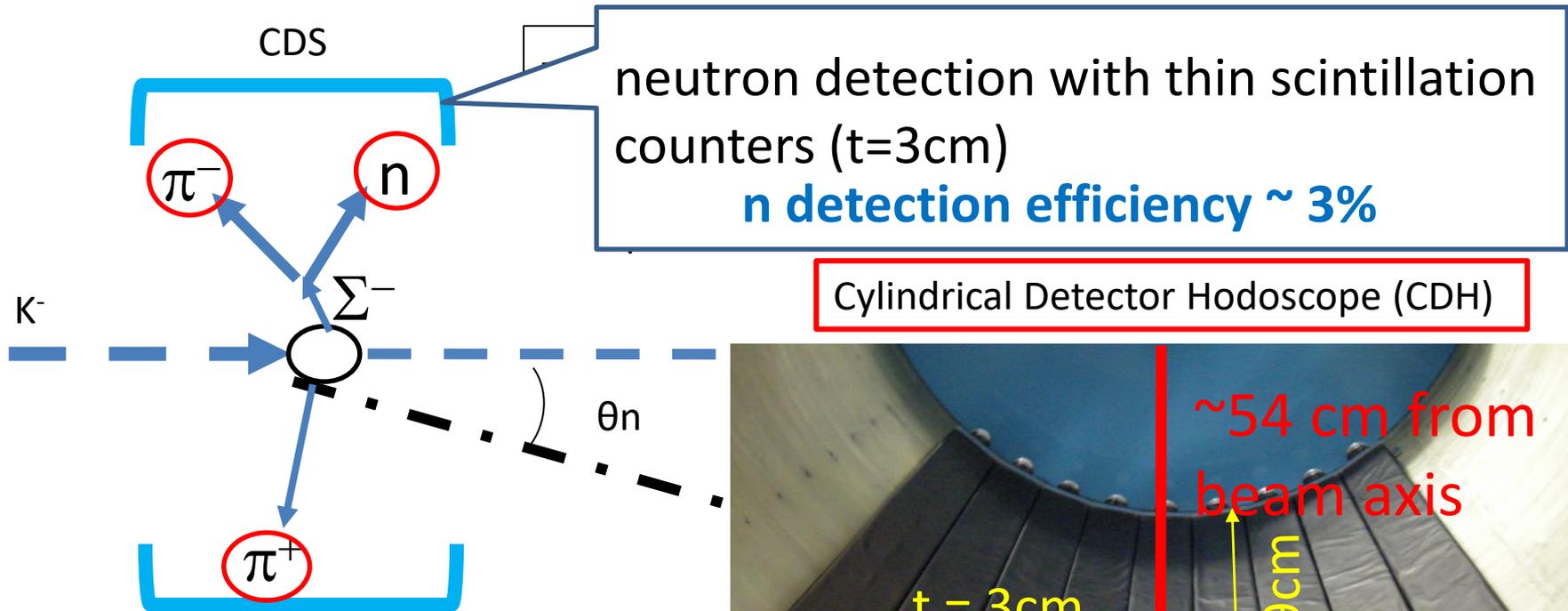


運動量移行 vs $\pi^\pm \Sigma^\mp$ 不変質量解析

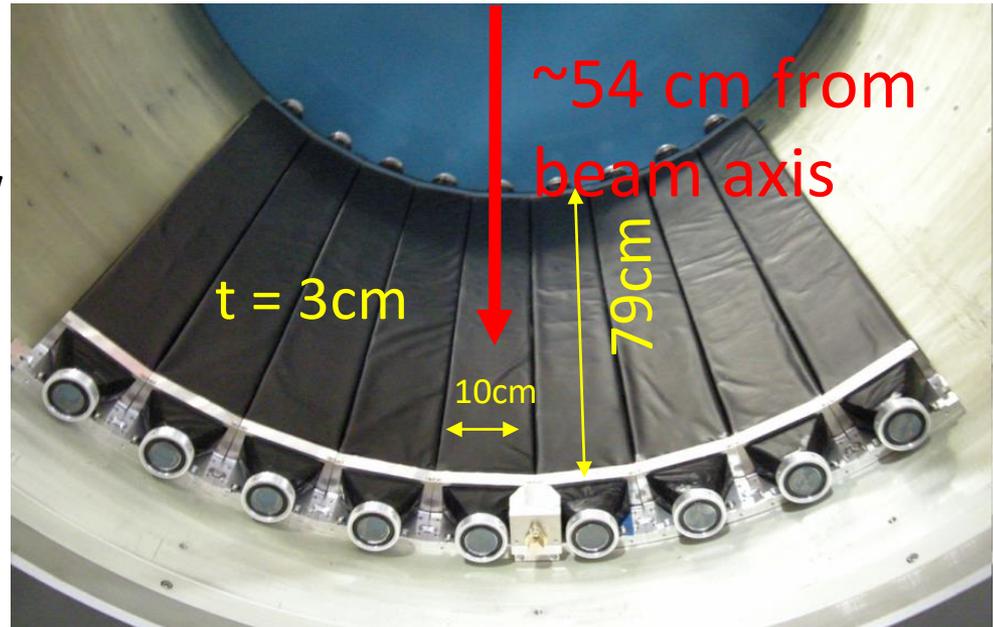
- Inspired by J-PARC E15 analysis
 - Y. Sada *et al.*, PTEP 2016 (2016) no.5, 051D01
 - S. Ajimura *et al.*, Phys.Lett. B789 (2019) 620-625
- Forward Neutron Counter (~ 20 msr, 0 degree) is not used
- Forward Neutron ID by missing mass
- momentum transfer “q” vs C.S. $\Lambda(1405)$



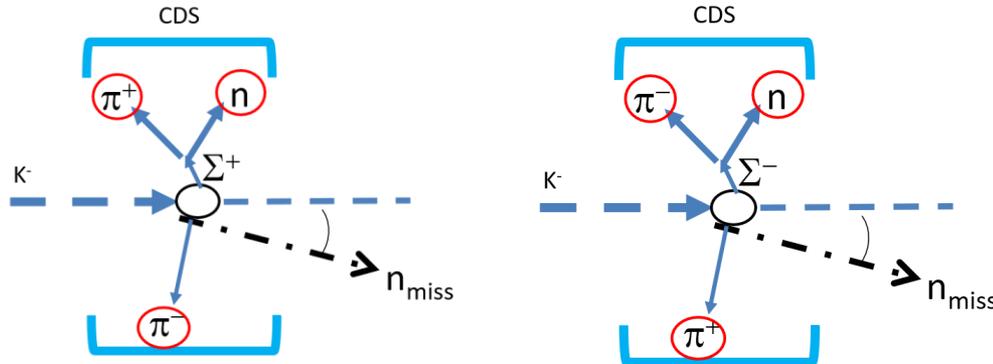
CDSによる中性子検出



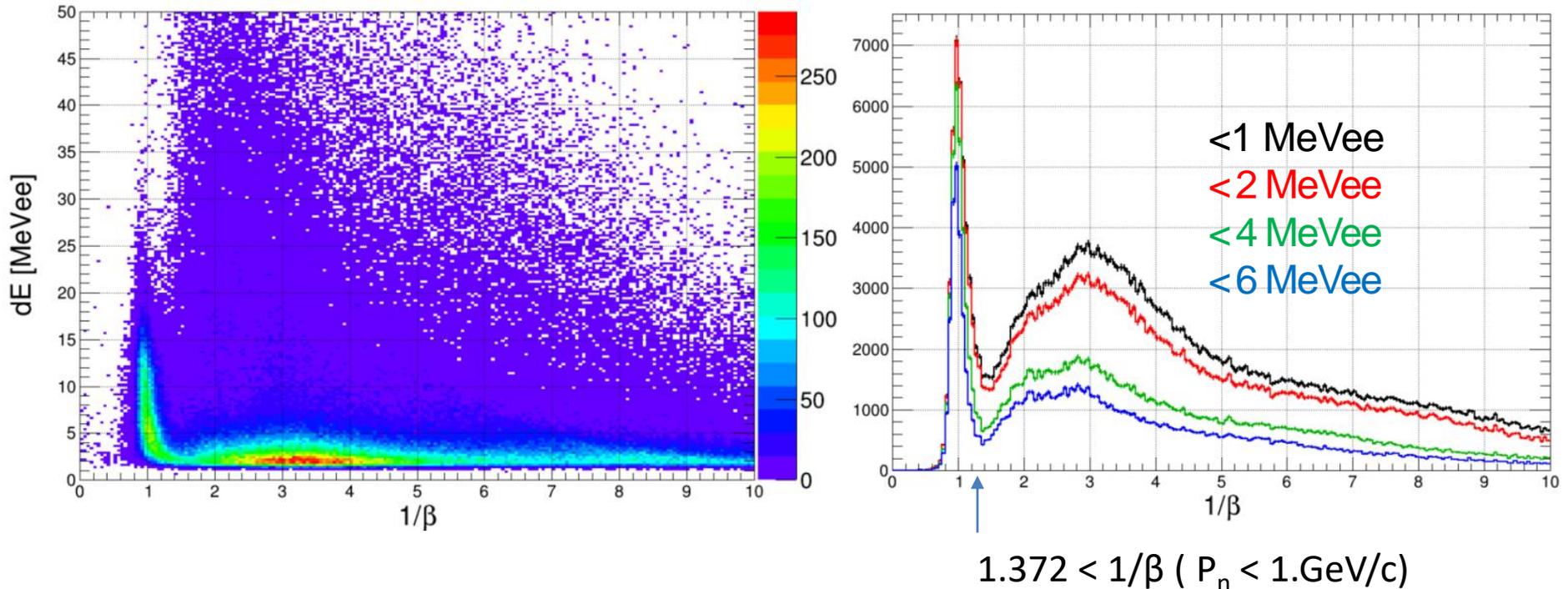
Cylindrical Detector Hodoscope (CDH)



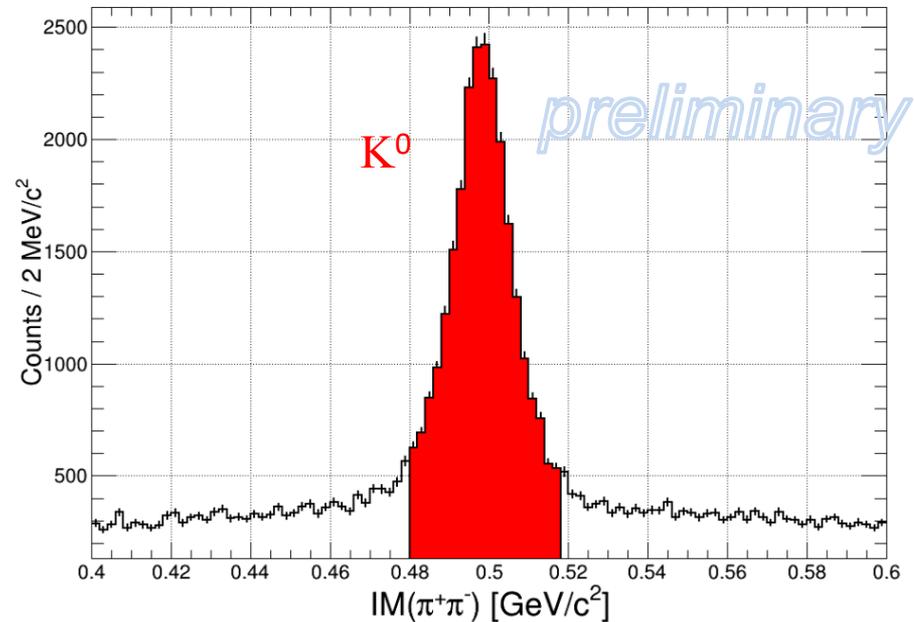
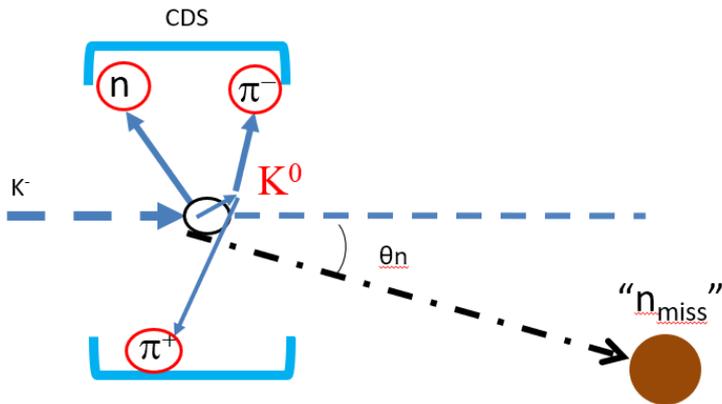
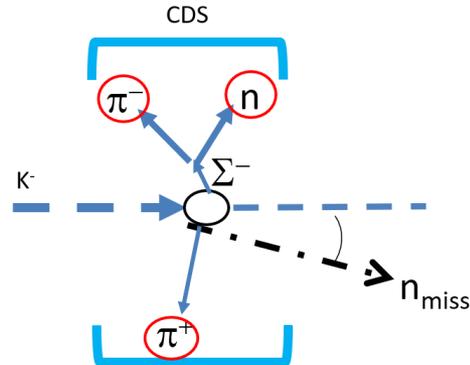
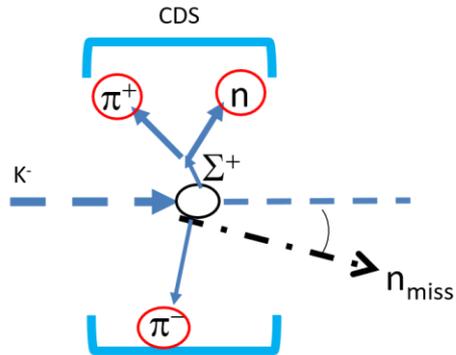
CDSによる中性子検出



- CDH hit = 3
- Found π^+ and π^-
- Charge veto by Cylindrical drift chamber



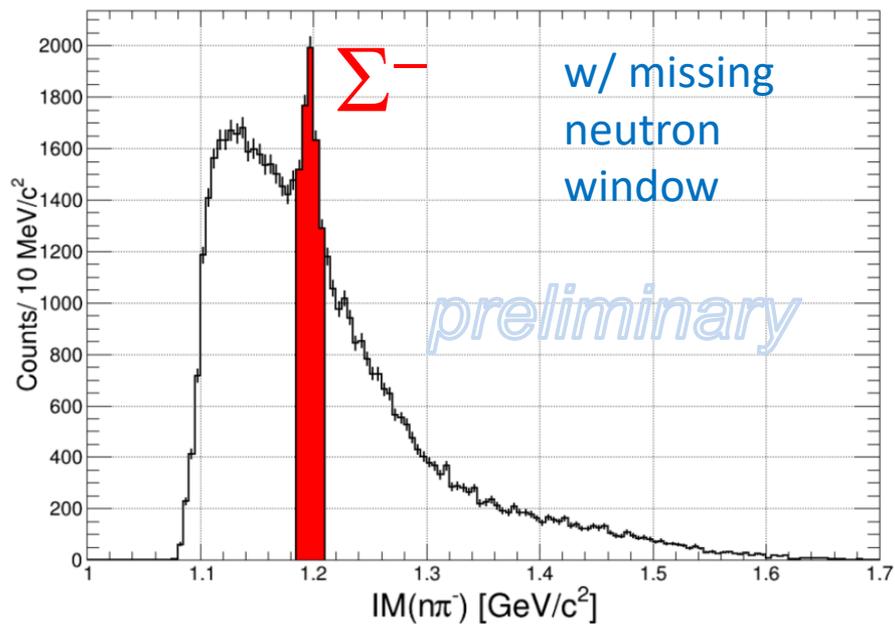
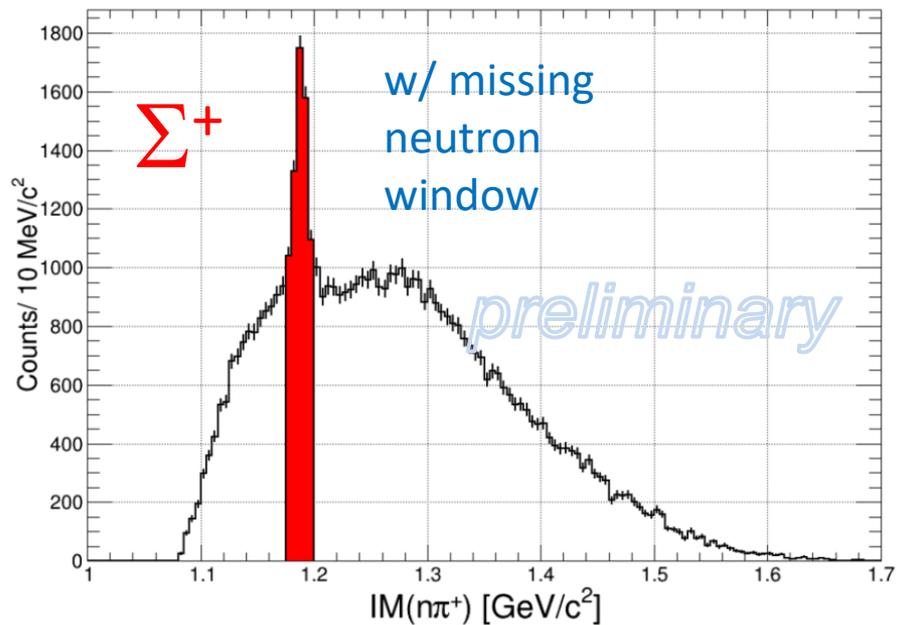
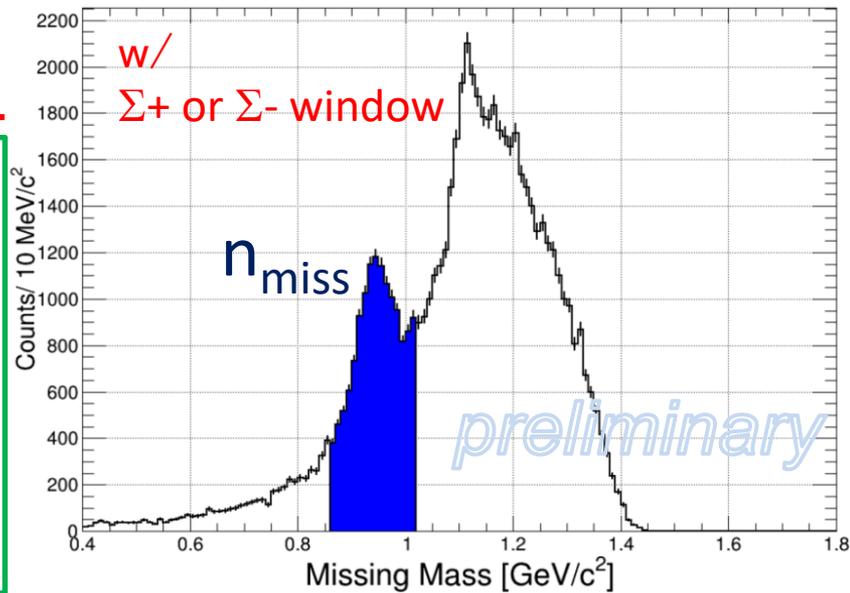
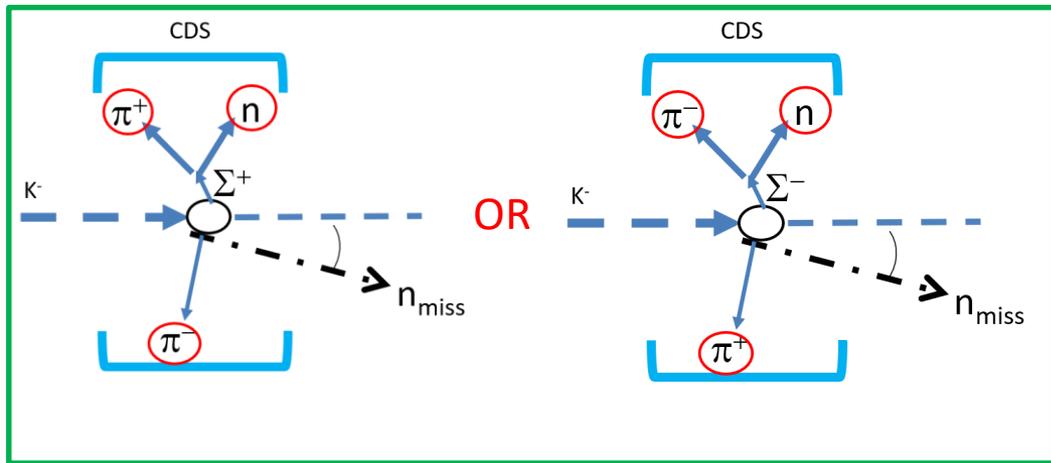
イベント選択 ($K^-d \rightarrow K^0nn$ イベント排除)



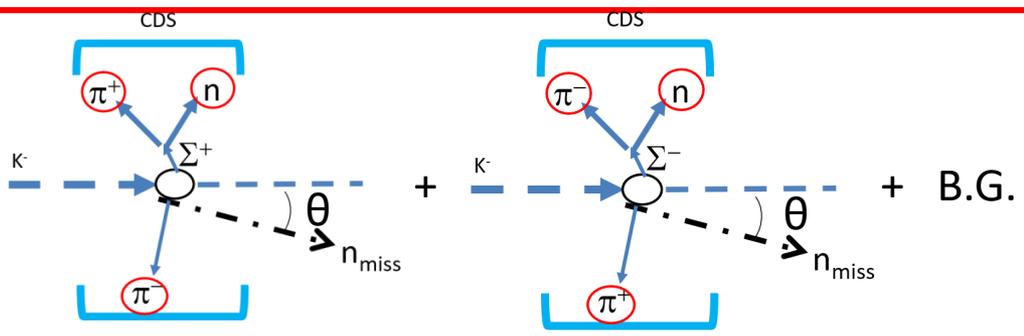
イベント選択

$d(K^-, \pi^+ \pi^- n) X$

6

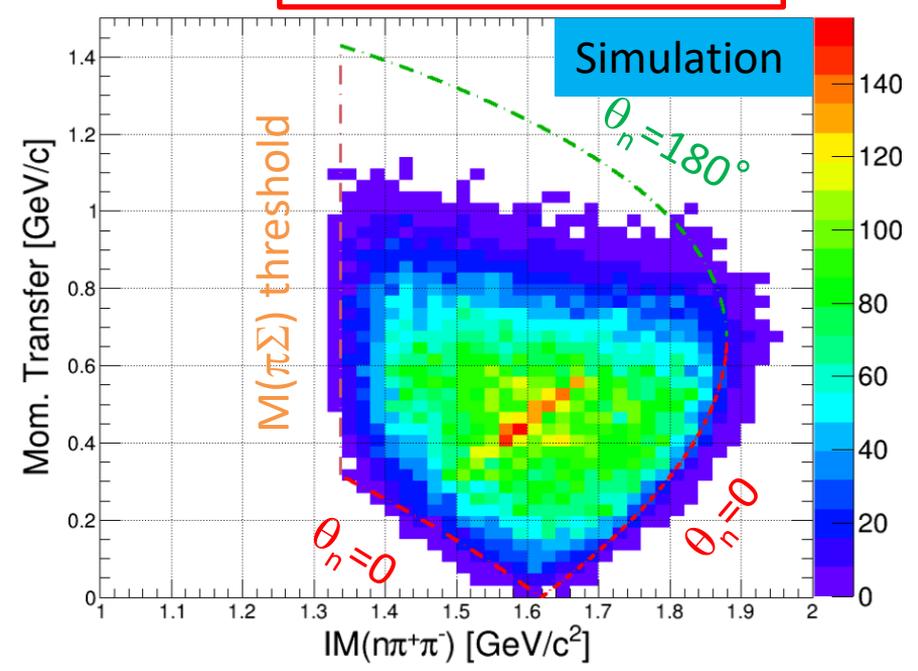
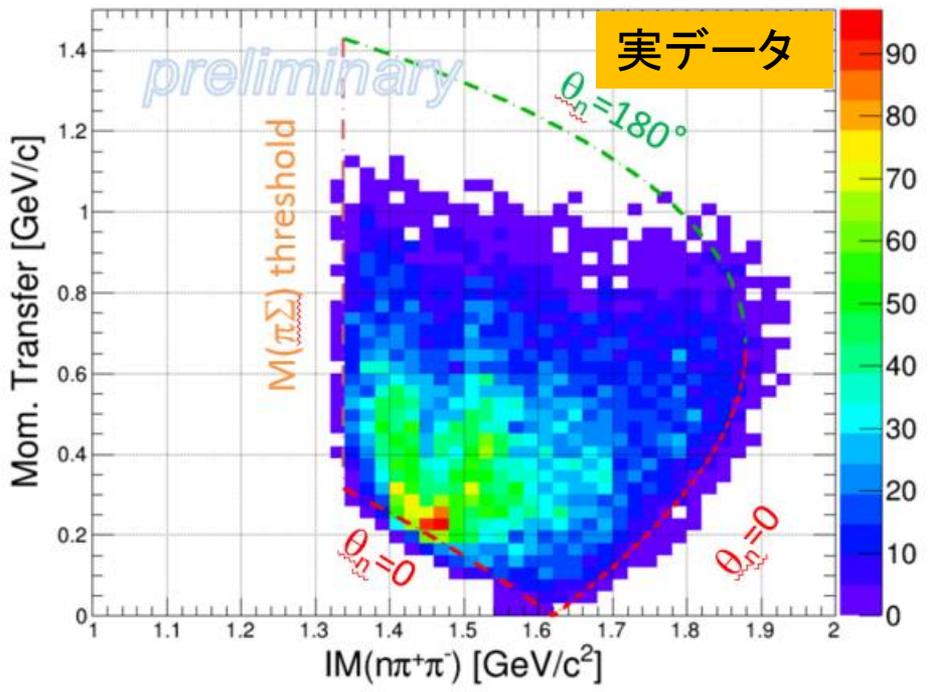


運動量移行 vs $\pi^\pm \Sigma^\mp$ 不変質量

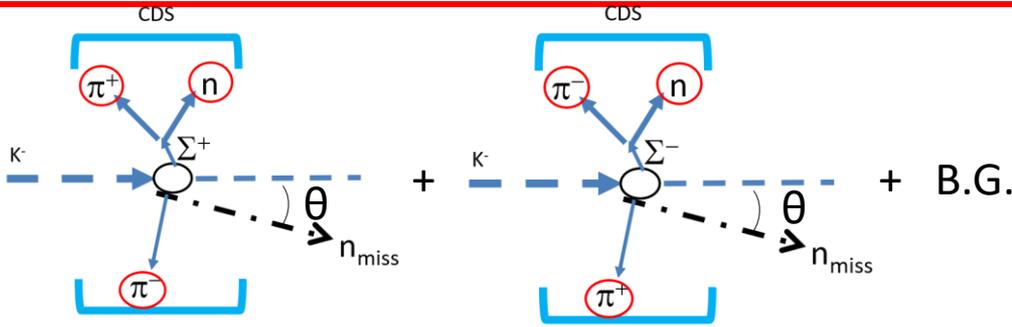


Mom. Transfer(q) = $|\vec{K} - \vec{n}_{miss}|$
 (Lab. Frame)

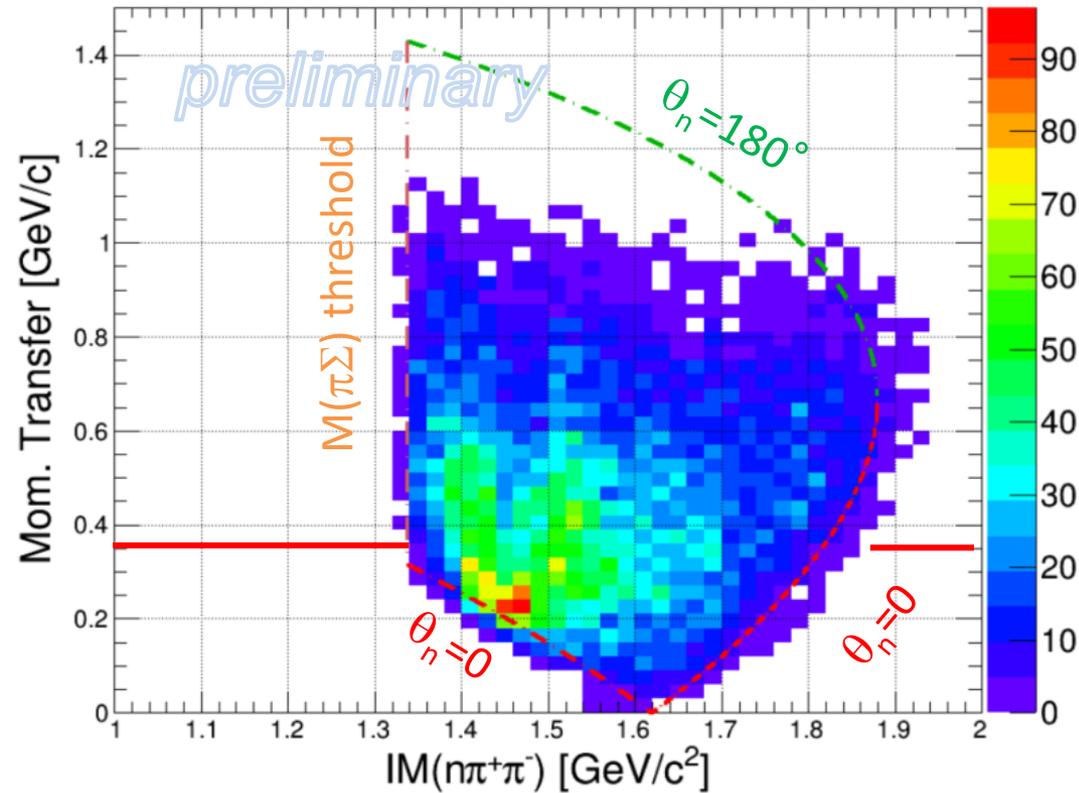
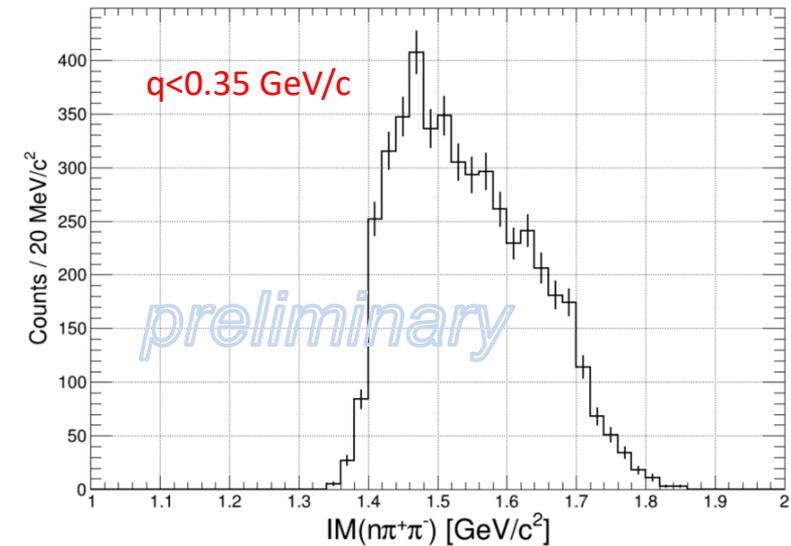
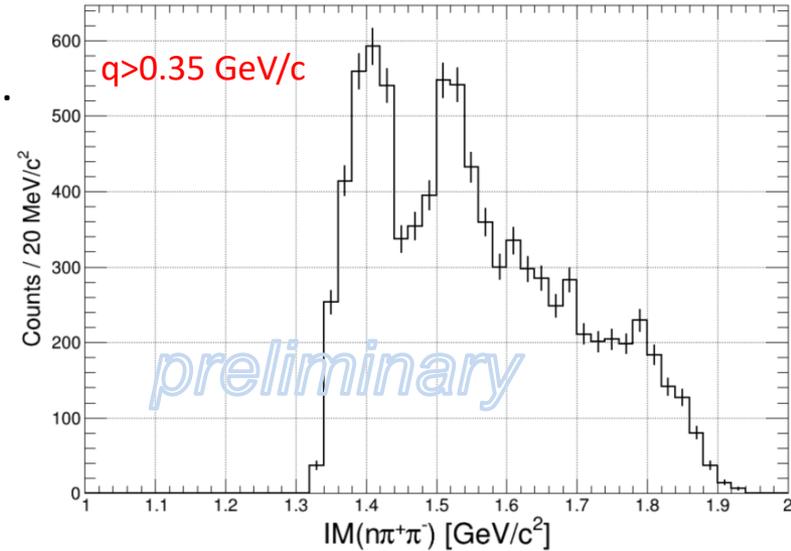
$\pi^- \Sigma^+ n$ phase space
 \otimes
 acceptance



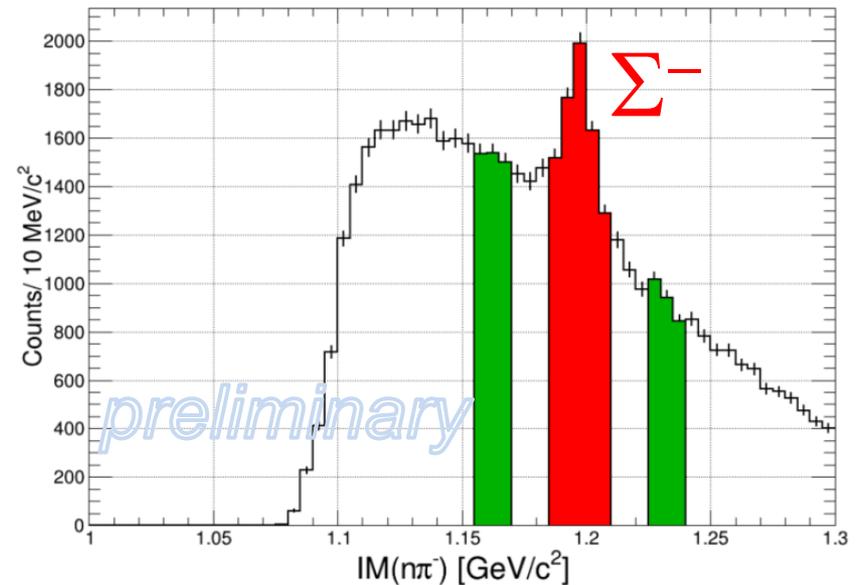
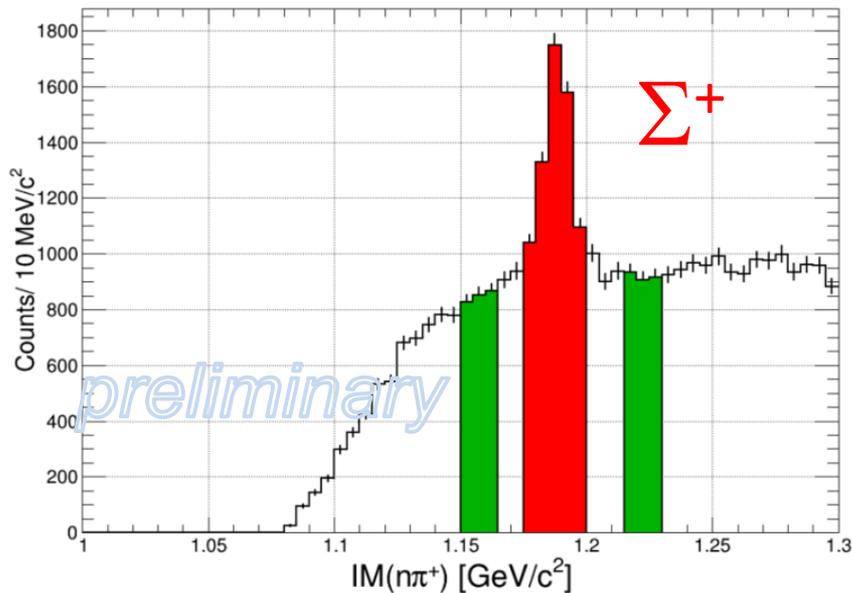
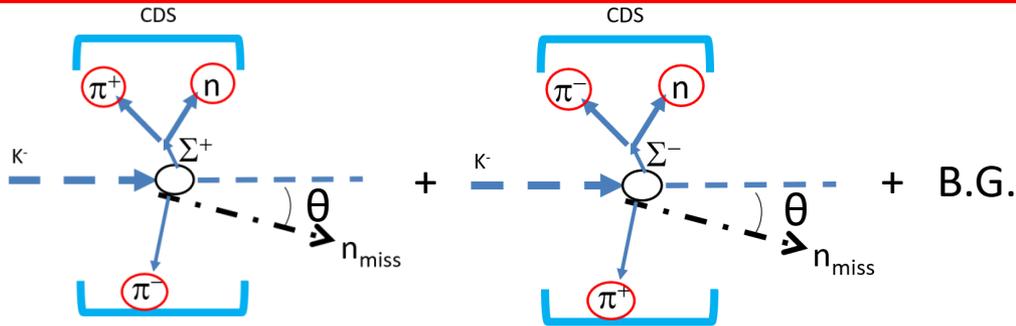
運動量移行 vs $\pi^\pm \Sigma^\mp$ 不変質量



$$\text{Mom. Transfer}(q) = |\vec{K} - \vec{n}_{\text{miss}}|$$



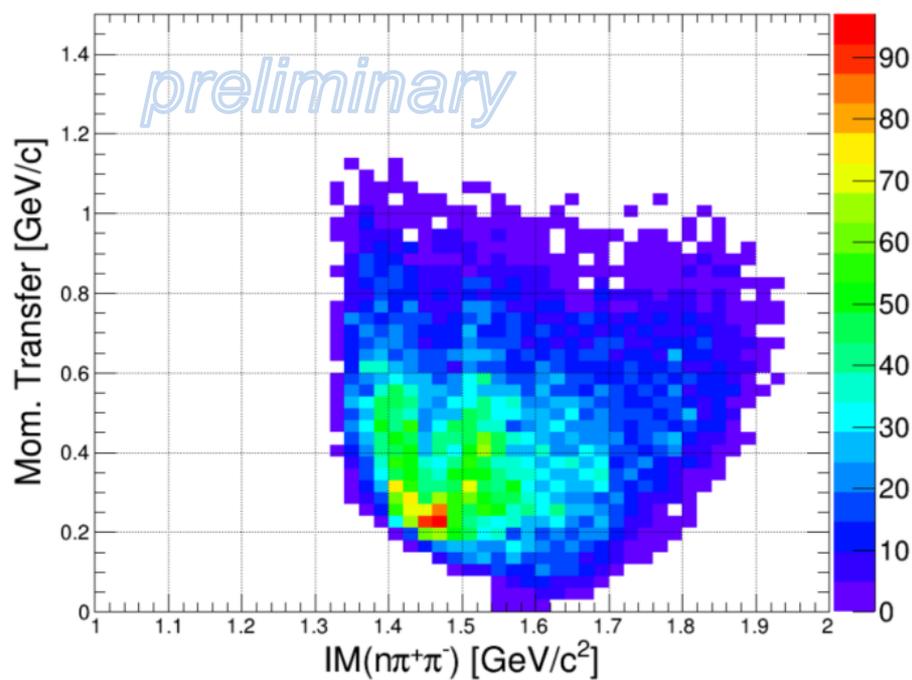
Sideband 法によるBackground 見積もり



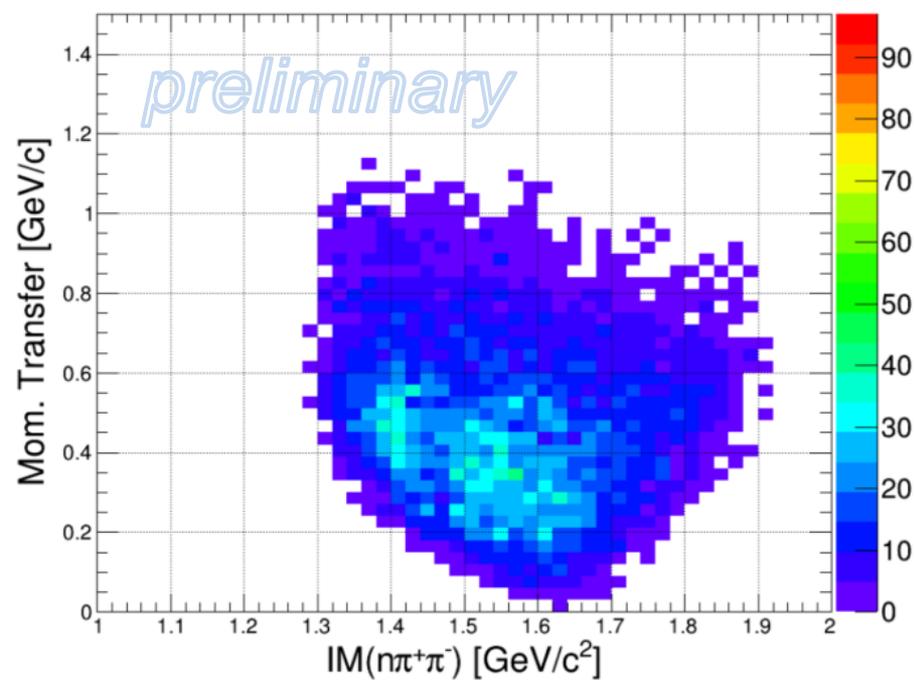
- Sideband 法によるBackground 見積もりのために緑の部分を選択

Sideband との比較

Foreground (+B.G.)

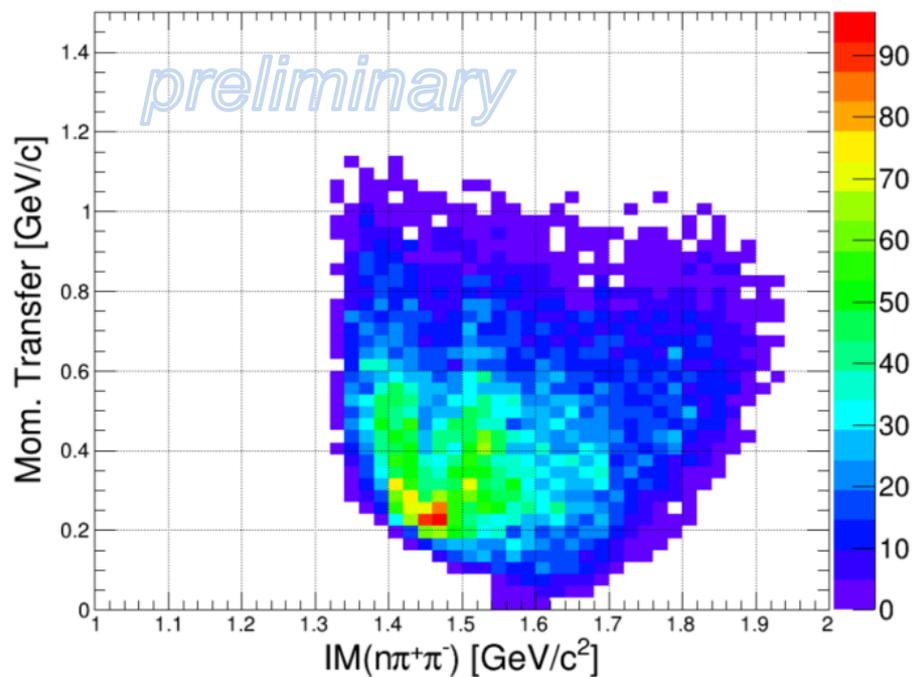


Sideband

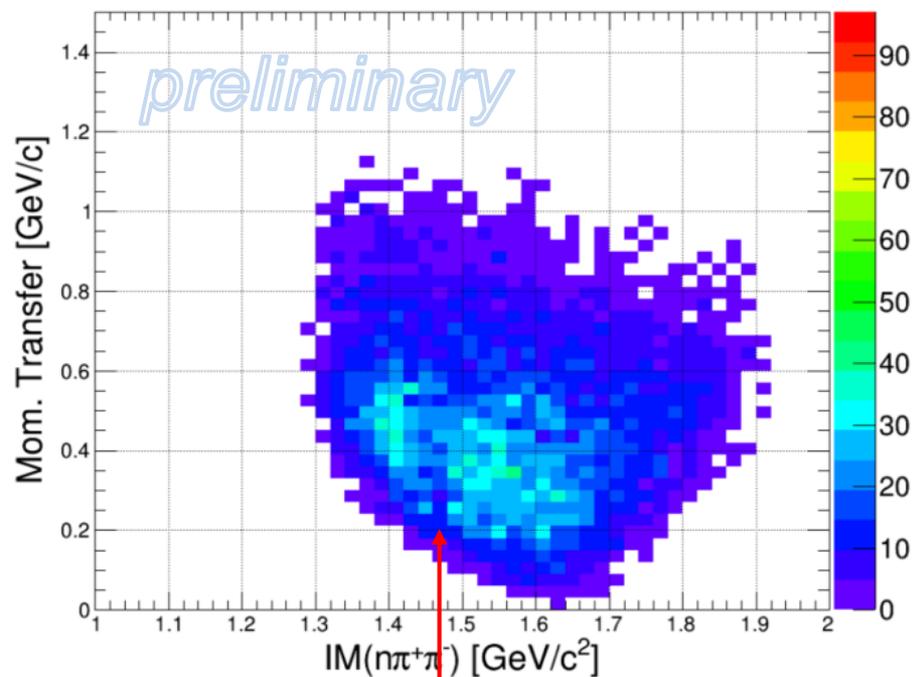


Sideband との比較

Foreground (+B.G.)

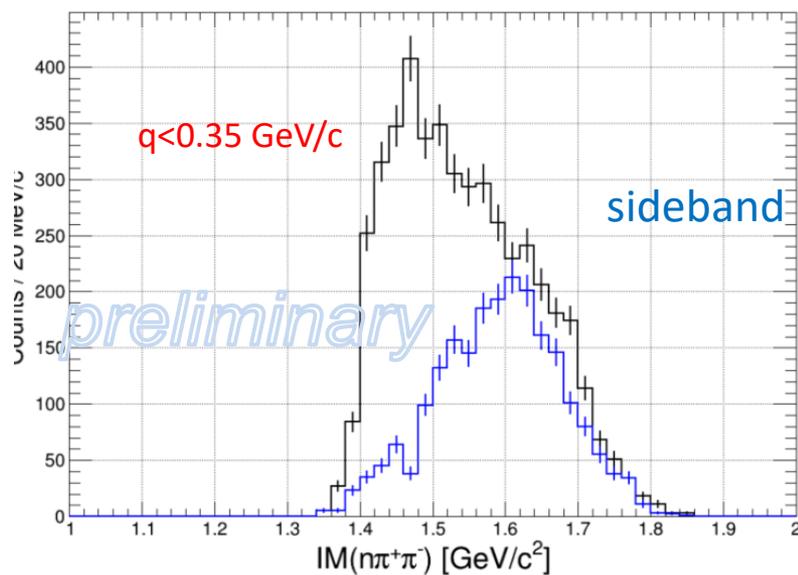
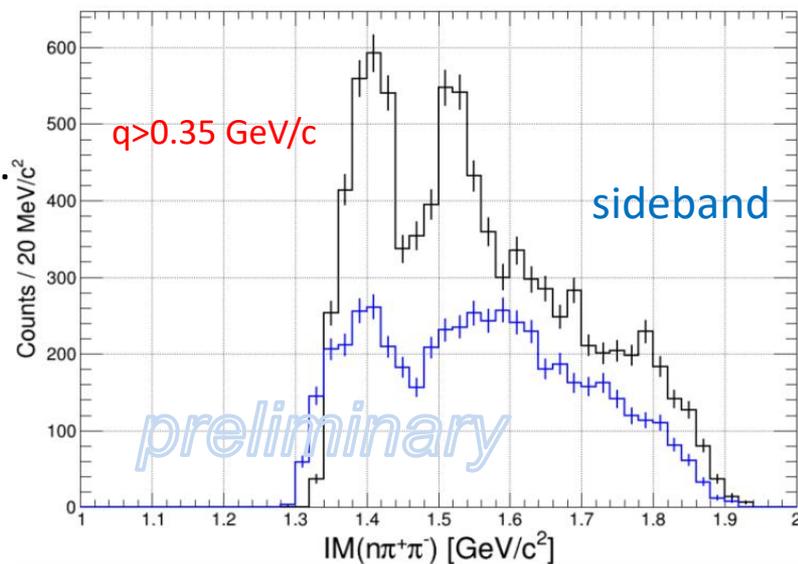
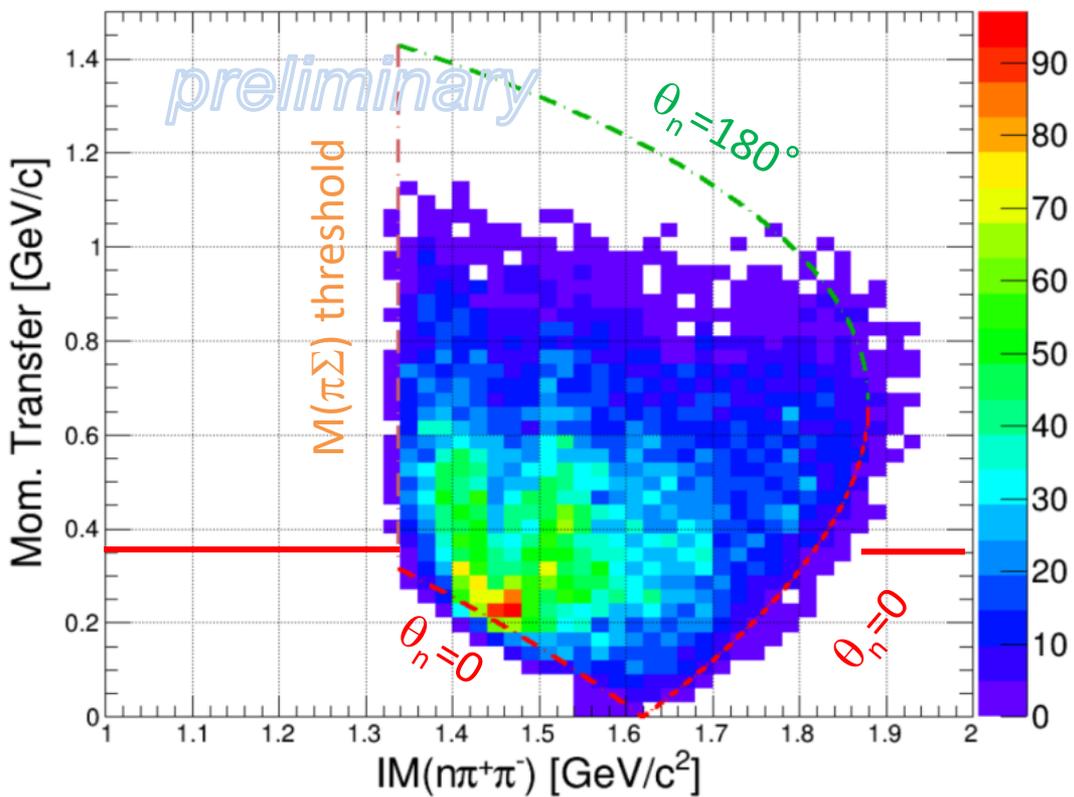
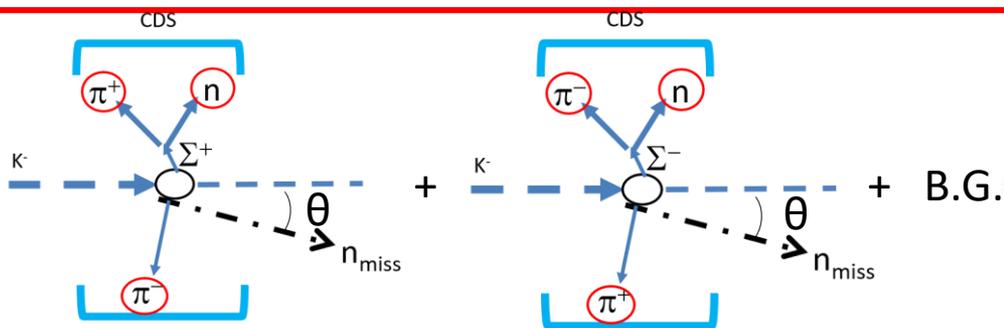


Sideband

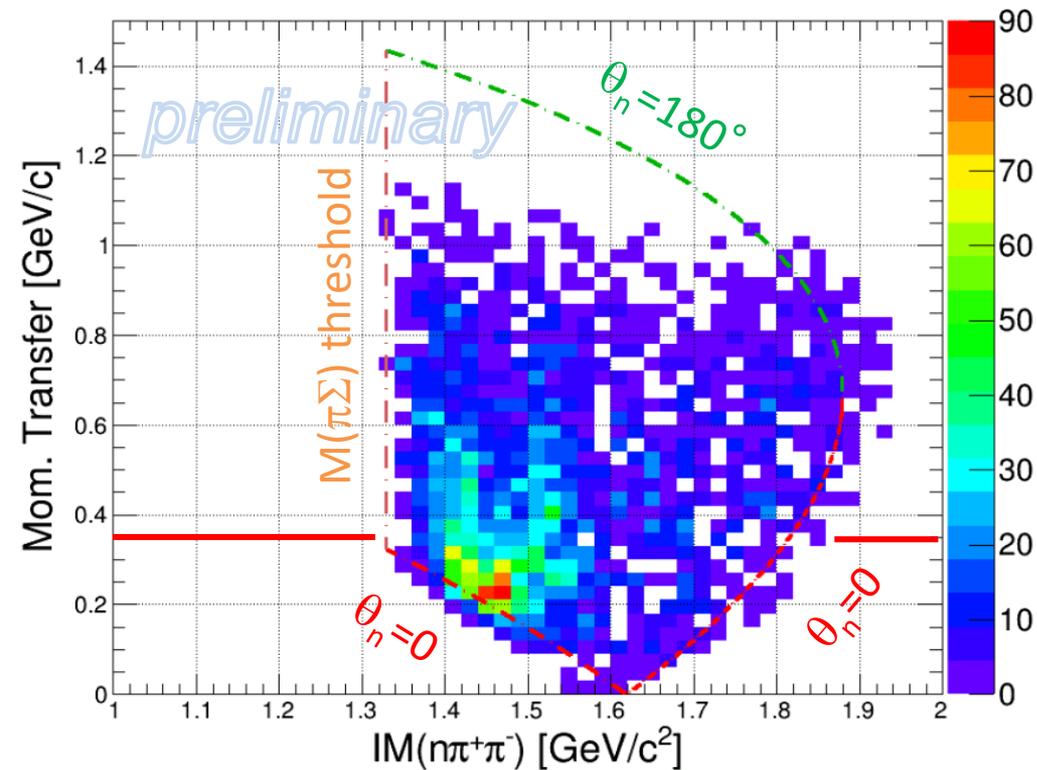
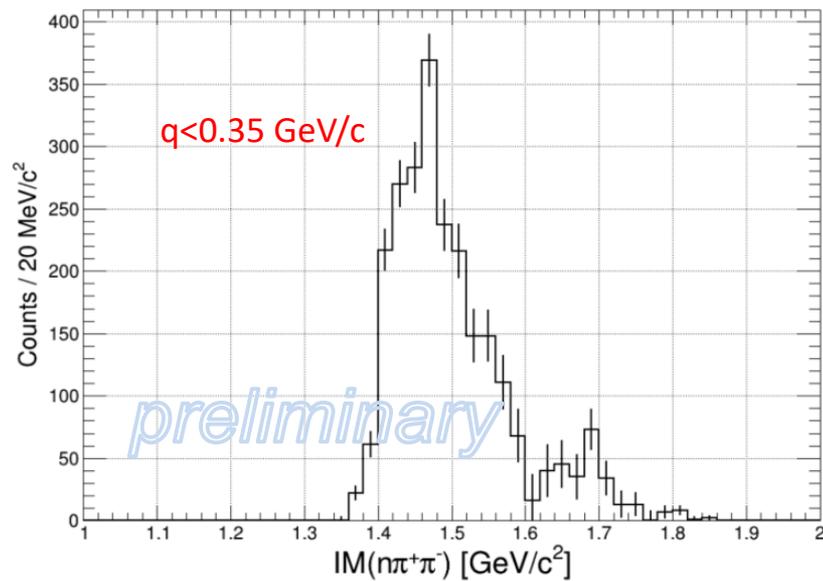
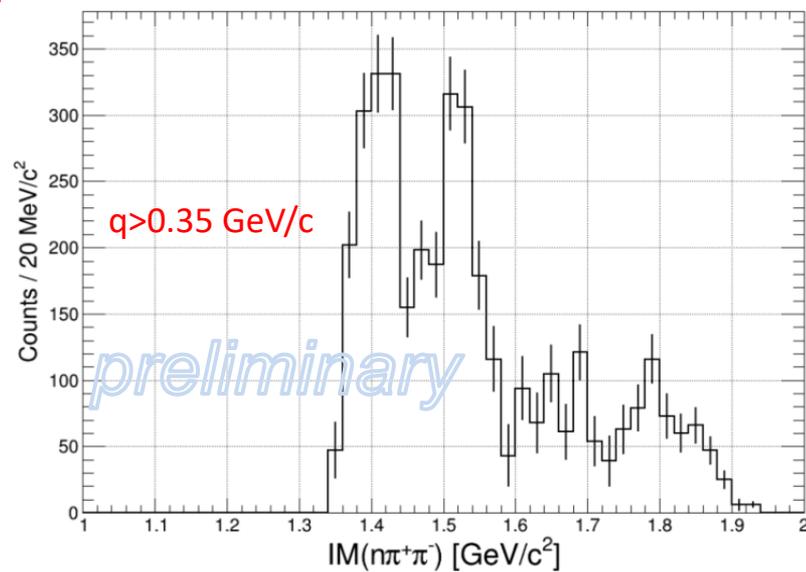
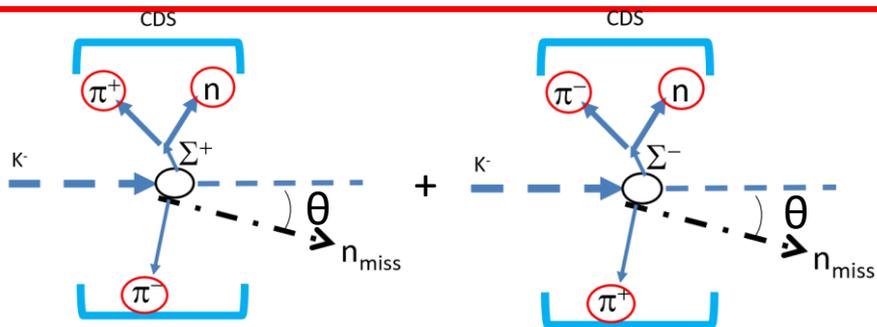


K-d \rightarrow K0nn イベントカットによるアクセプタンスの減少(最大2割程度)

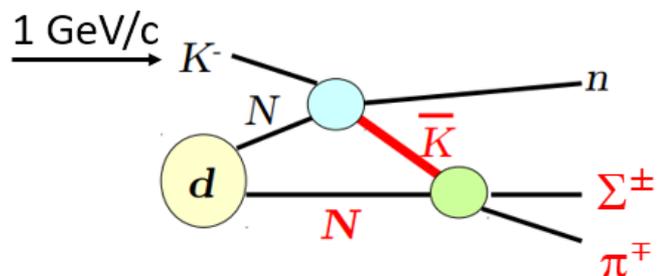
Sidebandとの比較



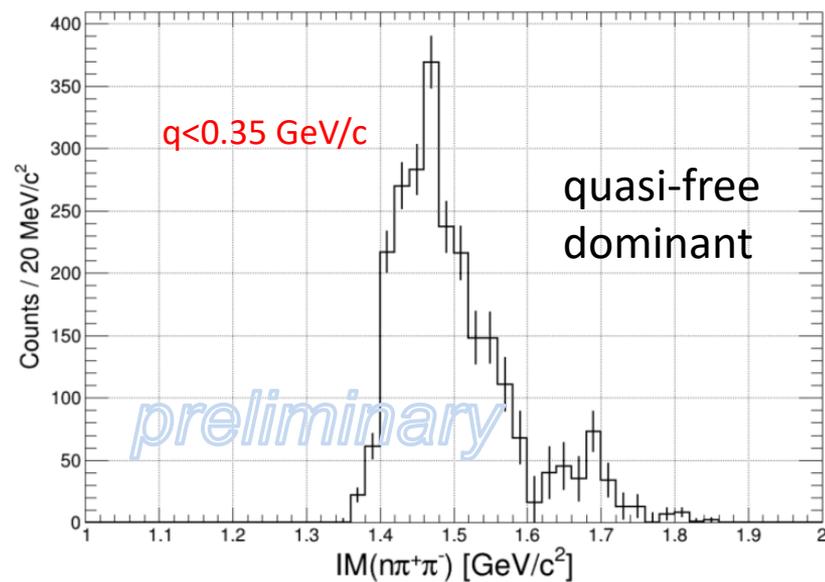
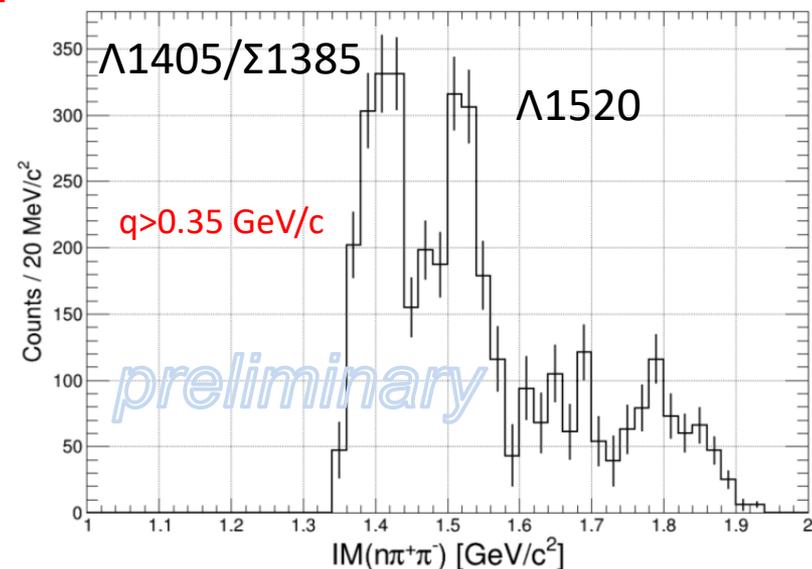
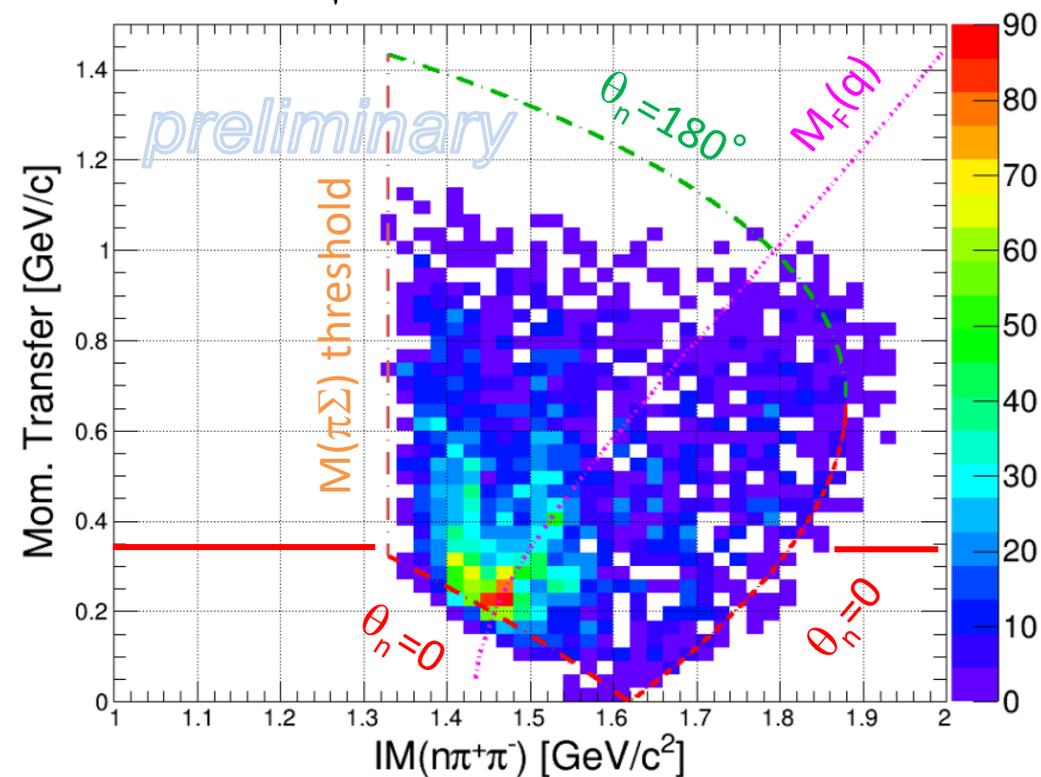
Sideband 差し引き後



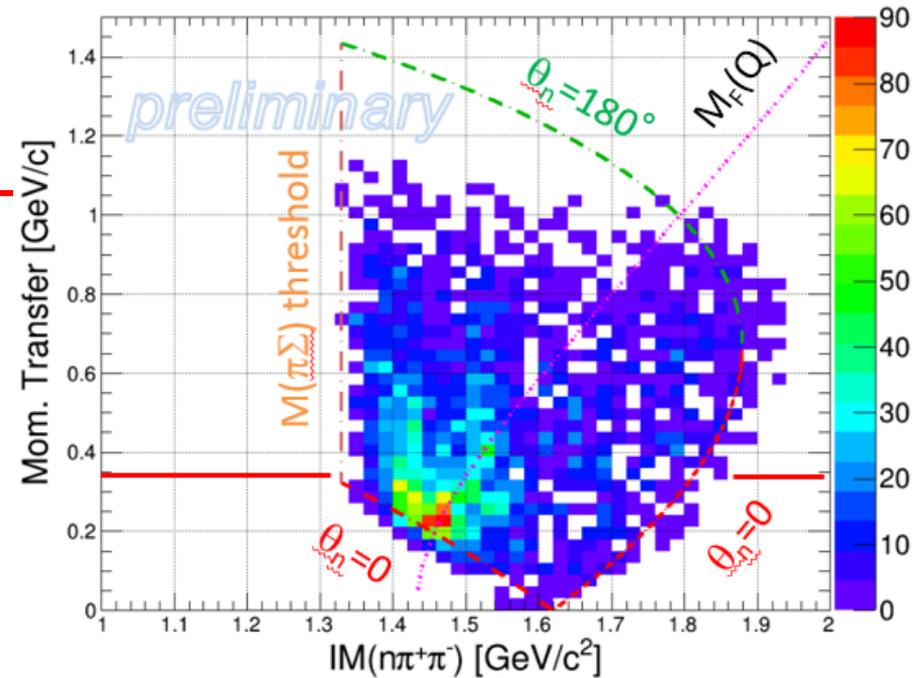
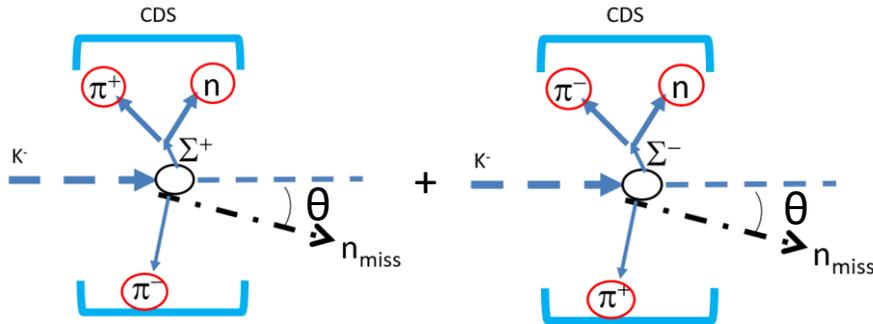
Sideband 差し引き後 (解釈)



$$M_F(q) = \sqrt{M_p^2 + M_K^2 + 2M_p \sqrt{m_K^2 + q^2}}$$

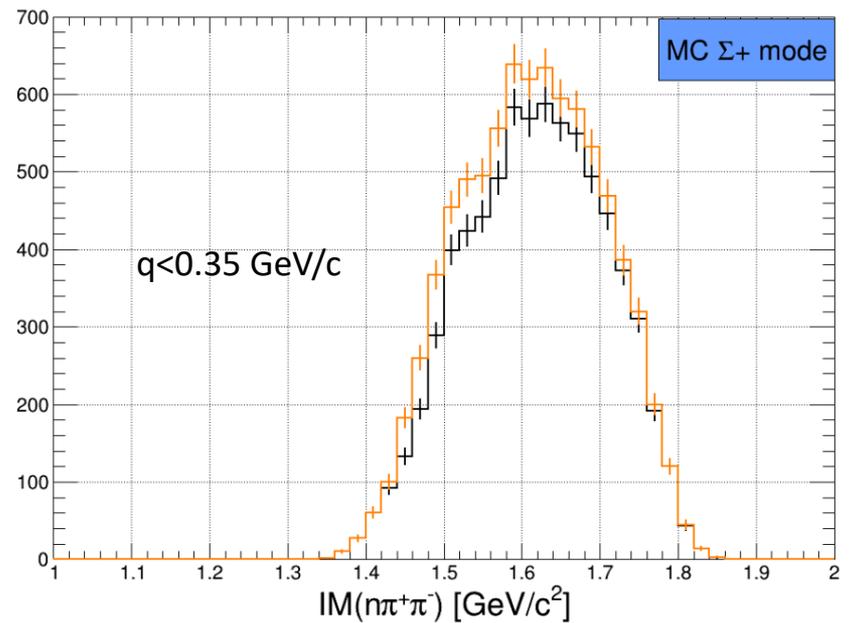
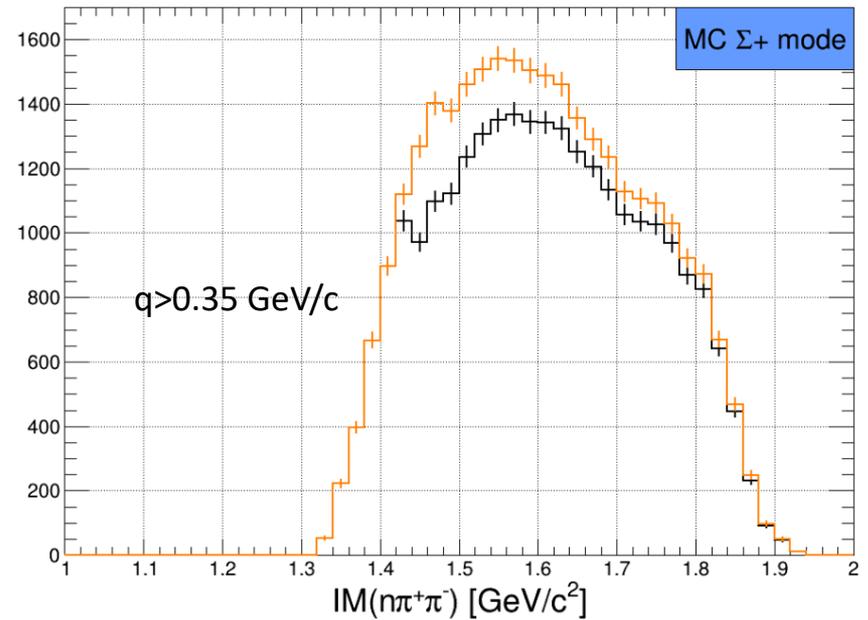


まとめ



- J-PARC E31実験で $\text{IM}(\pi^+\Sigma^-/\pi^-\Sigma^+)$ の運動量移行依存性を測定
- $\Lambda(1405)/\Sigma(1385)$ に対応するピークを観測
- 今後
 - $\Sigma(1385) \rightarrow \Lambda\pi$ チャンネルの解析
 - $\pi^+\Sigma^-$ と $\pi^-\Sigma^+$ 状態の分離、生成断面積の計算

K0 acceptance



イベント選択

