

Search for Σ^0 with HADES

Status Update, 7th October 2016

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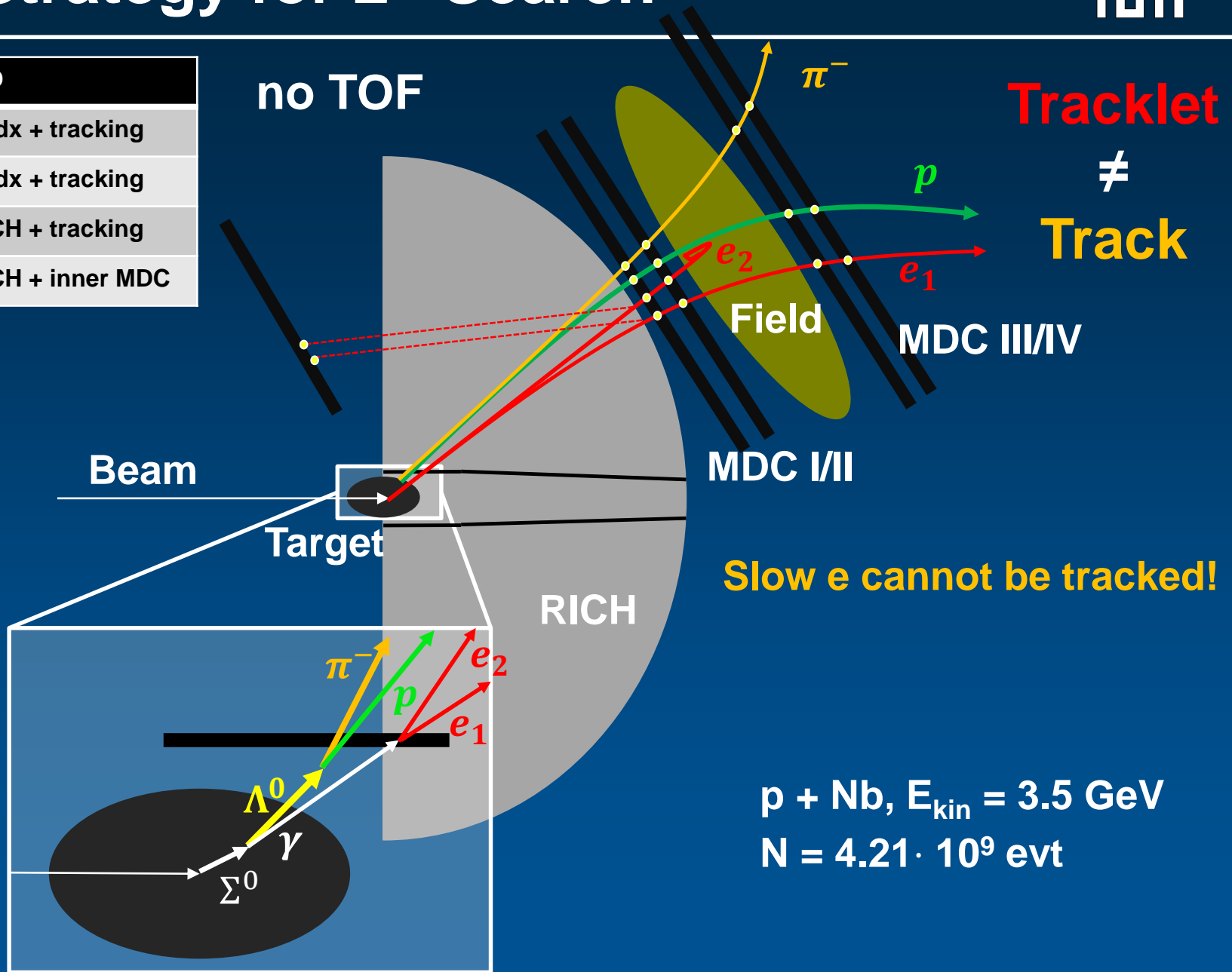


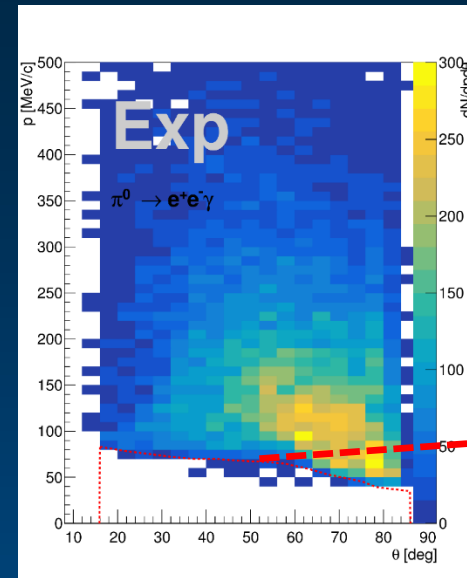
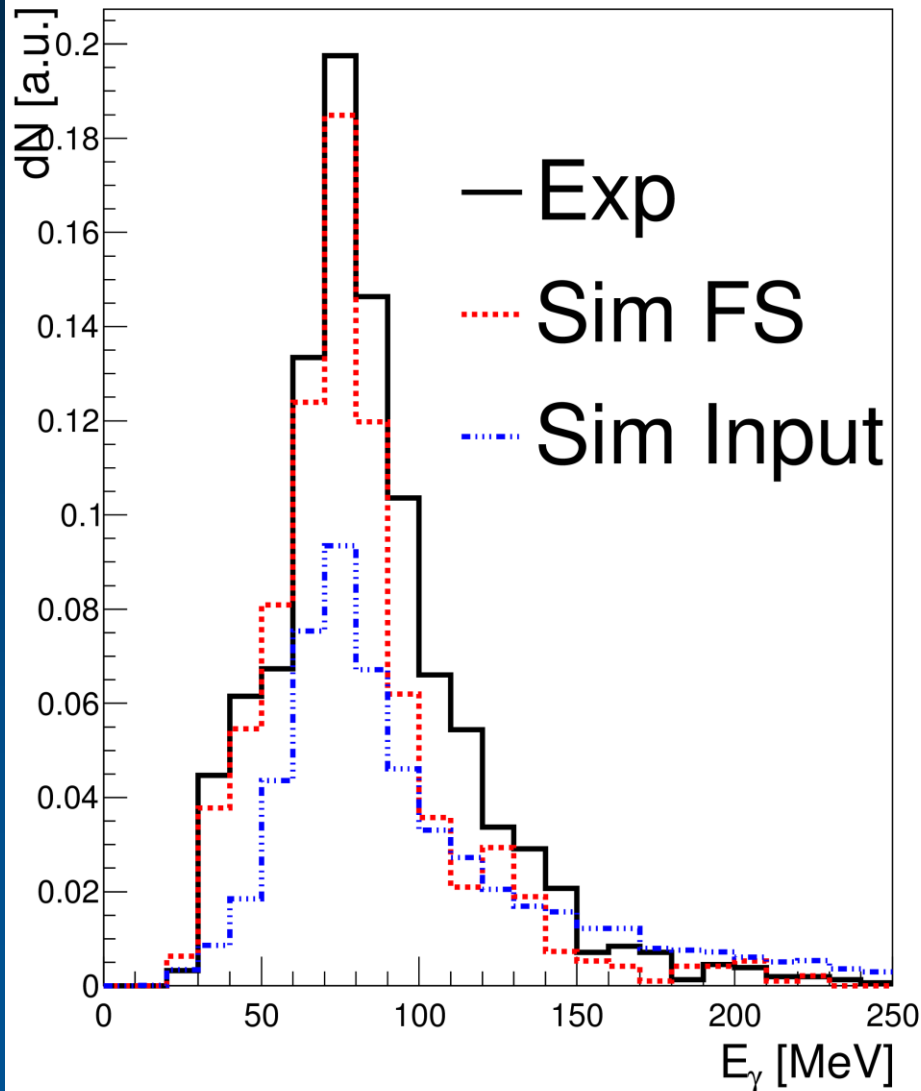


Strategy for Σ^0 Search

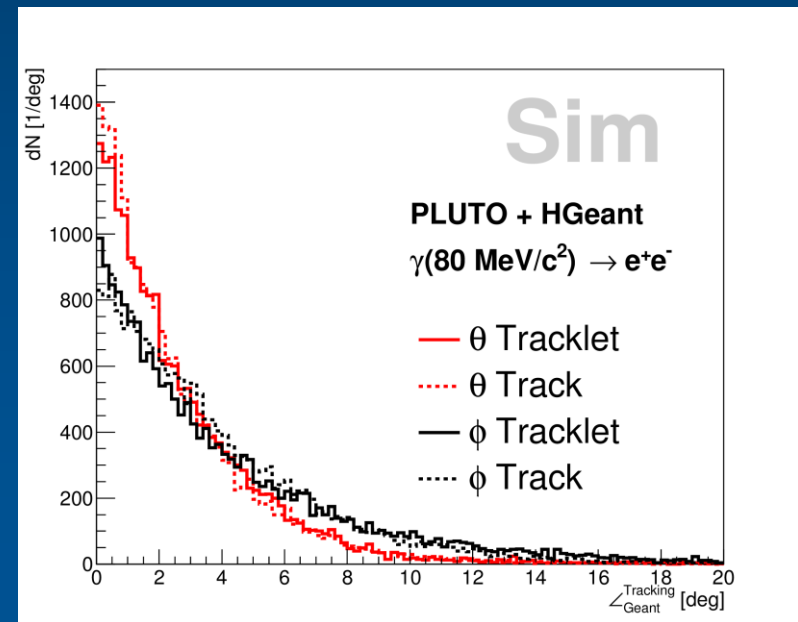
TUM

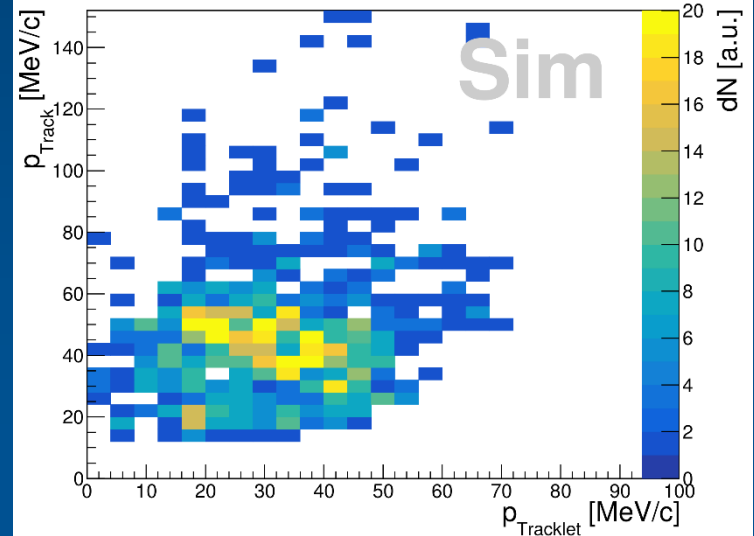
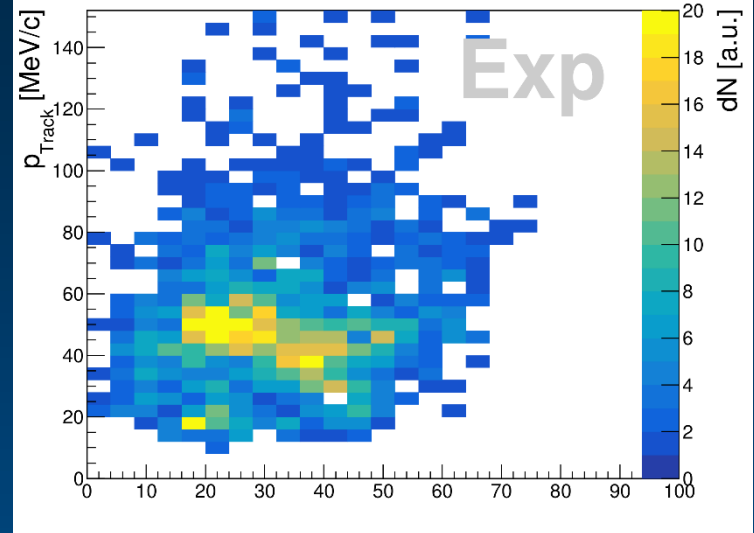
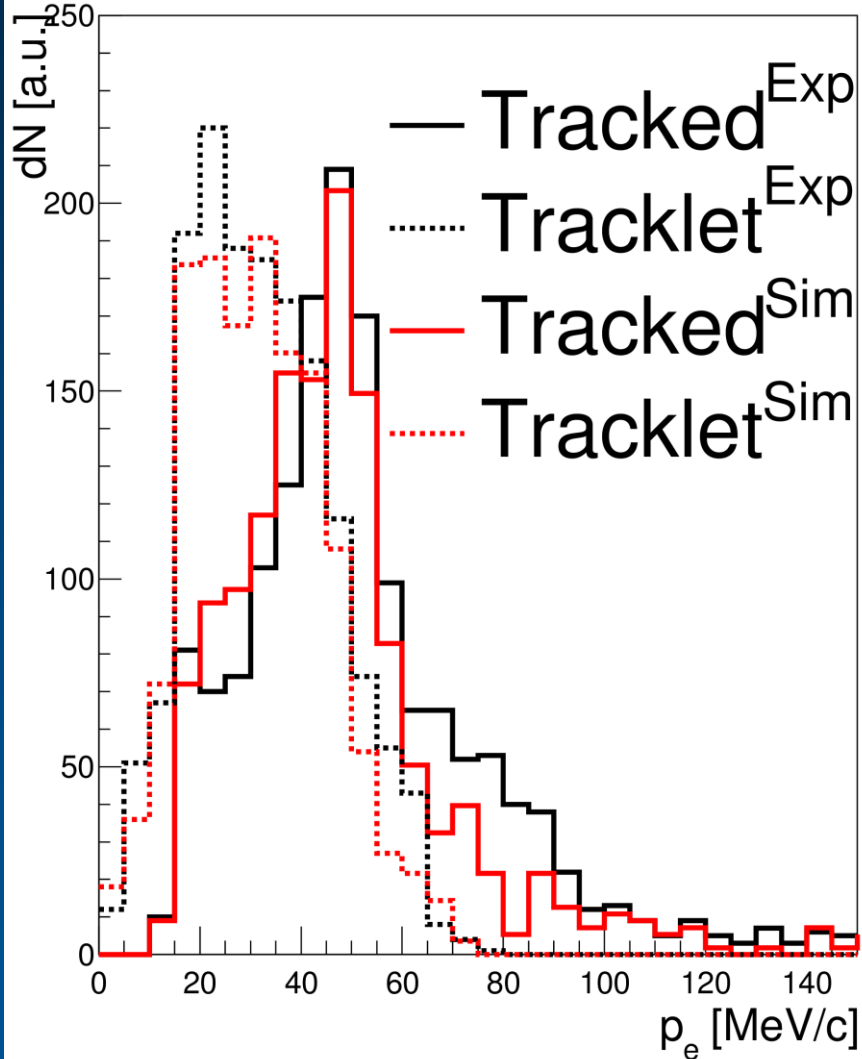
Particle	PID
p	dEdx + tracking
π^-	dEdx + tracking
e_1	RICH + tracking
e_2	RICH + inner MDC

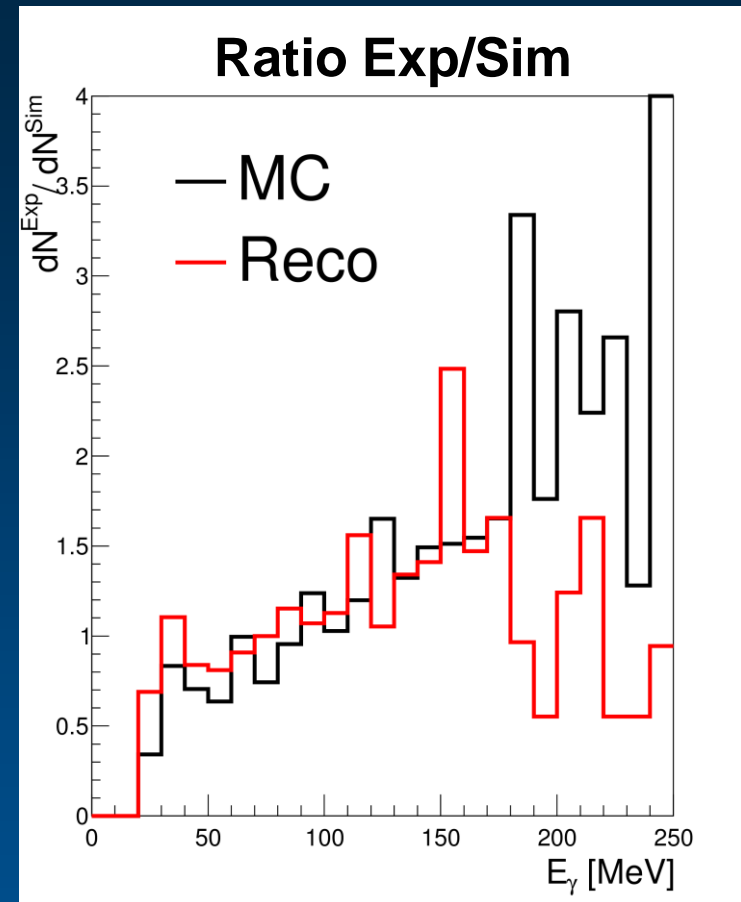
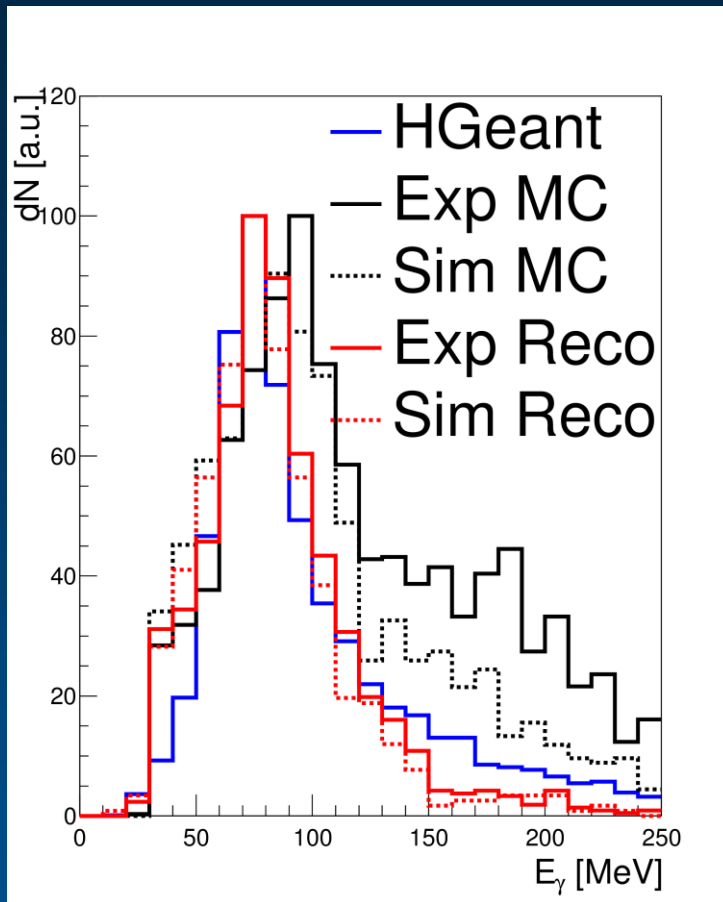




Tracking limit for e







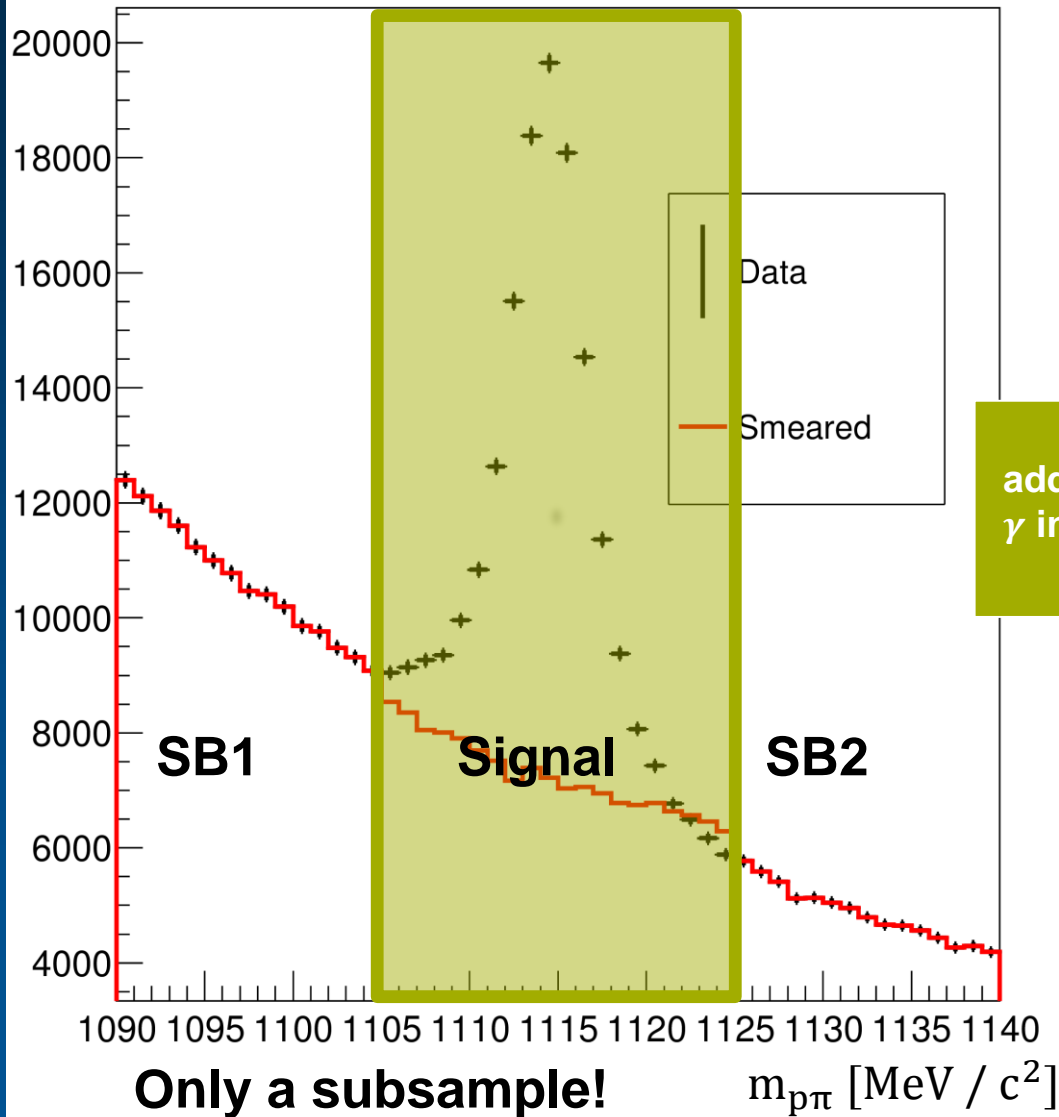
MC p_{tracklet}

- calc e_{tracklet} p randomly
- Probability from pluto
- No event hypothesis!

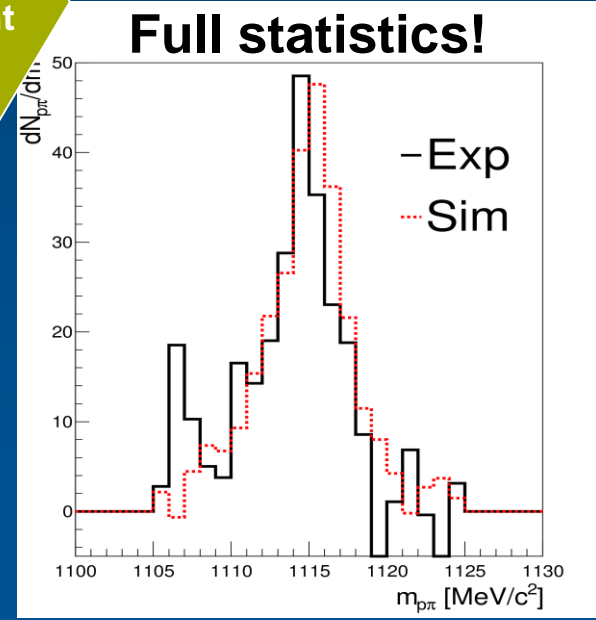
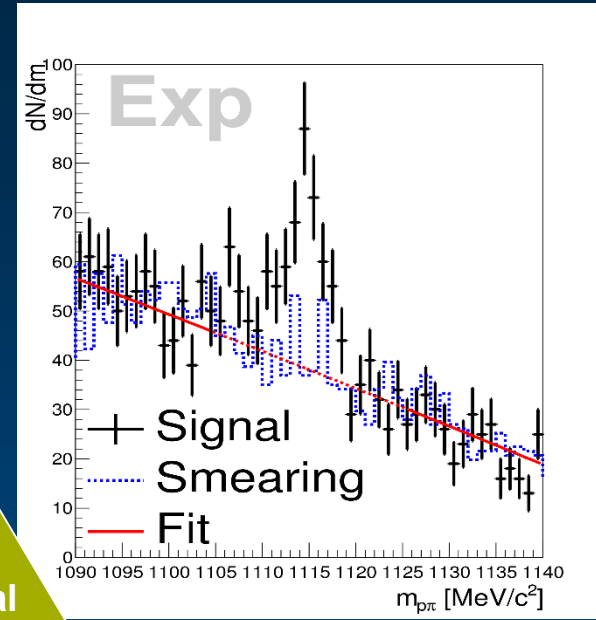


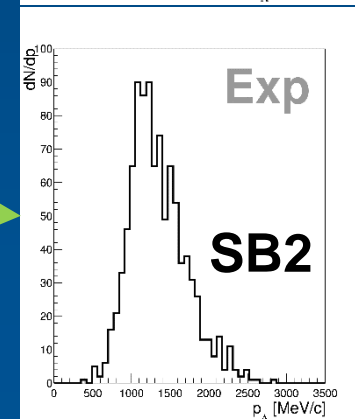
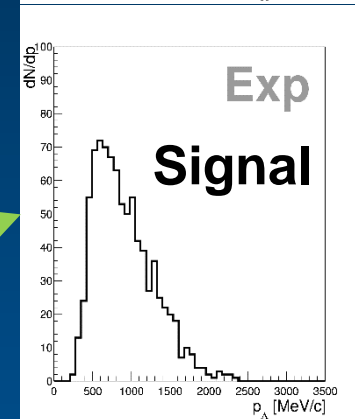
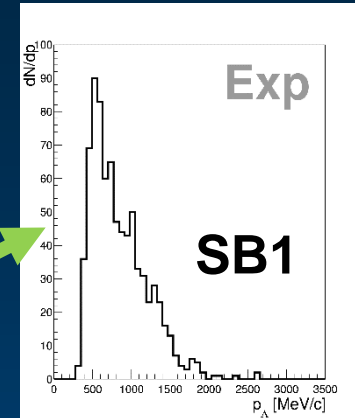
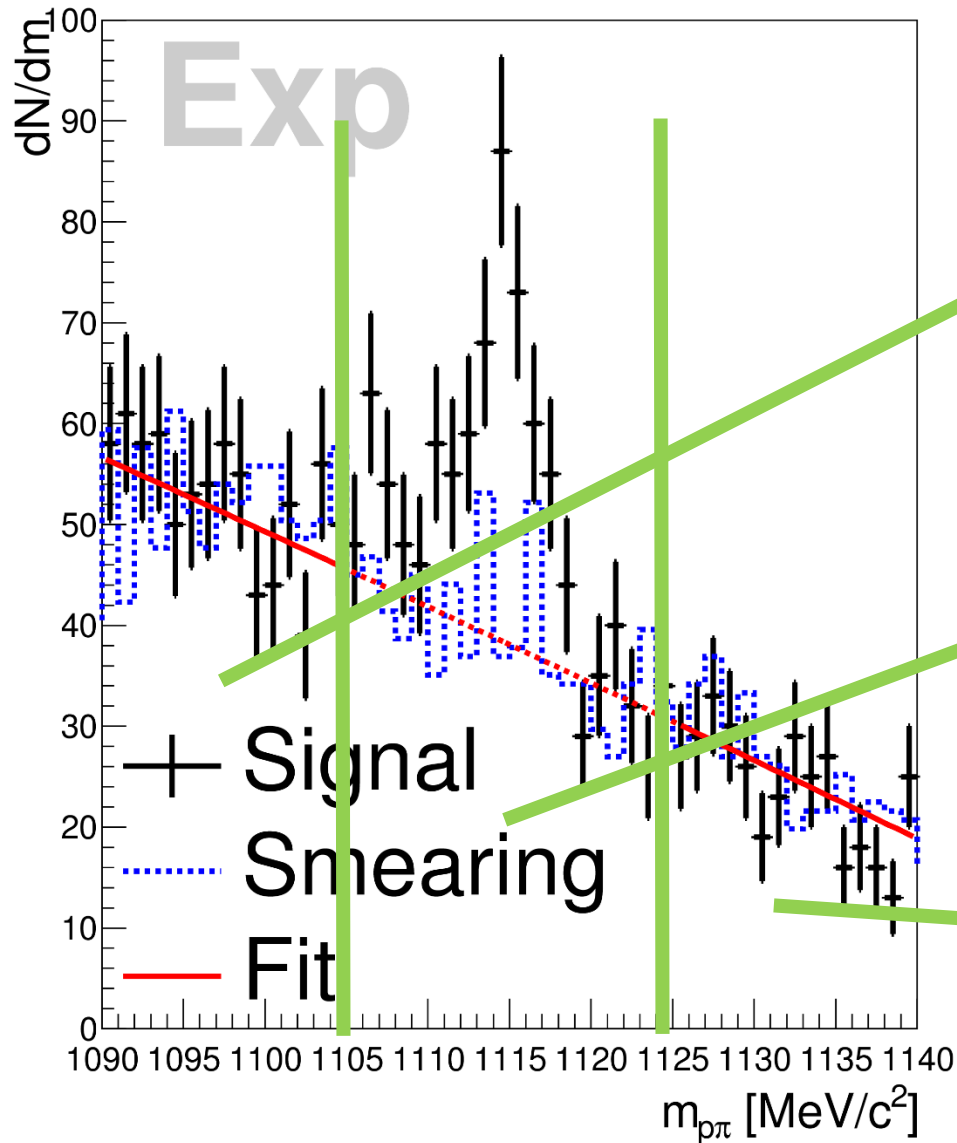
Reconstruct p_{tracklet}

- e_{track} p information
- e_{tracklet} θ , RICH, smearing
- Event hypothesis!



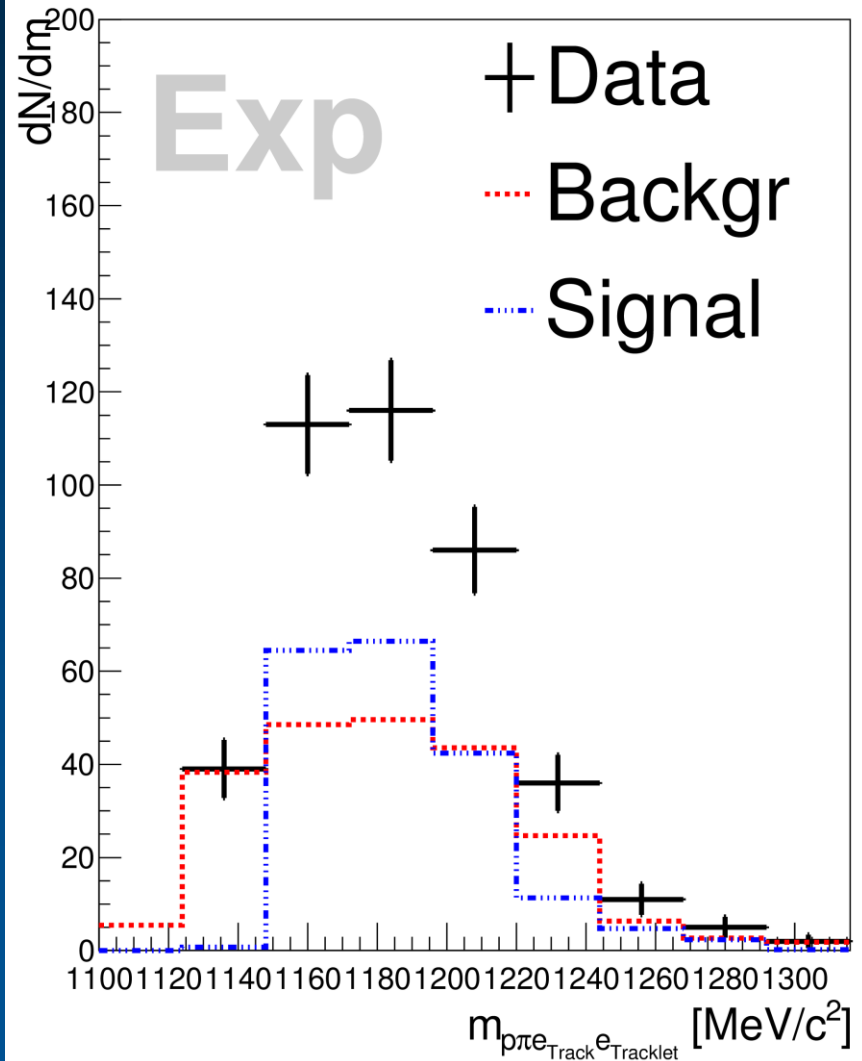
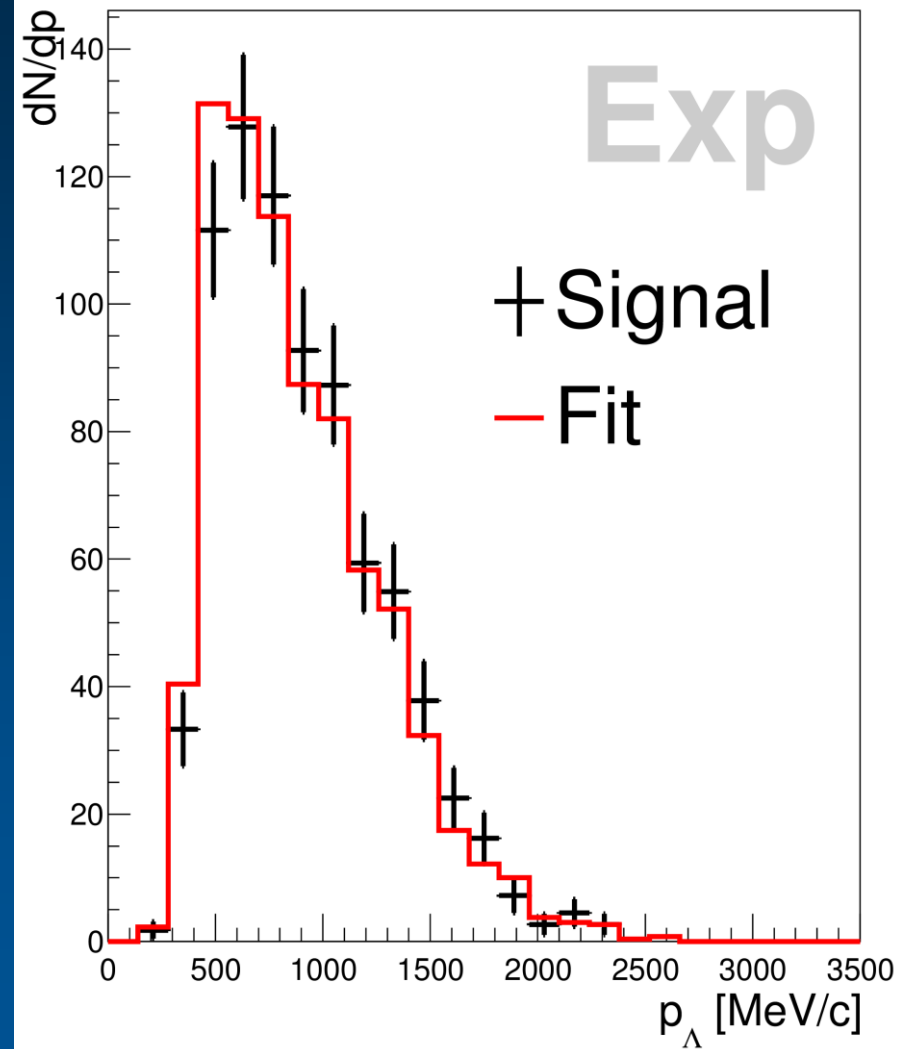
additional γ in event

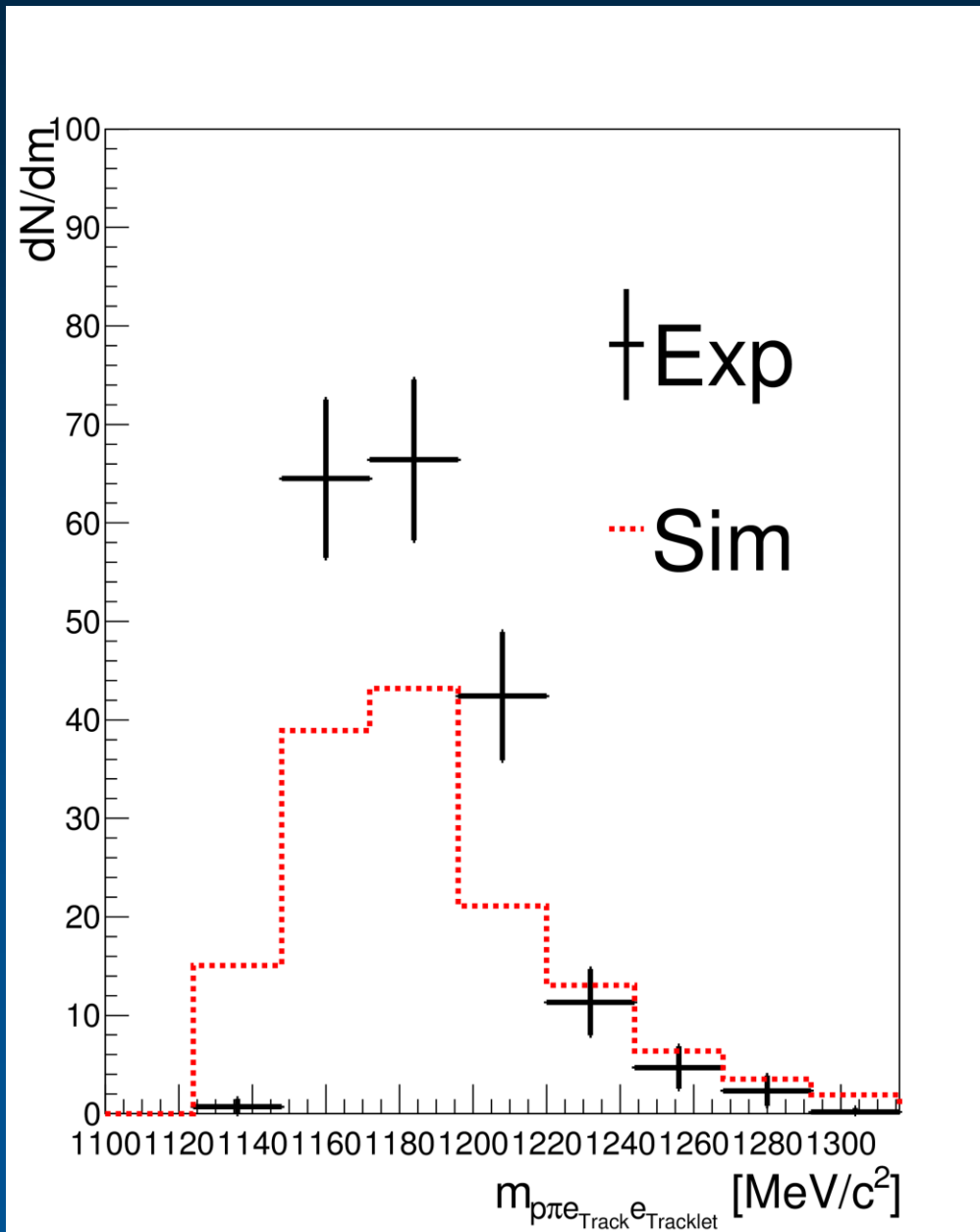


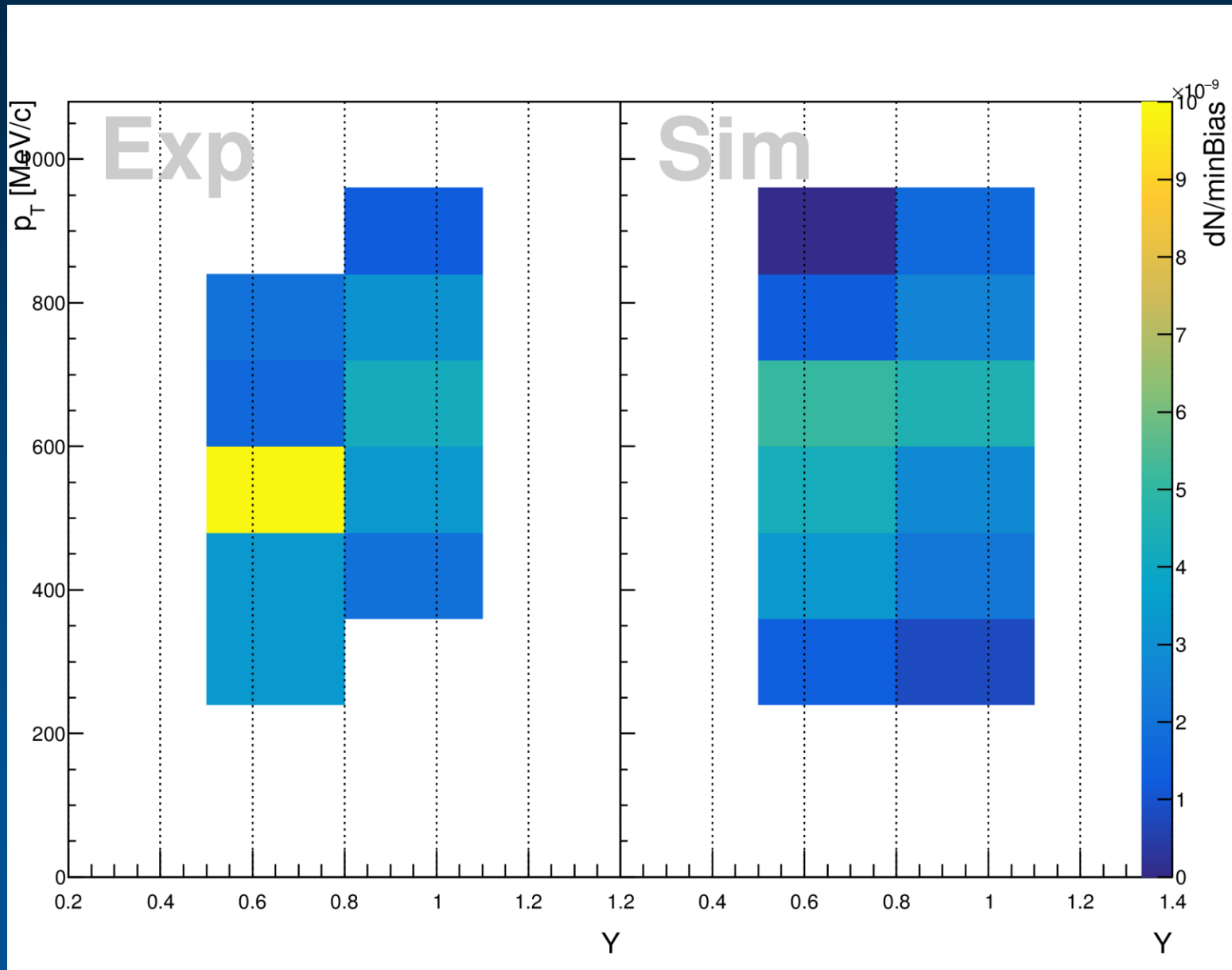


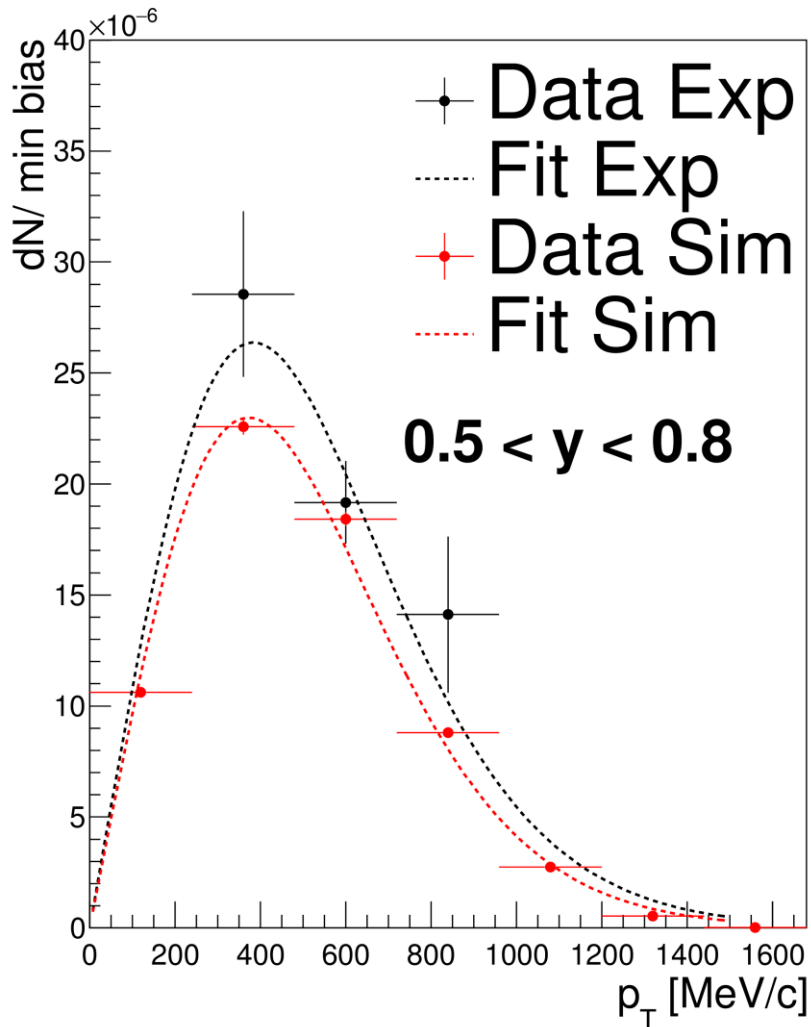
Sideband p_T distributions

Create Background from Smearing



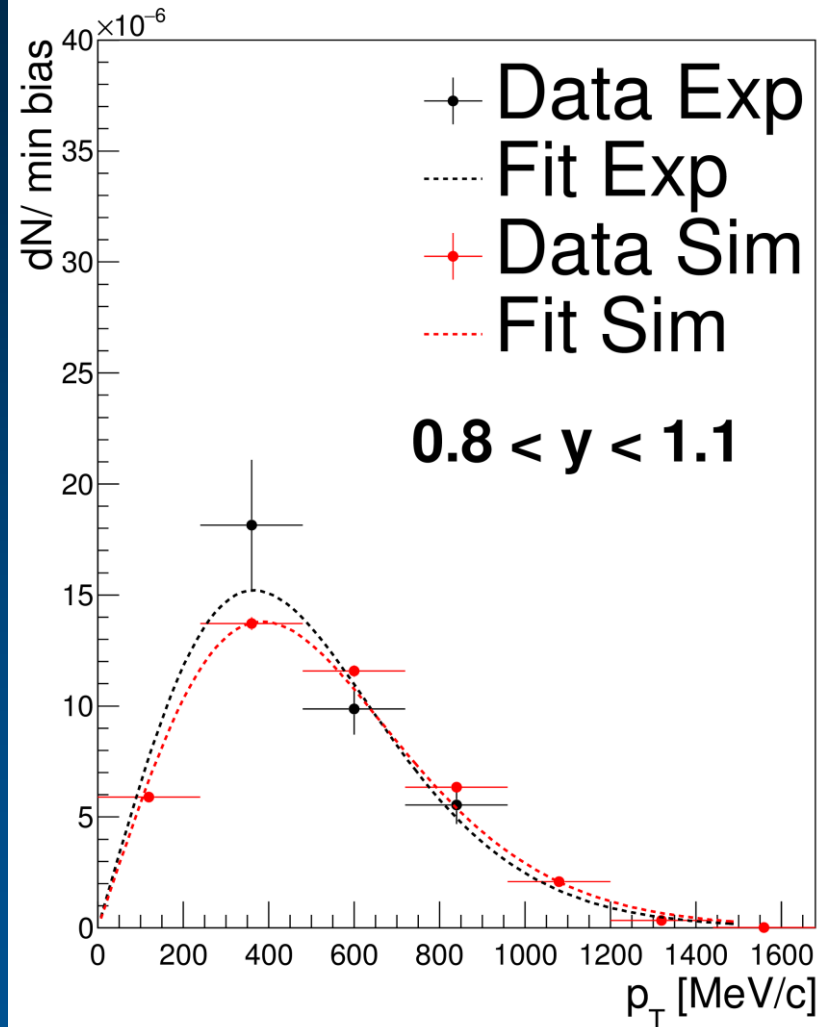






$$T_{\text{slope}}^{\text{Exp}} = 200 \pm 2$$

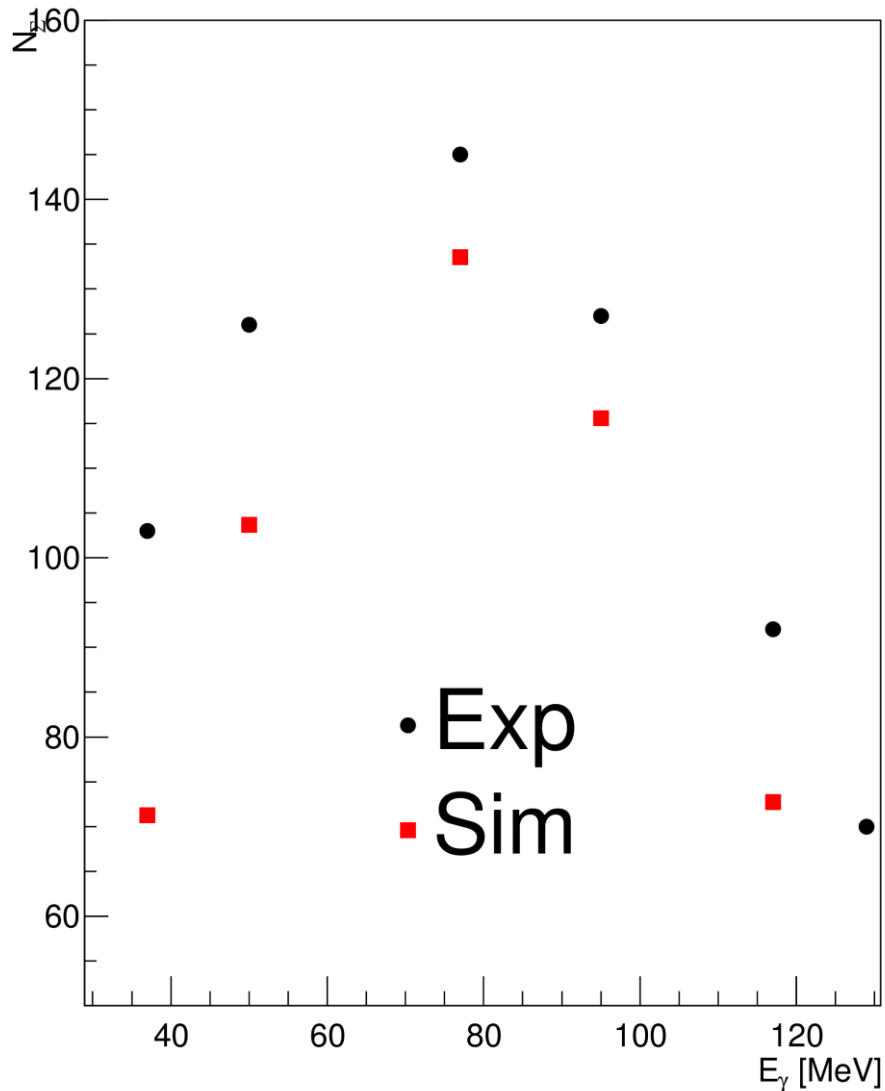
$$T_{\text{slope}}^{\text{Sim}} = 190.4 \pm 0.2$$



$$T_{\text{slope}}^{\text{Exp}} = 183 \pm 2$$

$$T_{\text{slope}}^{\text{Sim}} = 201.7 \pm 0.3$$

- **Statistical Errors “straight forward”**
- **Λ systematics from paper/ cut variation**
sys+stat \approx 17.6 %
- **γ systematics from dark photon paper**
sys \approx 15-25 %
- **Error from “tracklet”?**
vary E_γ
vary RICH cuts



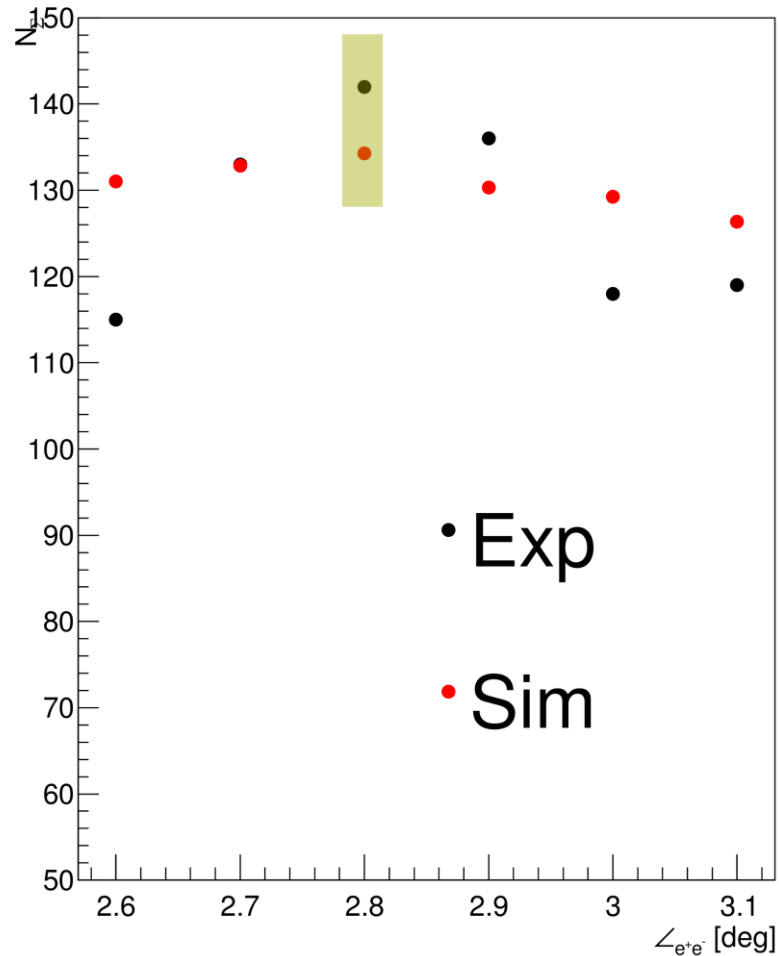
Fix γ energy from
 $E = 25 \dots 130$ MeV

Check resulting yield for
 $1132 \text{ MeV}/c^2 < m_\Sigma < 1252 \text{ MeV}/c^2$

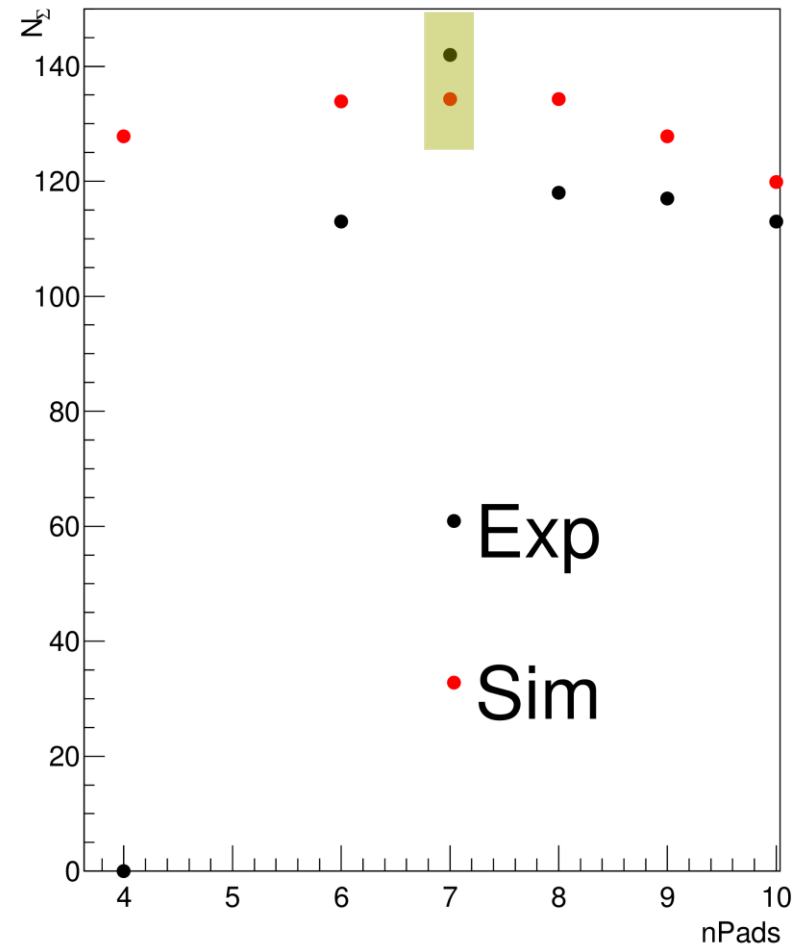
Resulting systematic uncert:

$$\sigma_\gamma = 3,8 \%$$

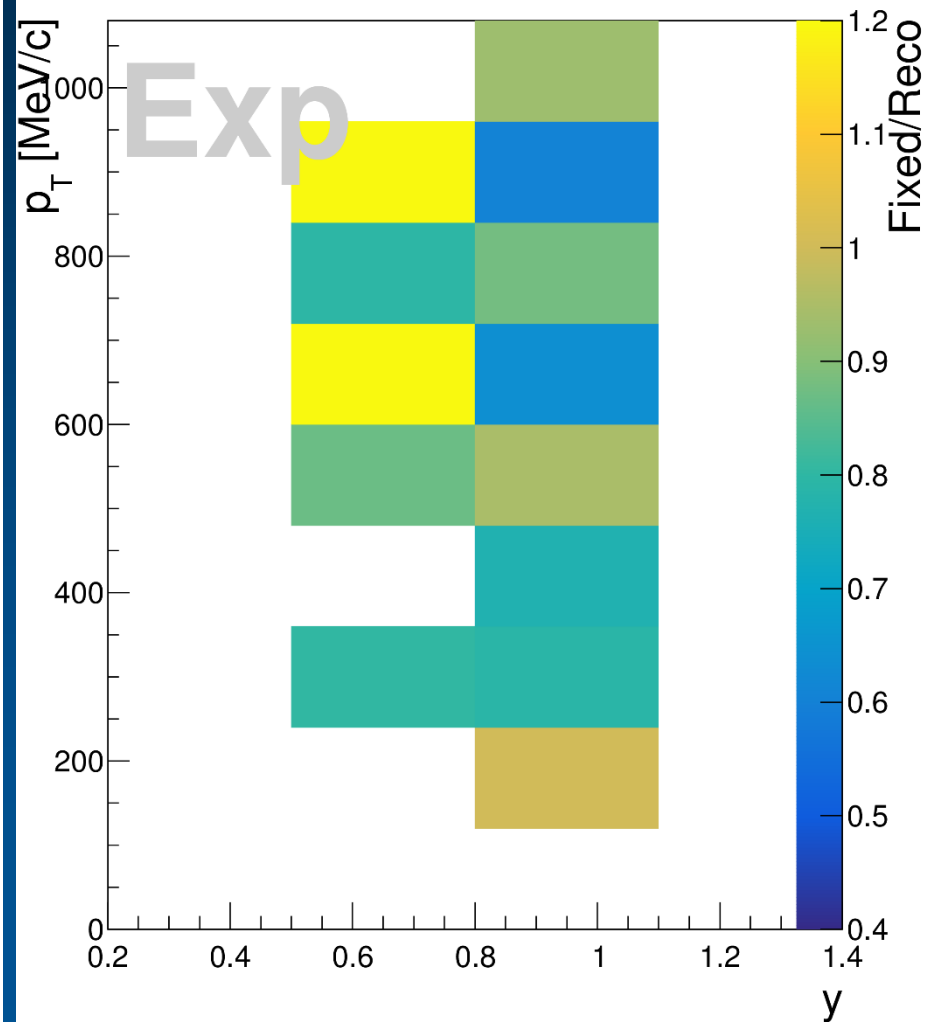
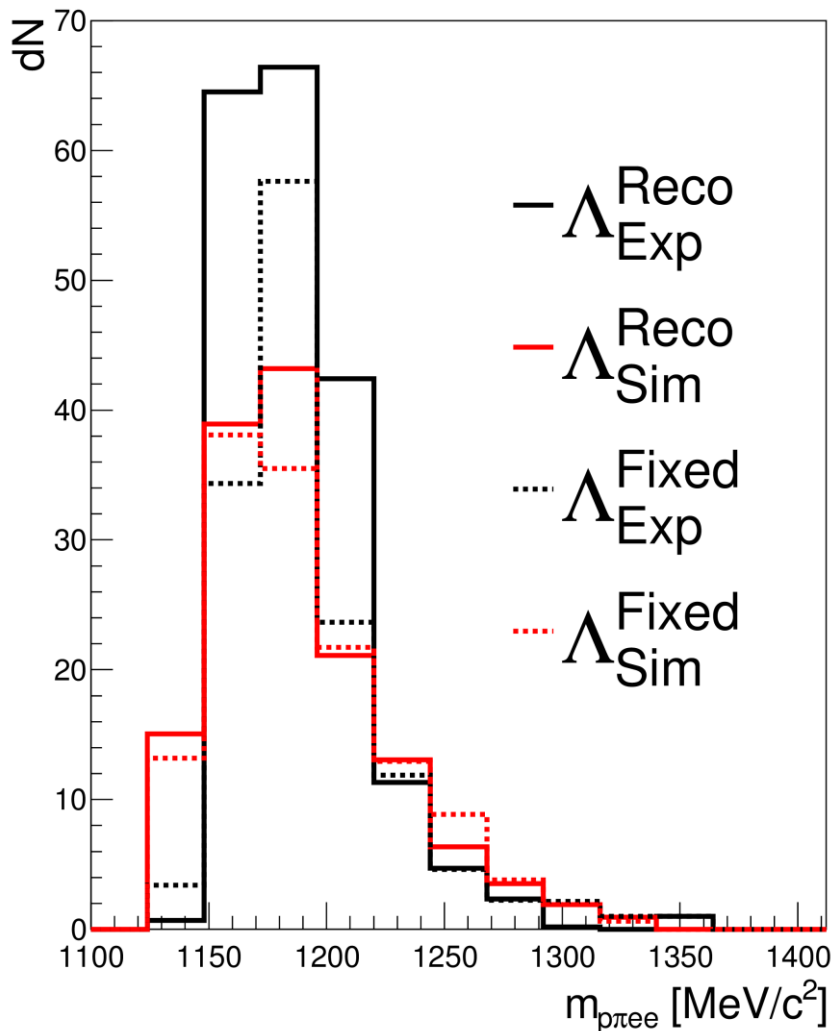
Opening Angle

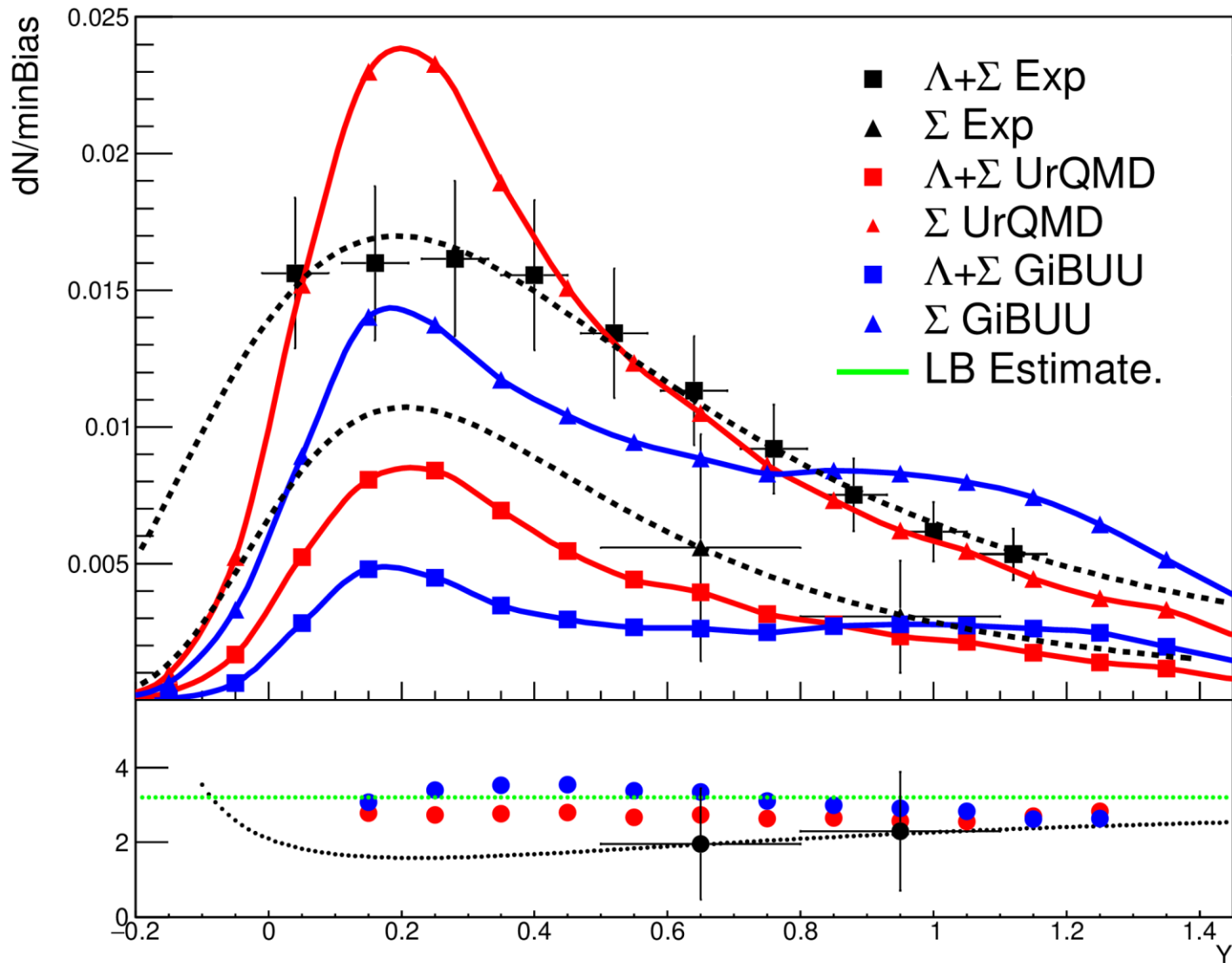


Pads per ring



Fix $m_\Lambda = 1115.683 \text{ MeV}/c^2$





	Value	uncertainty
Σ in X / minB	0,0024	0,0024
$\Lambda + \Sigma$ in Acc / minB	0,0033	0,0033
$(\Lambda + \Sigma)/\Sigma$ in Acc	2,2	2,2
Total Σ /minB	0,0078	
Total $\Lambda + \Sigma$ /minB	0,017	0,003
$\sigma(\Sigma)$	6.6 mb	6.6 mb

Extracted from Landold B.:

$$\frac{\Lambda + \Sigma}{\Sigma} \approx 3.2$$

Work in progress!