2D to 1D Mapping of Pt in Φ – Response Matrix

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Content

Slide 2

- Binning of P_T in Φ bins.
- Mapping **2D** to **1D** array of P_T in Φ bins.
- Mapped true and reco **1D** P_T in Φ distribution
- Smearing response matrix of P_T in Φ bins
- Next tasks

Binning of P_T in Φ Bins 2D (P_T, Φ) Unfolding

True and reconstructed transverse momentum distributions (GeV/c):

- P_T bins = 5 bins
- Minimum P_T = 0.0
- Maximum P_T = 0.3
- P_T slices = 0.0, 0.05, 0.10, 2.0, 3.0

True and reconstructed azimuth, Φ (radians):

- Φ bins = 7 bins
- Minimum Φ = 0
- Maximum Φ = +6.28 (2*Pi)
- Φ slices = 0.0, 1/3*Pi, 2/3*Pi, Pi, 4/3*Pi, 5/3*Pi, 2*Pi

Mapping 2D to 1D array of P_T in Φ bins


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```

True and Reco P_T in Φ Spectrum

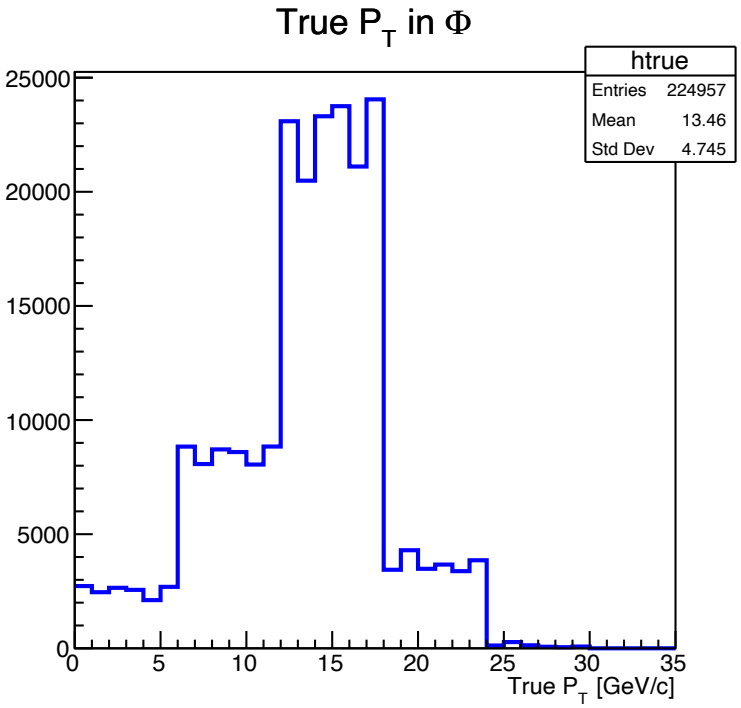
② Reconstructed spectrum: Unpolarized UPC sample

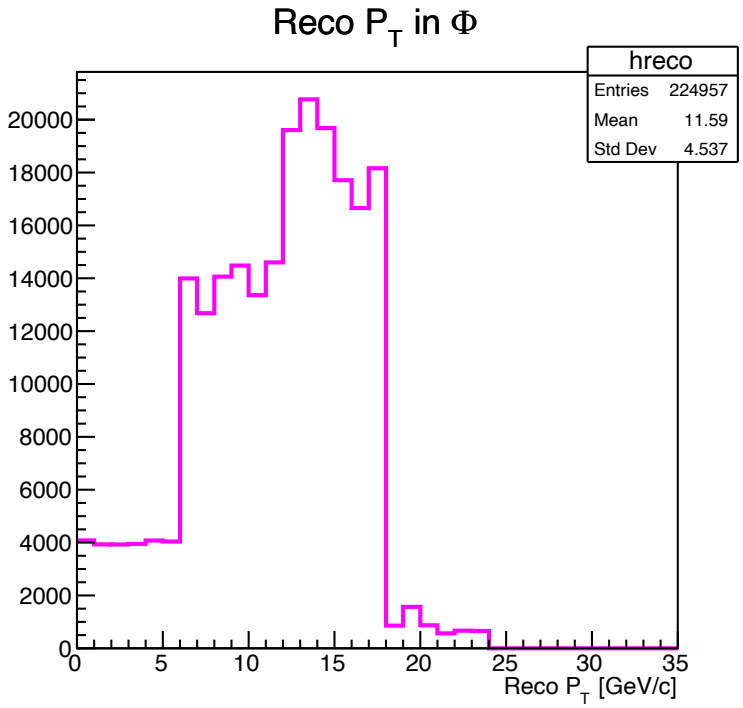
Neutron Selection Cuts

Following cuts were utilized for neutron identification and rejection of photon events.

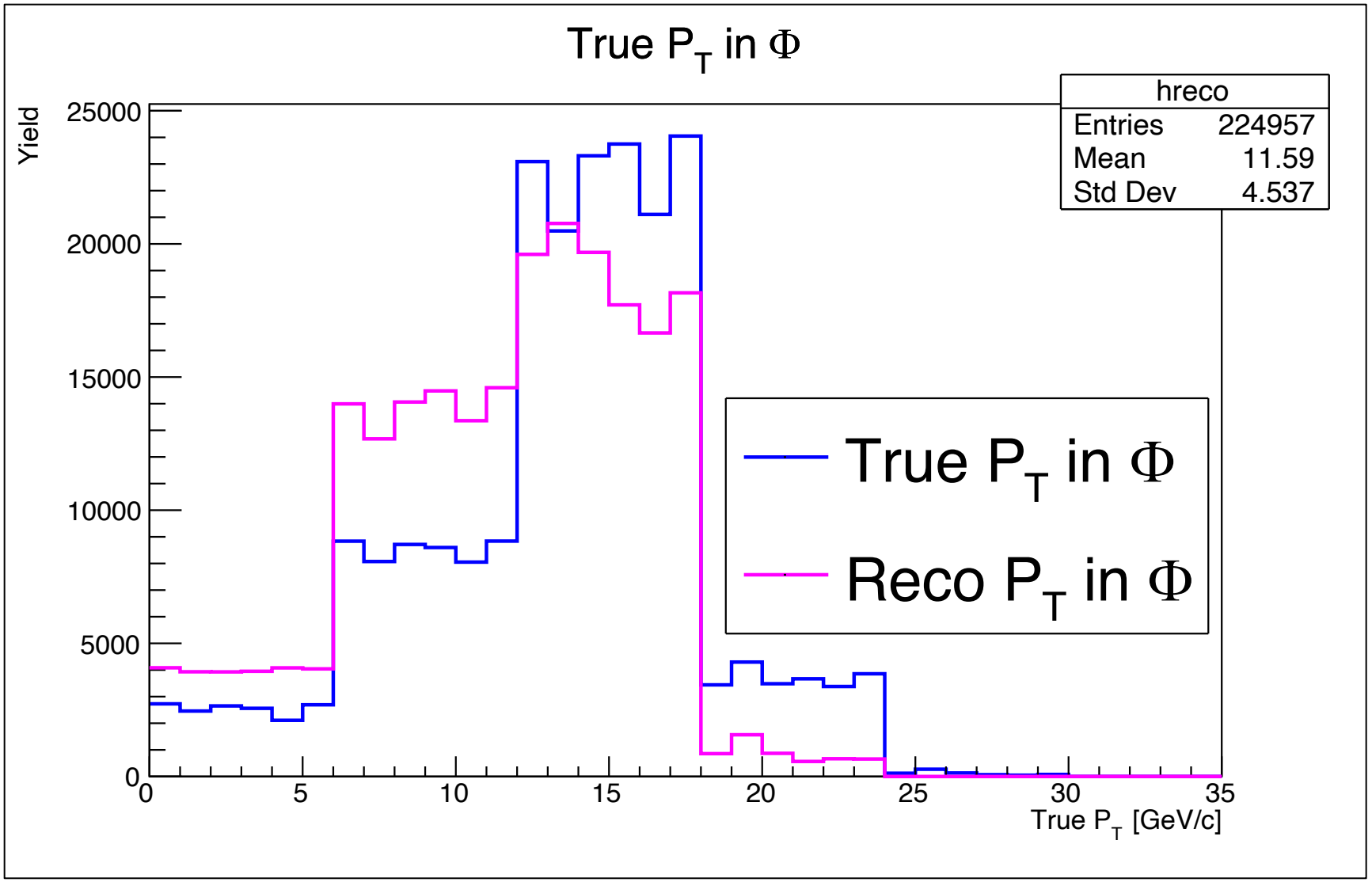
- ZDC energy: 40 < E < 120 and 2nd ZDC energy/ZDC total energy > 0.03 (i.e. non-zero 2nd ZDC energy)
- Acceptance cut: 0.5 < r < 4.0 cm
- SMD multiplicity: Nx/Ny >= 2 fired SMD strips.
- That is Nx and Ny > 1 fired strips above SMD threshold E = 0.003 GeV.

Mapped True and Measured P_T in Φ Spectra



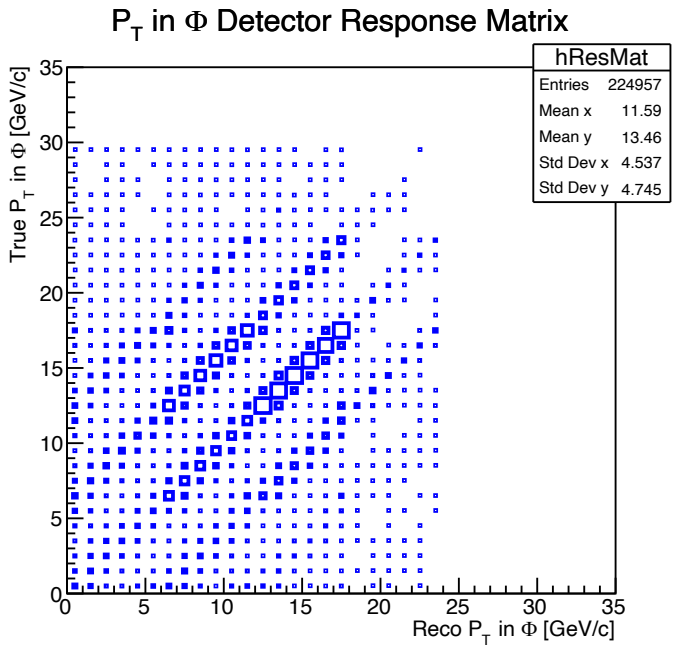


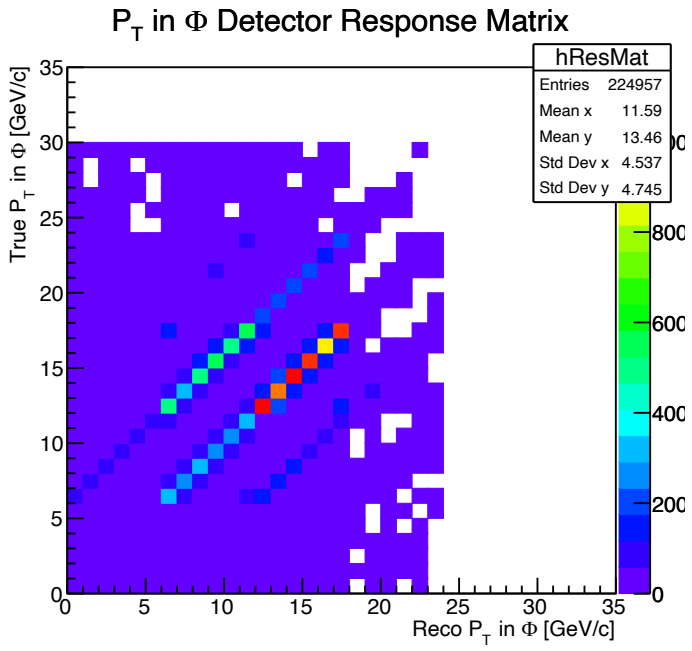
Superposed True & Measured P_T in Φ Spectra



Unfolding Input – Response Matrix

④ Smearing response matrix: 2D plot extracted from the Reco and True P_T in **Φ** spectra of UPC MC.





Compact Analysis Schedule (Check)

TIMELINE	ANALYSIS TASKS	STATUS
Nov. 2019	Monte Carlo tuning to match data	Checked
Nov. 2019	Disable single SMD hit event and get rid of spikes	Checked
Nov. 2019	Azimuthal distribution health check of UPC_A_N + 0.2	Checked
Dec. 2019	Convert 2D(P_T, Φ) into 1D preparation for 1D unfolding. Done!!!	Here now
Dec-Jan 2020	P_T, Φ 1D unfolding Next !!!	current
Jan-Feb 2020	Stability check of unfolding matrix using MC	current
Feb-Mar 2020	Unfolding experimental data	current
Mar. 2020	Calculate A_N as a function of P_T	Pending
Mar. 2020	Backgrounds and systematic uncertainty	Pending
Apr. 2020	Preliminary	Pending
May-Jul 2020	Paper draft	Pending
Aug. 2020	Paper submission	Pending
Aug-Oct 2020	Thesis writing	Pending
Dec. 2020	Defense	Pending

Tentative Analysis Schedule (Check)

TIMELINE	ANALYSIS TASKS	STATUS
Jan. 2020	Convert 2D (P_T, Φ) into 1D hist prepartion for unfolding. **Done!!!**	**Now here**
Mar. 2020	$P_{T\text{-}\Phi}$ 1D unfolding and stability check of unfolding matrix **Next !!!**	**Pending**
Aug. 2020	Unfolding the experimental data and calculation of $A_N(P_T)$	**Pending**
Dec. 2020	Study the background and systematic uncertainty and get preliminary	**Pending**
Jun. 2021	Preparation and submission of the paper draft	**Pending**
Dec. 2021	Defending thesis and completion of the Ph.D requirements.	**Pending**

BACKUP

Unfolding Input – Response Matrix

④ Detector response matrix: 2D plot extracted from the Reco and True P_T spectra of MC.