π^0 Electroproduction Cross Section Update

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1 Time Coincidence of two photon events

Some preliminary analysis has been done for Kinematic 48_4, including the subtraction of accidental photon events from the coincidence time distribution. The windows containing the accidentals are in [-11,-5], and [5,11] and the true coincidences in [-3,3]. The subtraction of photons from the true coincidences in windows [-3,3] is done by using Equation 1.

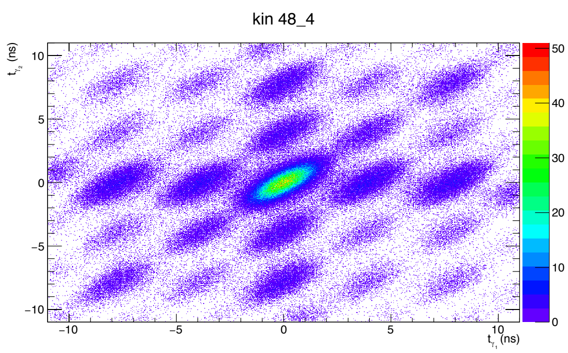


Figure 1: Arrival time distribution of γ_1 and γ_2 from $\pi^0 \rightarrow \gamma_1\gamma_2$ in kinematic 48_4. The window in the center [-3,3] contains true coincidences plus accidentals.

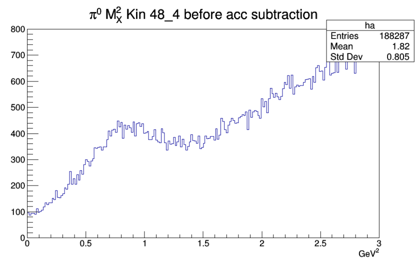
$$N_{\pi^0 accidentals} = N_{acc1} + N_{acc2} - N_{acc3} \quad (1)$$

N_{acc1} selects two-photon events in the the window [-11,-5]. N_{acc2} selects events with one photon in [-3,3] and one in [-11,-5]. N_{acc3} selects random photon events occurring in windows [-11,-5] and [5,11].

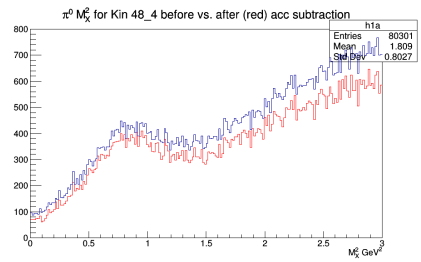
2 Missing Mass

2.1 M_x^2 After Accidental Subtraction

Figure 2 shows the missing mass squared after accidental subtraction.



(a)

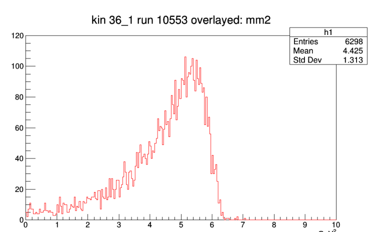


(b)

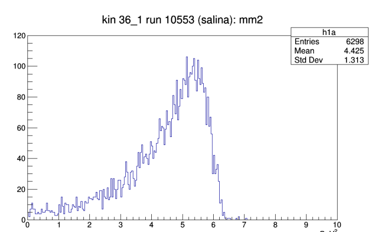
Figure 2: $(M_x)^2$ before and after accidental subtraction in kinematic 48_4.

2.2 Comparison to Mongi's analysis for run 10553 in kinematic 36_1

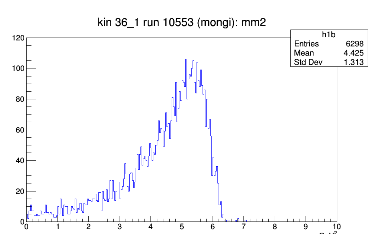
Comparing ntuple data from run 10553 in kinematic 36_1 with Mongi.



(a)



(b)



(c)

Figure 3: Comparison of $(M_x)^2$ from run 10553 in kinematic 36_1.

3 In the works

3.1 Simulation vs. Experimental Data

Figure 4 shows the $(M_x)^2$ of the simulation compared with the experimental data, before smearing. The next step is to smear the Monte Carlo simulation using the relationship shown in Equation 2, where the four-vector of the photon from the simulation is to be transformed using a smearing coefficient, σ and calibration coefficient, μ.

$$\begin{bmatrix} q_x \\ q_y \\ q_z \\ E \end{bmatrix} = gaus(\mu, \sigma) \times \begin{bmatrix} q_x \\ q_y \\ q_z \\ E \end{bmatrix} \tag{2}$$

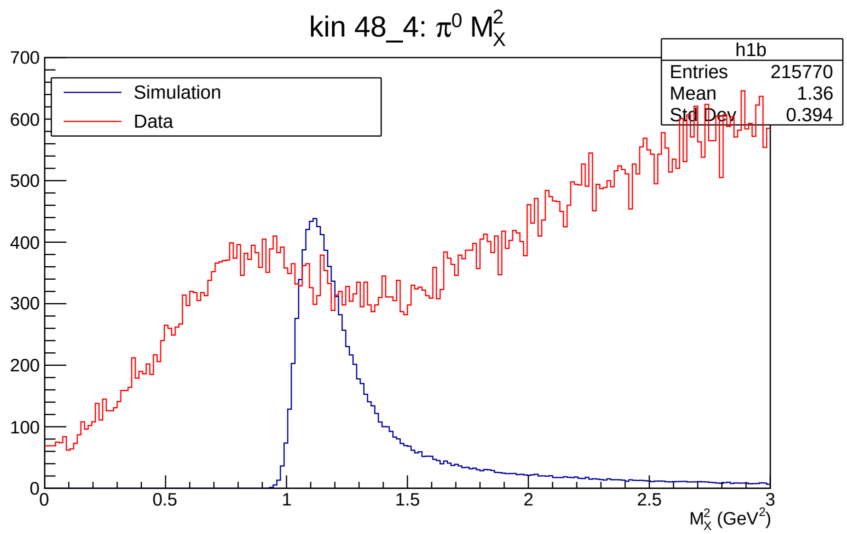


Figure 4: Missing mass squared of the simulation vs. experimental data, before smearing.