$$E^{\text{kin}}_{\text{Front Face}} = \sqrt{p^2_{Beam} + m^2_{Beam}} - m^2_{Beam} - E_{Loss} \tag{1}$$

$$E^{\text{kin}}_{j} = E^{\text{kin}}_{\text{Front Face}} - \sum_{j<i} E_{\text{dep i}} \tag{2}$$

$$E_i = \sqrt{p^2_{Beam} + m^2_{Beam}} - m^2_{Beam} - E_{Loss} - E_{\text{dep FF-i}} \tag{3}$$

$$\delta E_i = \sqrt{\delta p^2_{Beam} + \delta E^2_{Loss} + \delta E^2_{\text{dep FF-i}}} \tag{4}$$

$$E_{\text{dep FF-i}} = \sum_{j<i} E_{\text{dep i}} \Rightarrow \delta E_{\text{dep FF-i}} = (i-1)\delta E_{\text{dep i}} \tag{5}$$

$$\sigma^{\pi^-}_{TOT}(E_i) = \frac{1}{n\ \delta X} \frac{\epsilon^{\text{Inc}}(E_i)\ \ C^{\pi MC}_{\text{Int}}(E_i)\ \ N^{\text{TOT}}_{\text{Int}}(E_i)}{\epsilon^{\text{Int}}(E_i)\ \ C^{\pi MC}_{\text{Inc}}(E_i)\ \ N^{\text{TOT}}_{\text{Inc}}(E_i)}. \tag{6}$$

$$\sigma^{K^+}_{TOT}(E_i) = \frac{1}{n\ \delta X} \frac{\epsilon^{\text{Inc}}(E_i)\ \ C^{KMC}_{\text{Int}}(E_i)\ \ N^{\text{TOT}}_{\text{Int}}(E_i)}{\epsilon^{\text{Int}}(E_i)\ \ C^{KMC}_{\text{Inc}}(E_i)\ \ N^{\text{TOT}}_{\text{Inc}}(E_i)}. \tag{7}$$