LUCID approximation for medium μ

fit method I

$$N_{AND/BX} = 1 - e^{-\varepsilon_A \mu} - e^{-\varepsilon_C \mu} + e^{-\varepsilon_{sing} \mu} \approx 1 - 2\, e^{-(\varepsilon_{sing}+\varepsilon_{coin})\mu/2} + e^{-\varepsilon_{sing}\mu}$$

$$N_{AND/BX} \approx 1 - 2 e^{-\mu(\sigma_{vis}^{AND}+\sigma_{vis}^{OR})/2\sigma_{inel}} + e^{-\mu\sigma_{vis}^{OR}/\sigma_{inel}}$$

$$\mu = a\, N_{AND/BX} + b\, N_{AND/BX}^2 + c\, N_{AND/BX}^3$$

The inverse of the expression is plotted and fitted with a polynomial function !

$$L = \frac{f_{BX}}{\sigma_{inel}} \times \mu$$

VDM: $\sigma_{vis}^{OR} = 40.18$ mb $\sigma_{vis}^{AND} = 12.40$ mb PYTHIA: $\sigma_{inel} = 71.5$ mb

$a = 5.7095$ $b = -2.5567$ $c = 5.0824$

LUCID approximation for medium μ

fit method II

$$N_{AND/BX} = 1 - e^{-\varepsilon_A \mu} - e^{-\varepsilon_C \mu} + e^{-\varepsilon_{sing} \mu} \approx 1 - 2\, e^{-(\varepsilon_{sing}+\varepsilon_{coin})\mu/2} + e^{-\varepsilon_{sing}\mu}$$

$$N_{AND/BX} \approx 1 - 2\, e^{-(\sigma_{vis}^{AND}+\sigma_{vis}^{OR})L_{BX}/2} + e^{-\sigma_{vis}^{OR}L_{BX}}$$

The inverse of the expression is plotted and fitted with a polynomial function !

$$L_{BX} = a\, N_{AND/BX} + b\, N_{AND/BX}^2 + c\, N_{AND/BX}^3$$

$$L = f_{BX} \times L_{BX}$$

VDM: $\sigma_{vis}^{OR} = 40.18$ mb $\sigma_{vis}^{AND} = 12.40$ mb

$a = 0.079856$ $b = -0.035785$ $c = 0.071125$