A/q Calculation

Everything is measured and calculated in the FRS section S2-S4. Different degraders are in front and cannot affect the identification procedure.

$$A/q = B\rho \,/\, \beta\gamma \;*\; \text{const.}$$

with $\gamma = \mathrm{sqrt}(1-\beta^2)$

$\beta = L \,/\, \mathrm{ToF}$

and

$$B\rho = B\rho_0\,[1 + \delta\,] = B\rho_0\,[1 + \frac{x_{S2}\,(x,x) - x_{S4}}{(x,\delta)}\,]$$

The path length (L) depends on $B\rho$ and on transverse angle A. As this is a small correction, we can write it as a Taylor expansion with two factors still to be determined.

$$L = L_0 \,*(1+f_1\,\delta)\,(1+ f_2\,A)$$

The dependence on δ is small compared to the other contributions to A/q already contained in $B\rho$ directly. In this first order approximation choosing slightly different optics coeffcients (x,x) or (x,δ) will already include the the path length correction for ToF for the final A/q calculation. Therefore, no separate coefficient f_1 is neccessary.

The dependence on A is shown on the next slide. Corrections with X are tiny. As the FRS is in one plane Y and B constribute only in 2nd order.

2014/11/19
H. Weick

Simulation for A/q Correction

MOCADI for ^{222,223,224}Th from ^{238}U at 1 GeV/u, FRS in standard optics (RUN81-TA2B), 3 g/cm^2 Be target, 4 g/cm^2 S2 Al degrader. Correction proportional to angle A at S4, corrects path length for ToF.