Idea for a test of multinucleon models via “CCQE-true” measurement (with existing exps)

Consider:
$T_{\mu} \sim 0.7 \text{GeV}$
$\cos \theta \sim 0.85$
$\sim 20\%$ non-QE predicted
"CCQE-like"
$T_{\mu} \text{ vs } \cos \theta$

$T_{\mu} \sim 0.7 \text{GeV}$
$\cos \theta \sim 0.85$
$\sim 20\% \text{ non-QE}$
predicted
$Q^2 \sim 0.3 \text{ GeV}^2$

QE proton:
$T_p \sim 150 \text{MeV}$
$p_p \sim 550 \text{MeV/c}$

Measure:
$d\sigma(\text{"QEtru", } \mu+p)/$
$d\sigma(\text{QE-like, } \mu)$
Can correct for FSI of proton. Scatters out of FSI (100-77)%=23% of time.

VII. CONCLUSIONS

In this experiment the ratio of the integrated missing-energy coincidence \((e, e'p)\) cross sections to the integrated \((e, e')\) cross sections was measured for several targets \((A = 12–181)\) as a function of proton angle for an average proton kinetic energy of 180 MeV. This is the first experiment to perform such a broad integration in the quasifree region for this regime of proton energies. The purpose of the experiment was to obtain a macroscopic measure of the proton attenuation.

FIG. 8. The experimental transmissions (on a logarithmic scale) from Table III for a missing-energy range of 0–80 MeV vs nucleon number of the target nucleus (on a cube-root scale) are shown including the systematic errors. The lines represent the calculations of Ref. [30] described in Sec. VI.B. The solid curve is the result of the full calculation. The other curves are for the free \(N-N\) cross sections (dotted), adding Pauli blocking (dashed) and adding density-dependent effects of the \(N-N\) cross section (dot-dashed).
\( T_\mu \text{ vs } \cos \theta \)

\( T_\mu \approx 0.7 \text{ GeV} \)
\( \cos \theta \approx 0.85 \)
\( \sim 20\% \text{ non-QE predicted} \)
\( Q^2 \approx 0.3 \text{ GeV}^2 \)

QE proton:
\( T_p \approx 150 \text{ MeV} \)
\( p_p \approx 550 \text{ MeV/c} \)

Measure (with T2K eg)
\[ \frac{d\sigma(\text{QE, } \mu+p)}{d\sigma(\text{QE-like, } \mu)} \]

Is data consistent with 80\% truQE (corrected for 77\% proton transmission)

Compare to other models for QE-like scattering, including multiN effects.
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Compare
\[ \frac{d\sigma(QE, \mu+p)}{d\sigma(QE-like, \mu)} \]