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

The nucleon axial mass and the MiniBooNE Quasielastic Neutrino-Nucleus Scattering problem

J. Nieves (Valencia U., IFIC) , I. Ruiz Simo, M.J. Vicente Vacas (Valencia U., IFIC & Valencia U.)

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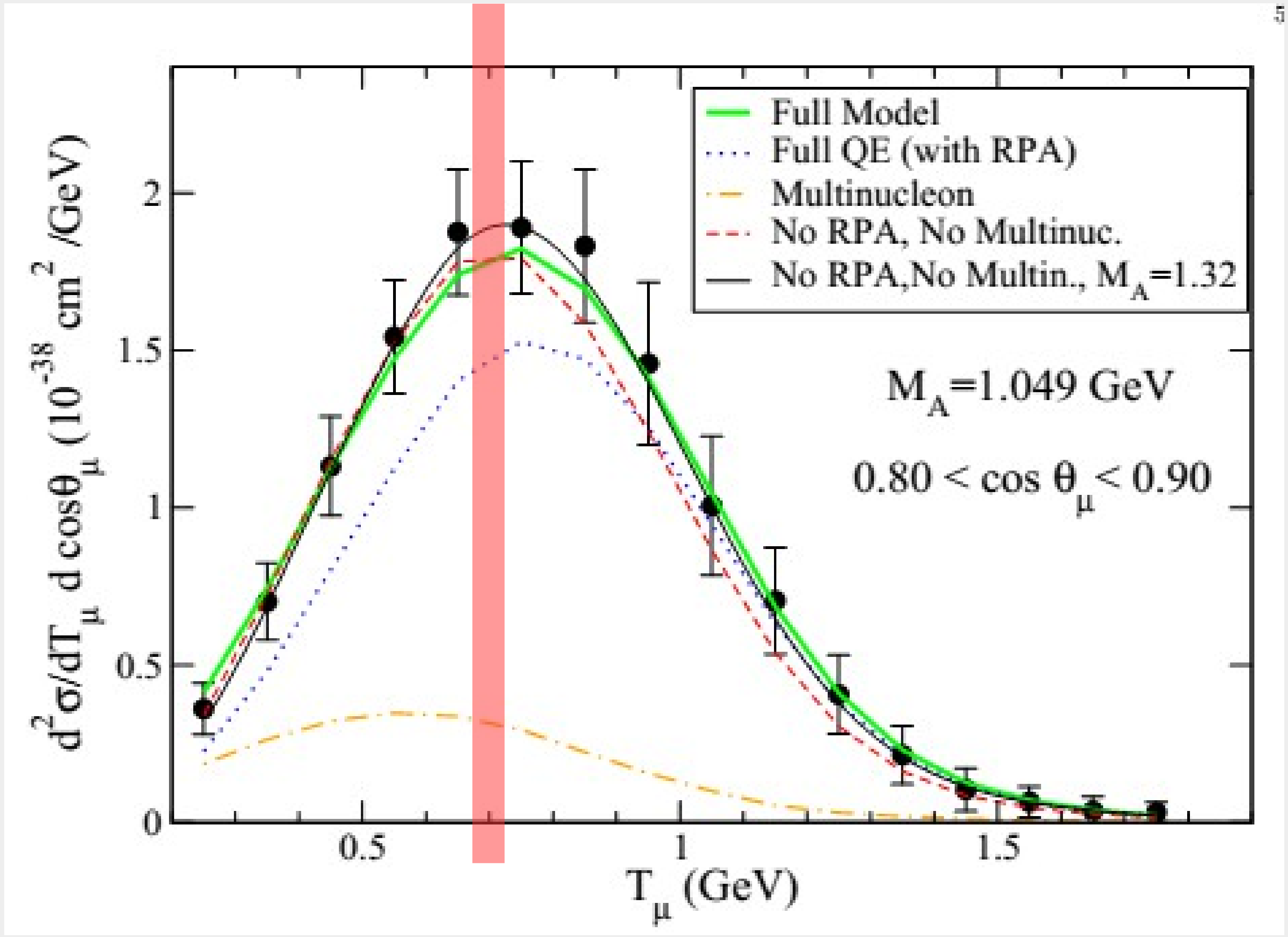
e-Print: arXiv:1106.5374 [hep-ph] | PDF

consider:
T_μ~0.7GeV
cos θ ~ 0.85
~ 20% non-QE predicted

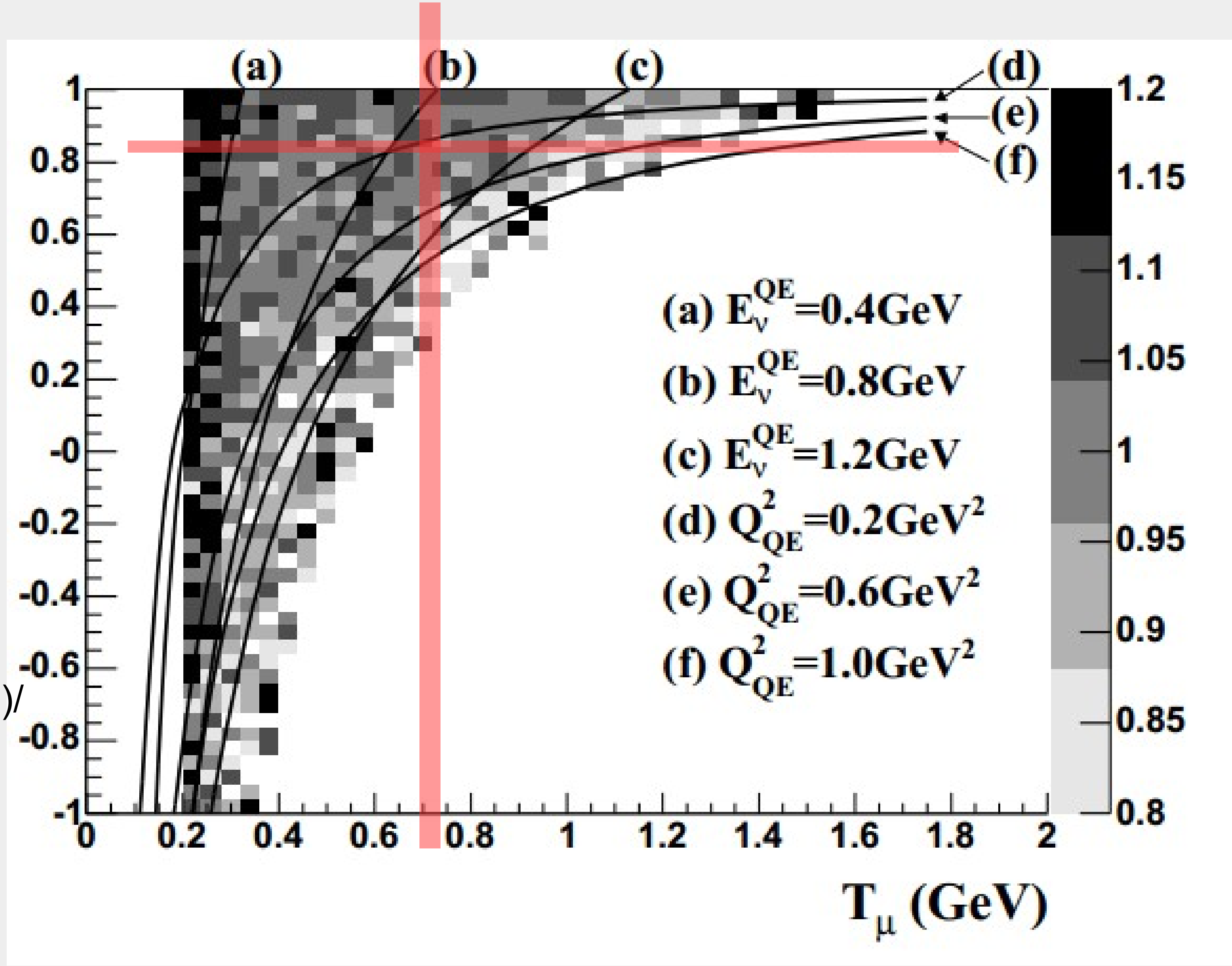


"CCQE-like"
Tμ vs cosθ

Tμ~0.7GeV
cos θ ~ 0.85
~ 20% non-QE predicted
Q2 ~ 0.3 GeV2

QE proton:
T_p~150MeV
p_p~550MeV/c

Measure:
dσ("QEtru", μ+p)/
dσ(QE-like, μ)



Proton propagation in nuclei studied in the (e, e-prime p) reaction

G. Garino, M. Saber, R.E. Segel (Northwestern U.) , D.F. Geesaman, Ronald A. Gilman, M.C. Green, R.J. Holt, J.P. Schiffer, B. Zeidman (Argonne, PHY) , E.J. Beise *et al.* Show all 22 authors

1992

Phys.Rev. C45 (1992) 780-790
DOI: 10.1103/PhysRevC.45.780

Can correct for FSI of proton. Scatters out of FSI (100-77)%=23% of time.

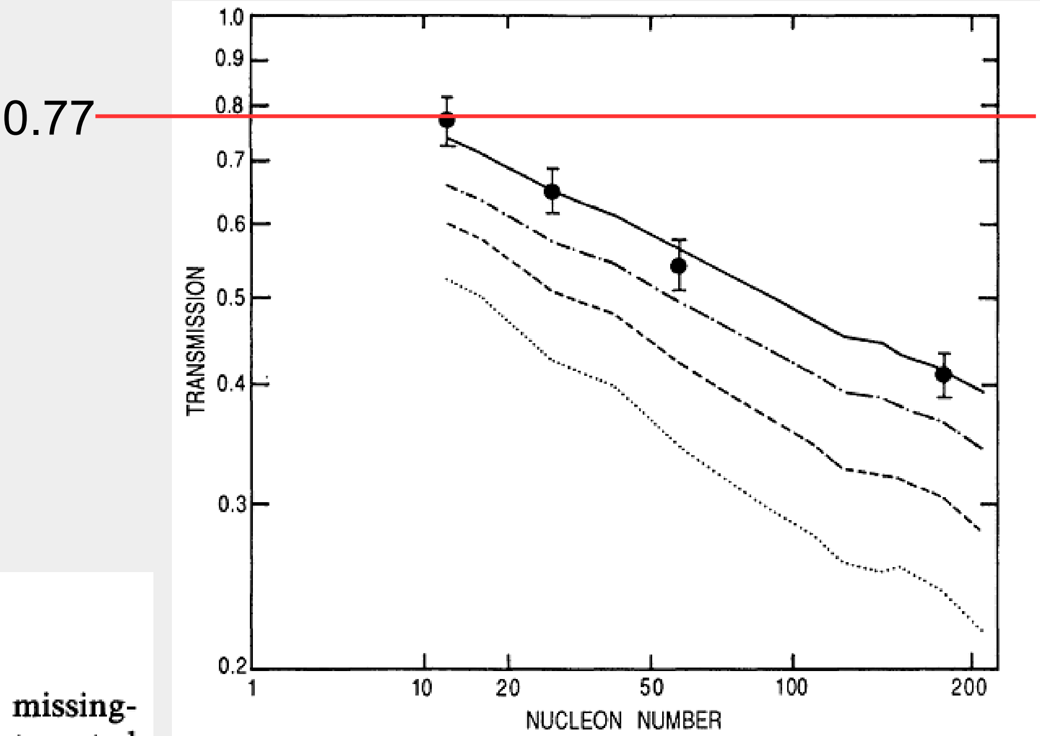


FIG. 8. The experimental transmissions (on a logarithmic scale) from Table III for a missing-energy range of 0–80 MeV vs nucleon number of the target nucleus (on a cube-root scale) are shown including the systematic errors. The lines represent the calculations of Ref. [30] described in Sec. VI B. The 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).

VII. CONCLUSIONS

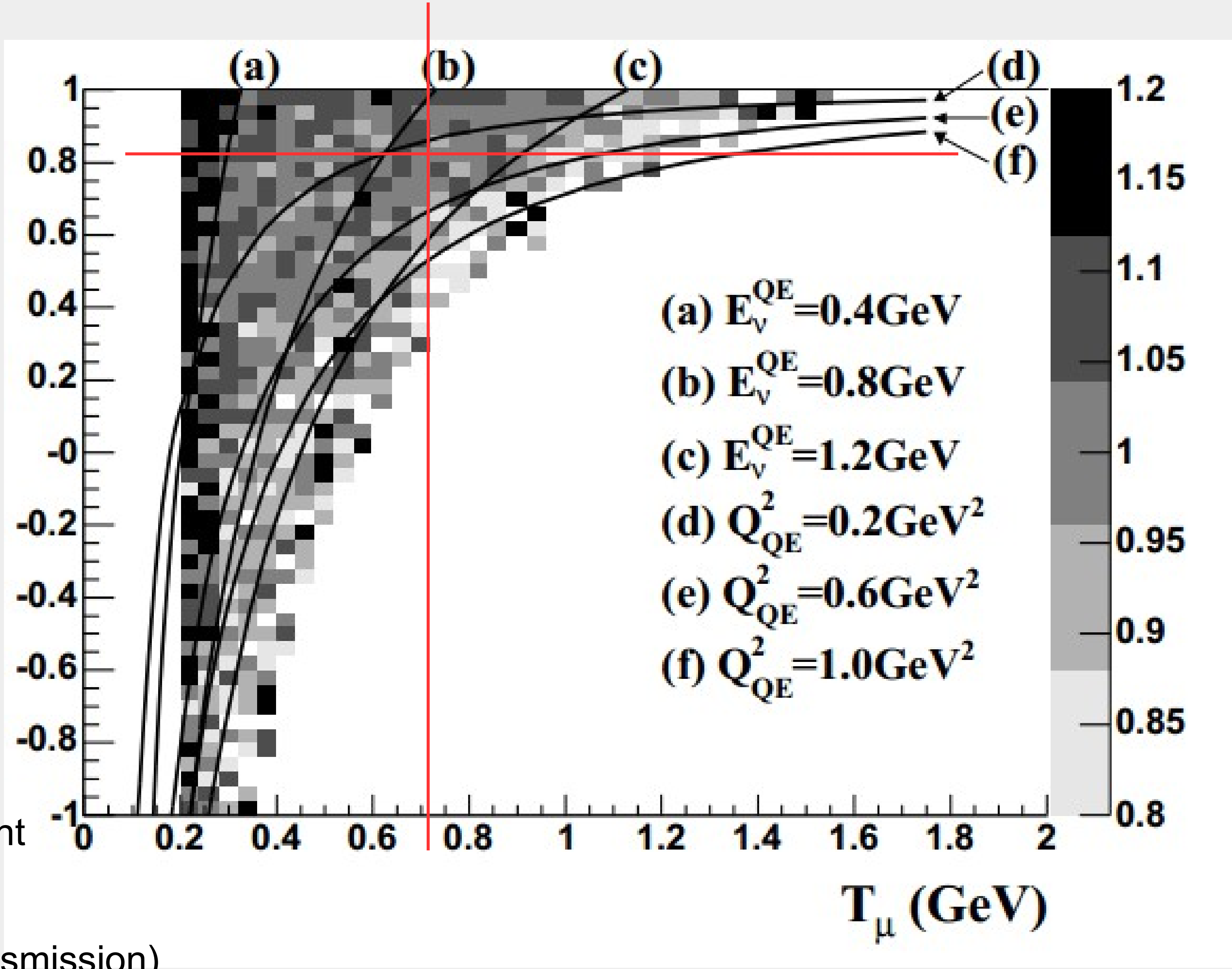
In this experiment the ratio of the integrated missing-energy coincidence $(e,e'p)$ cross sections to the integrated (e,e') cross sections was measured for several targets ($A=12-181$) as a function of proton angle for an average proton kinetic energy of 180 MeV. This is the first experiment to perform 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.

Tμ vs cosθ

Tμ~0.7GeV
cos θ ~ 0.85
~ 20% non-QE predicted
Q2 ~ 0.3 GeV2

QE proton:
T_p~150MeV
p_p~550MeV/c

Measure (with T2K eg)
dσ(QE, μ+p)/dσ(QE-like, μ)



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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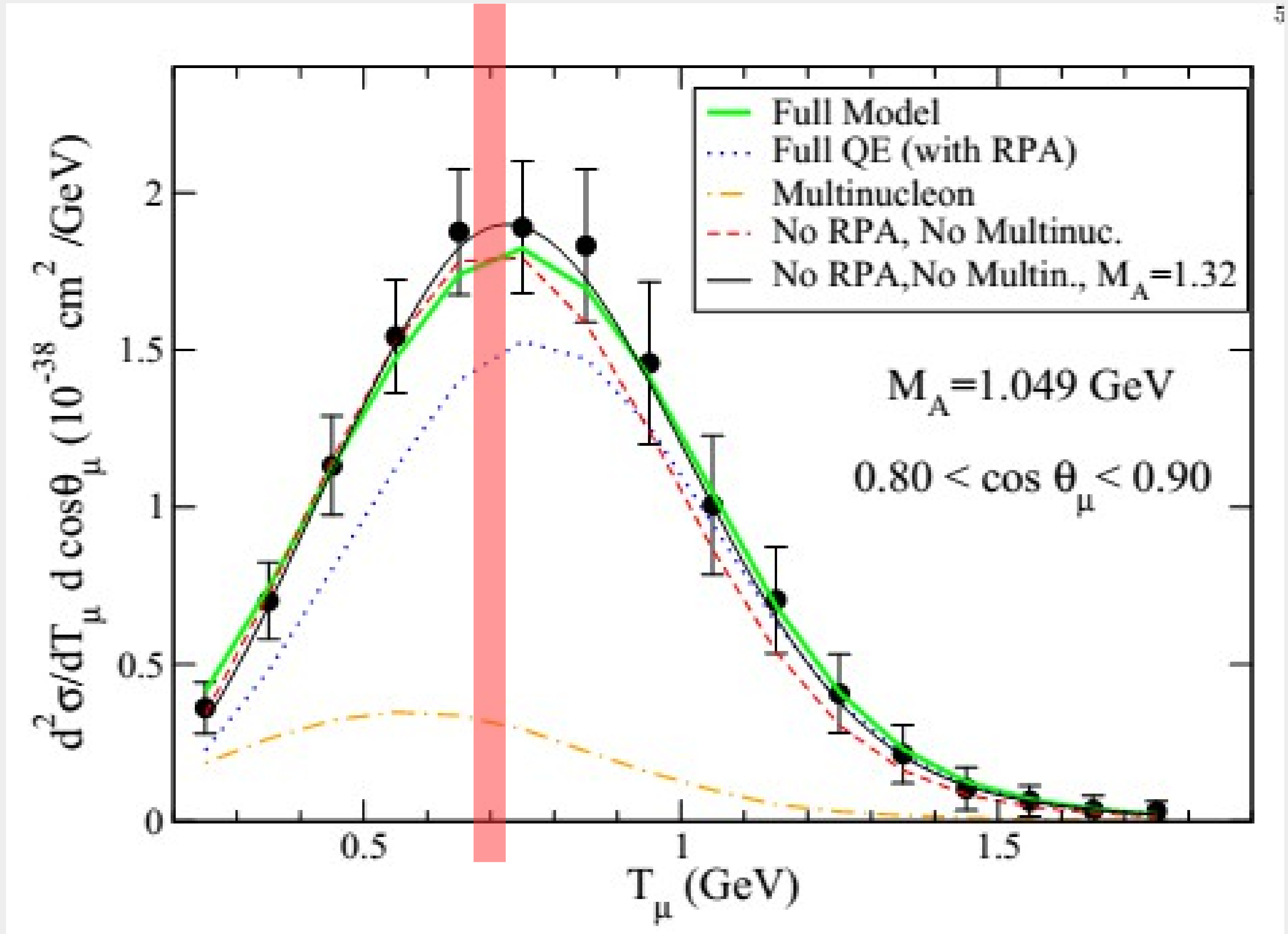
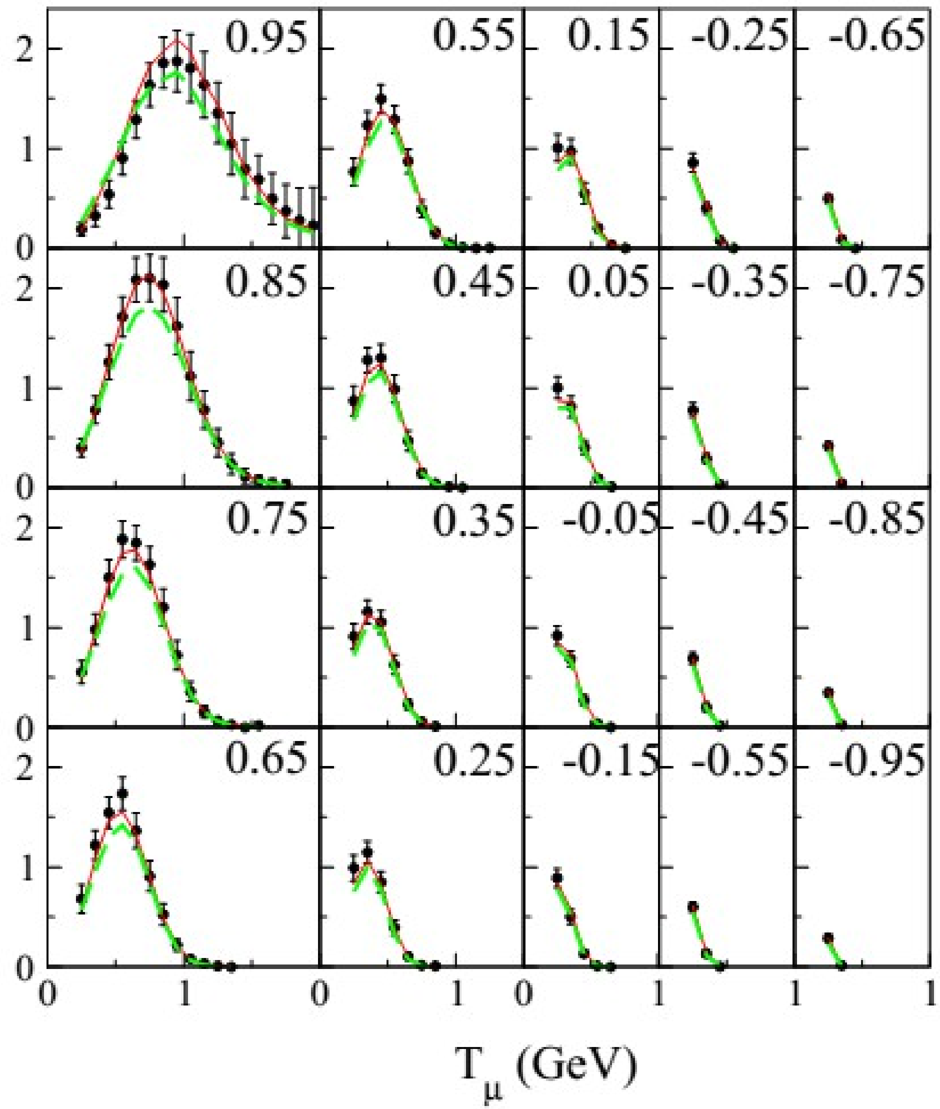
Compare
$d\sigma(QE, \mu+p)/$
$d\sigma(QE\text{-like}, \mu)$




0.95
0.55
0.15
-0.25
-0.65
0.85
0.45
0.05
-0.35
-0.75
0.75
0.35
-0.05
-0.45
-0.85
0.65
0.25
-0.15
-0.55
-0.95
$d^2\sigma/dT_\mu\, d\cos\theta_\mu$ (10^{-38} cm^2 / GeV)
T_μ (GeV)