nuPRISM cross sections

K. Mahn

nuPRISM face-to-face meeting

1 Feb 2015

MICHIGAN STATE UNIVERSITY

Straightforward:

- CC0π

- CC1π^+

- NCπ^0

- CC ν_e/ν_μ ratio

Neutrino and antineutrino beam measurements possible

More challenging?

- NC1γ

- CC inclusive

- CC1π^0

- NCπ^+
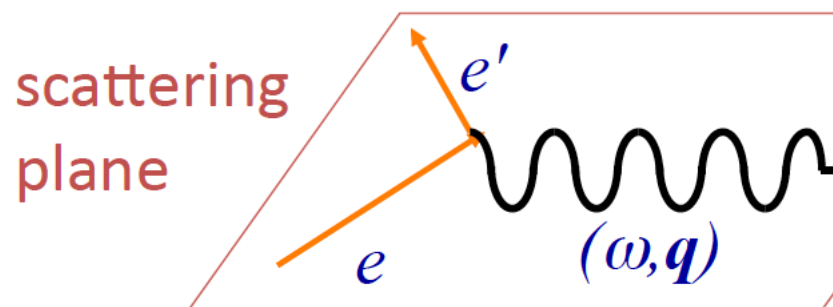
- CC, NC coherent (through angular distribution)

Additional studies:

- Use neutron information through Gd doping

- Use of WBLS
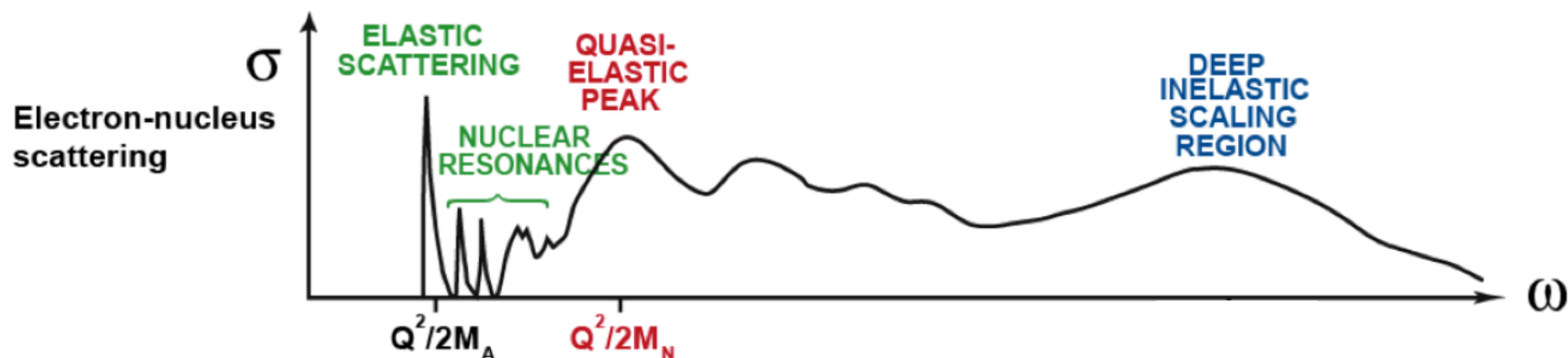
- Fits to model parameters (e.g. determination of F_A)

eA scattering uses

- ω: E transfer ($E_e - E_{e'}$)
- q^2: 3 momentum transfer
- $Q^2 = q^2 - \omega^2$
- x: Bjorken x, $Q^2 / 2m\omega$

D. Higinbotham, Dec 2013 INT workshop

Kinematics fully determines scattering

Plot cross section or $d\sigma/d\omega d\Omega$
Sometimes projected at fixed angle (Q^2)

MSU effort

Two undergraduates: Greg Ponti and Sean Wainwright

- Successfully? compiled nuPRISM software on local high performance cluster

- Next:
  - Reproduce pseudo-mono chromatic beam plots
  - Produce eA-like plots of QE peak in $<E_v>$ - E_μ
  - Produce estimated CC v_e/v_μ cross section measurement with flux (and any additional uncertainties) for model identification
  - Investigate pseudo-mono chromatic beams in hadronic system

KM effort

- Joint HEP-NSCL seminar on nuPRISM scheduled for 4/1
- Finish concept paper

Goals:

For paper:

- Complete eA style plots
- Requests for range, width of pseudo-monochromatic beams
- Particle detection thresholds
  - Study pileup and decay electron tagging?

For full proposal:

- Show one complete (or as complete as we can) cross section measurement
- Is it more informative for the audience to start with $NC\pi^0$? Or $CC0\pi$?