NuFact 2014

WG2

Neutrino Scattering Physics

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K2K, MiniBooNE, MINOS, NOMAD, SciBooNE

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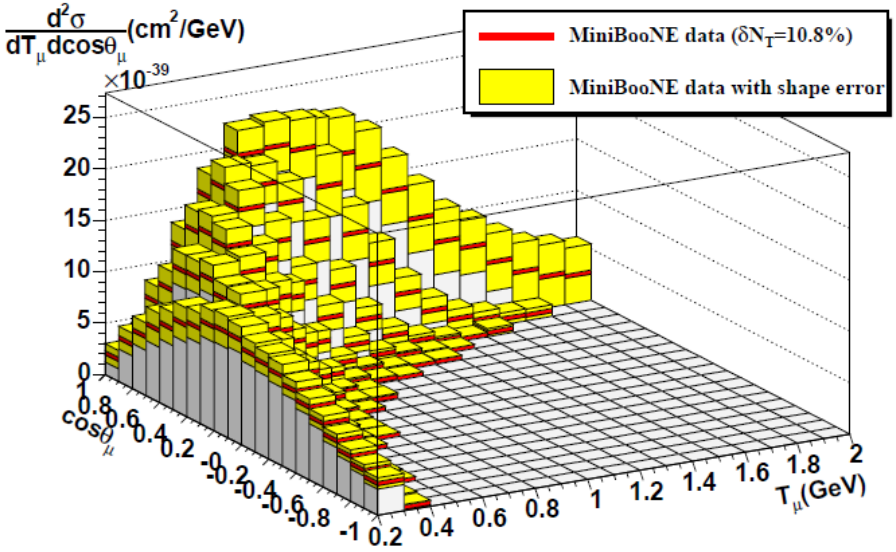
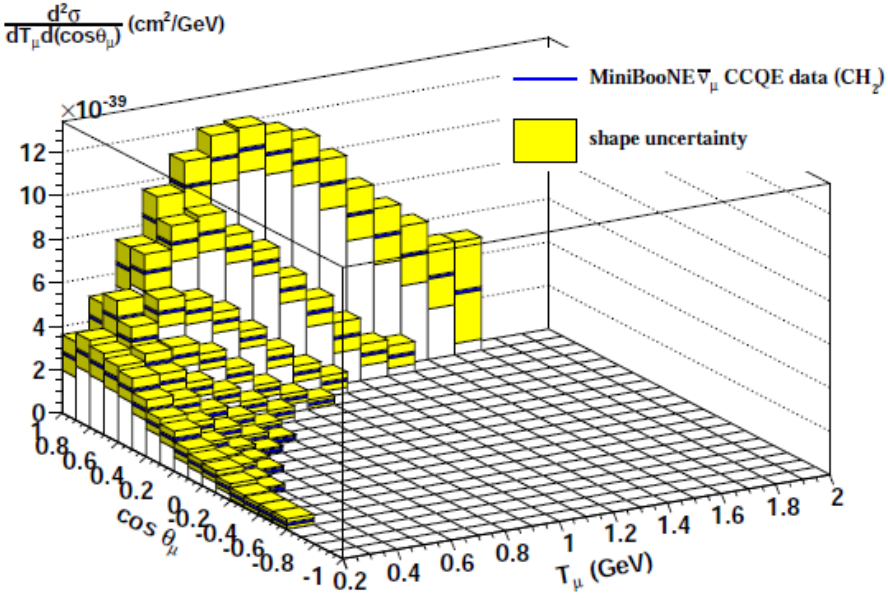
  - Example: first 2-diff CCQE-like cross section @ MiniBooNE





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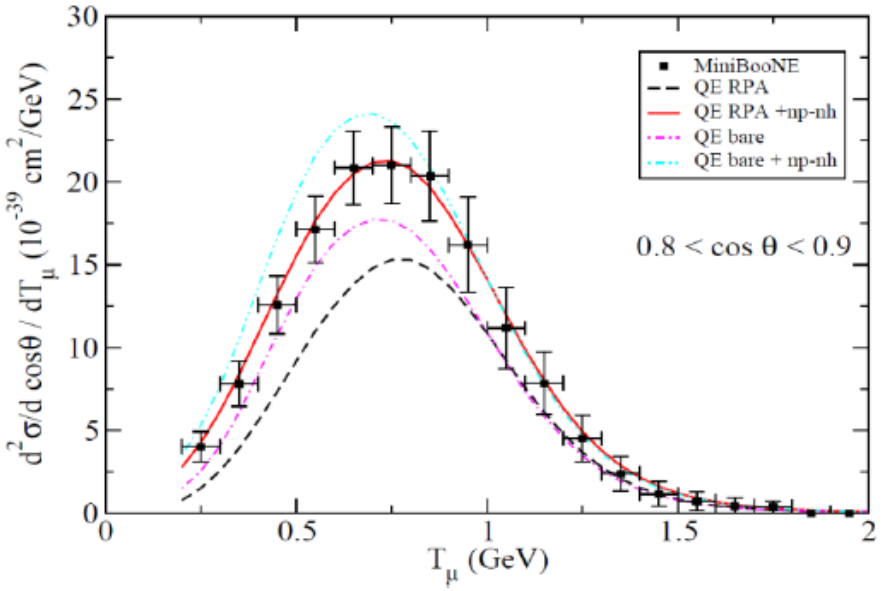
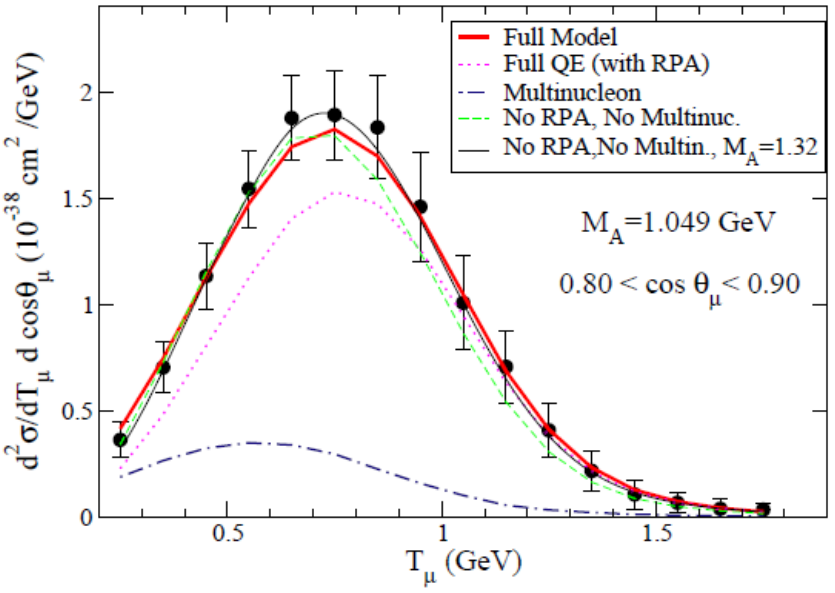
Martini et al.



Nieves et al.



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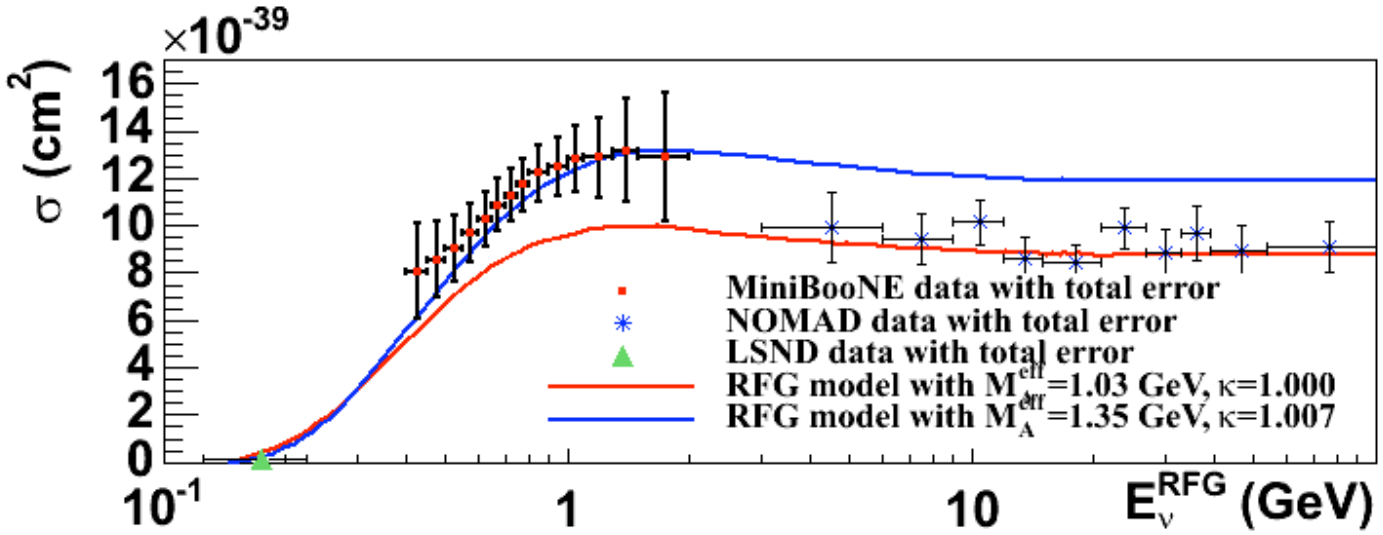

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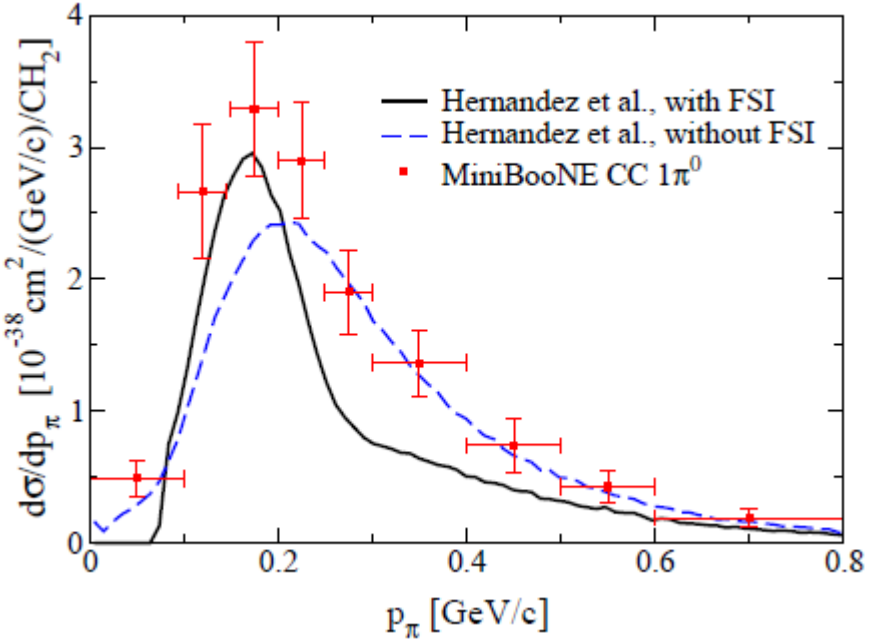

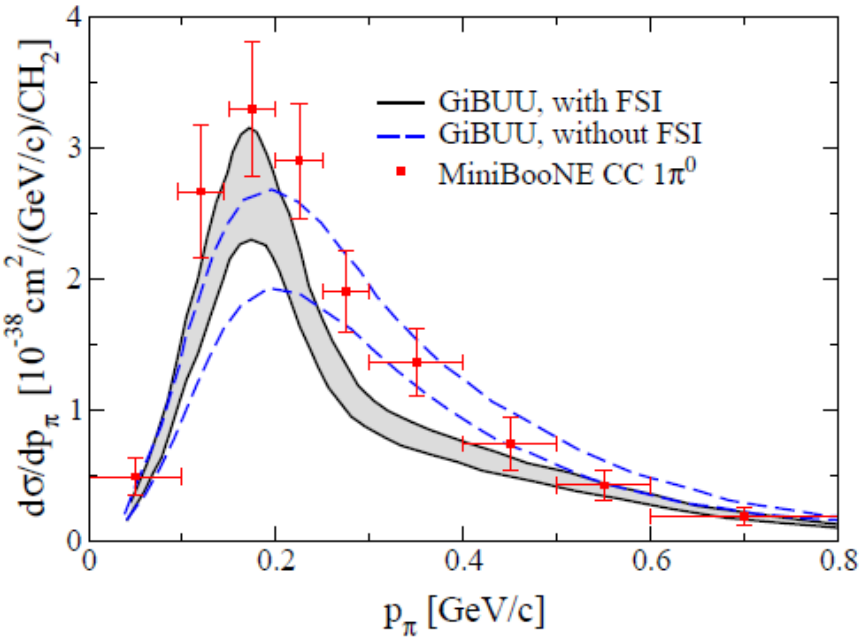

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$$\frac{\sigma_{\mathrm{CC-COH}\pi^+}}{\sigma_{\mathrm{NC-COH}\pi^0}} = 0.14^{+0.30}_{-0.28}$$ SciBooNE

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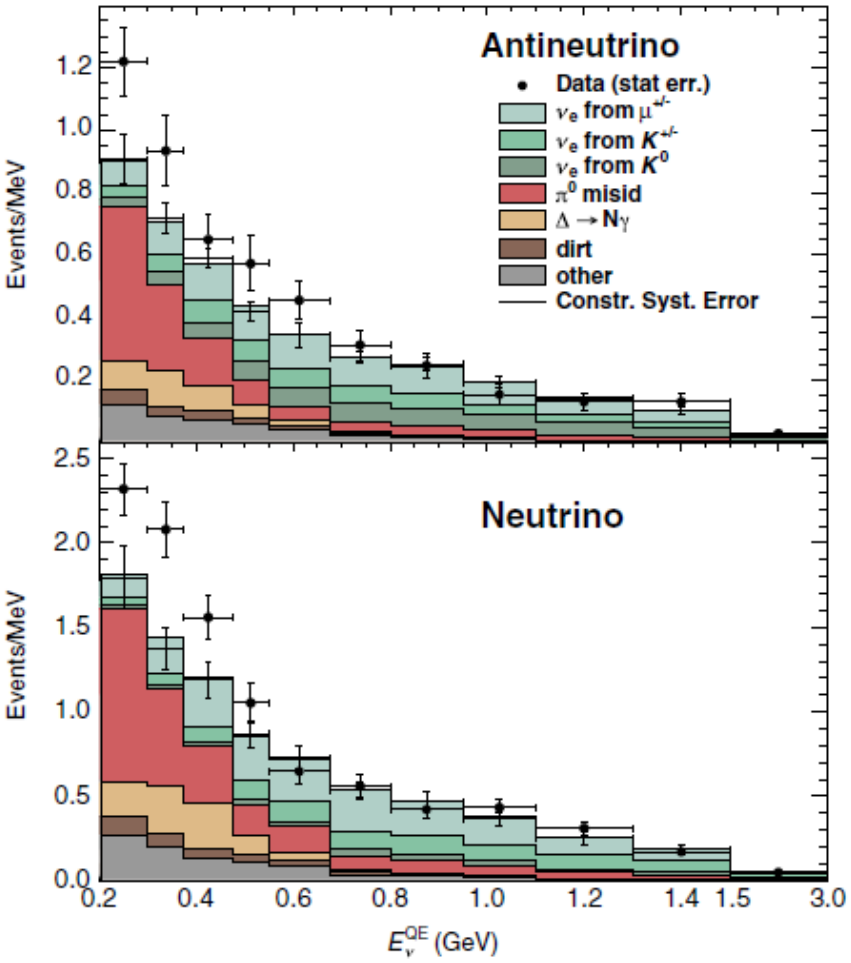

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Present Experiments

ArgoNeuT, MINERvA, NOvA, T2K

- Experimental overview: Plenary 2, J. Nelson
- WG2 talks:
  - Resonance production at NOMAD [130]
  - CCQE interactions at MINOS [140]
  - T2K cross section measurements with INGRID [109], ND280 [128], SK [138]
  - Cross section measurements at ArgoNeuT [119]
  - ν_e CCQE-like[132], inclusive and Cohπ interactions [144] at MINERvA
  - CC inclusive and QE at NOvA [123]
- Question: will these exp. allow to solve (some of) the standing puzzles?

- Understanding ν fluxes:
  - Via simulations
    - Input from hadron production data (NA61/SHINE) for T2K and how to use them [49]
  - Via direct ν cross section measurements
    - New method of extracting the flux from inclusive data using the maximum entropy method [86]

- Understanding nuclear effects:
- Considerable theoretical effort. Overview: plenary 2, A. Ankowski
- WG2 talks:
  - cRPA [89]
  - 2p2h [92]
  - CTEQ nPDF [145]

- Developing MC generators (theory improvements and new data)
  - NEUT [107]
  - GENIE [117]

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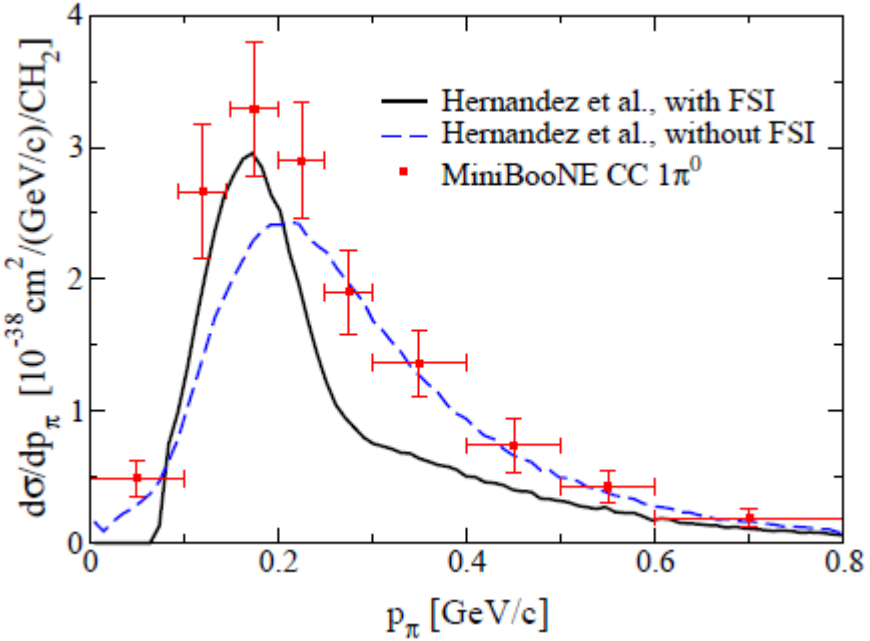

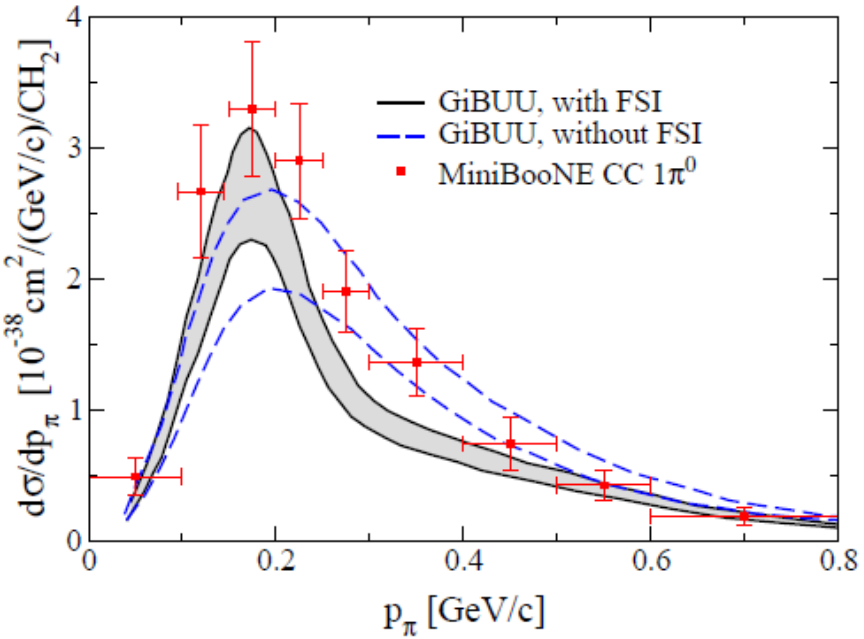

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- Question: Is it possible to understand ν interactions on nucleons without direct measurement?
- Alternatives: PV electron scattering
  - Nucleon axial form factor from PV electron scattering [83]

- Two joint WG1+ WG2 sessions at NuFact 2014
- Main topic: the problem of energy reconstruction
  - Caused by broad fluxes
  - Complicated by nuclear effects, FSI, poor knowledge of elementary processes
  - Affects oscillation and cross sections studies
  - NOvA [85], T2K [91], MINERvA [137] approaches
  - Related topic at WG2: Hadronization [134]

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Future Experiments

- νPRISM [118]
- A Fine-Grained Tracker ND for LBNE [122]
- LAr tecnology: LAriaT [112]

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Looking forward to an interesting and productive NuFact 2014