Two-body current contributions in neutrino-nucleus scattering

SUMMARY/THEORY
(rather a starting point for discussion)

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Goals of the workshop

Discuss and compare different models

Benchmark models against electron scattering data

Compare results for neutrino scattering observables

Discuss best strategies to implement models in generators

2p2h models

Microscopic 2p2h models:

Argonne/Los Alamos/Jlab	(Lovato et al.)
Ghent	(Ryckebusch et al.)
Granada/MIT/Sevilla/Torino	(Amaro et al.)
Lyon/Saclay	(Martini et al.)
Rome	(Rocco et al.)
Valencia	(Nieves et al.)

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Phenomenological models:

GIBUU	(Mosel et al.)

Models for the QEP

Each model is associated to a specific treatment of the **1-body part of the problem**:

- RPA
- spectral function
- superscaling / RMF
- Green's Function Monte Carlo
- HF
- Relativistic Green's Function

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Final state interactions

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CONSISTENCY?

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- underlying Lagrangian
- relativistic content
- correlations
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Different approximations:

- selection of diagrams
- numerical approximations
- exchange terms
- longitudinal vs. transverse
- treatment of the Δ propagator
- inclusion of the axial response
- ...

Testing models

When compared to **neutrino** data

- similar models give sometimes different results
- different models give sometimes similar results

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Every group is encouraged to do the same, possibly at the same conditions
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It would be great if all generators could be adapted to electron scattering (some already are and some are working on it)

How can theorists help experimentalists?

- Provide the 2p2h hadronic tensor as a function of q and ω

- Provide parametrizations of the results

- Separate contributions of pn, pp and nn pairs

- Provide the two nucleons kinematics

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- What else?

- Warning: each model has a limited kinematical range of validity: extrapolations are dangerous

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DISCUSSION!