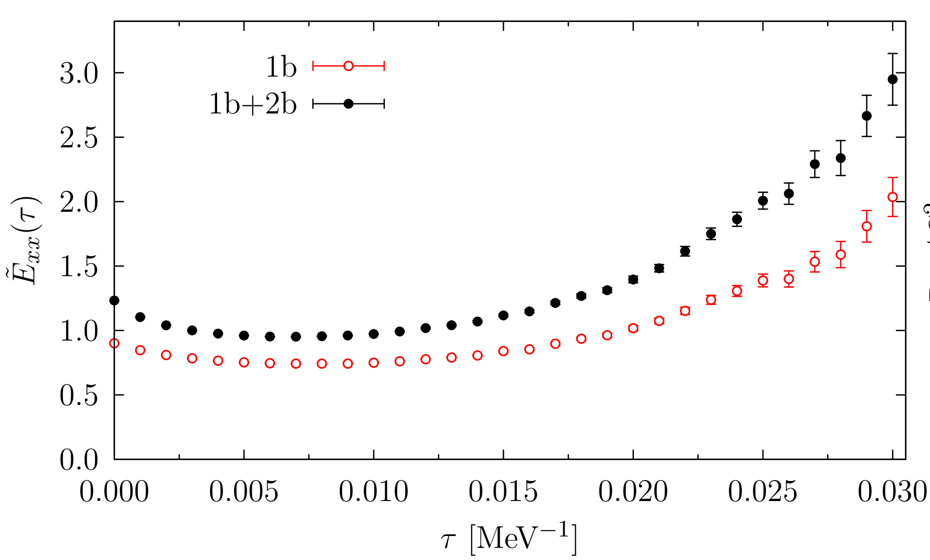
Electromagnetic and neutral-weak response of ^{4}He and ^{12}C

Objectives

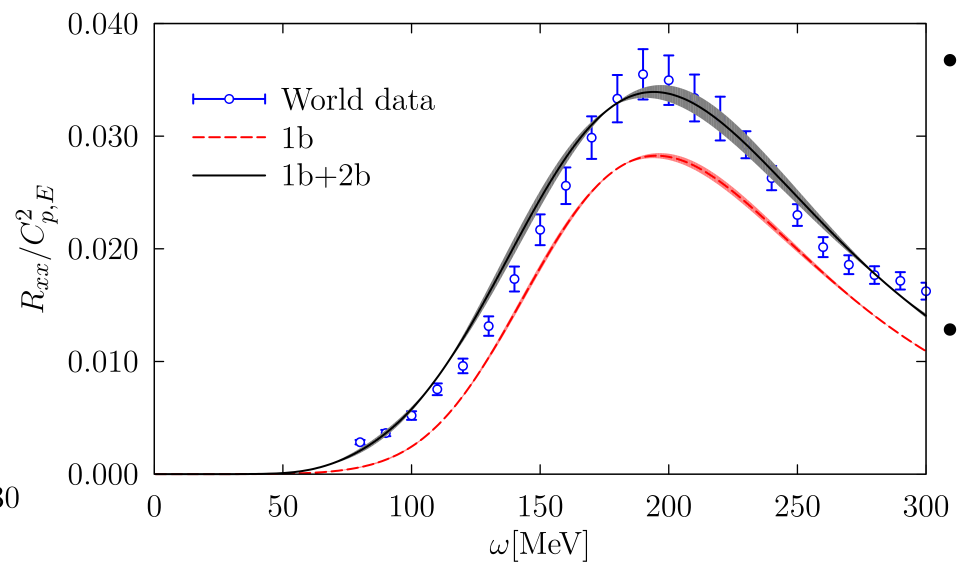
- Compute the electromagnetic response functions of ^{4}He and ^{12}C for which accurate experimental data are available.
- Within the same formalism, study the neutral-current and charged-current response functions, fundamental ingredients for describing neutrino-^{12}C scattering.
- Investigate the energy dependence of the two-body meson-exchange currents contributions.

Impact

- The calculations of the Euclidean electromagnetic response function of ^{12}C can be used to predict the results of the latest electron-^{12}C scattering experiment of JLab.
- Accurate calculations of electroweak response functions are relevant to neutrino-nucleus scattering experiment (MiniBoone) and to understand the mechanism of supernovae explosions.



Euclidean neutral-weak transverse response functions of ^{12}C at q = 570 MeV. Two-body currents increase the one-body response in both the quasielastic and threshold regions.



Electromagnetic transverse response functions of ^{4}He at q = 600 MeV obtained from the corresponding Euclidean response by using Maximum Entropy techniques.

Accomplishments

- Development of an algorithm to compute the Euclidean response functions within Green's function Monte Carlo.
- Using Maximum Entropy techniques it is now possible to obtain the electromagnetic response of ^{4}He from the Euclidean response.
- Two-body currents and nuclear correlations have to be accounted for in order to get good agreement with experimental data.

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References: arXiv:1501.01981

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