Contribution ID: **75**   Type: **not specified**

Quasielastic interactions of monoenergetic kaon decay-at-rest neutrinos

Wednesday, March 17, 2021 8:35 AM (10 minutes)

Monoenergetic muon neutrinos with an energy of 236 MeV are readily produced in intense medium-energy proton facilities at Fermilab and J-PARC when a positive kaon decays at rest in neutrino beamline absorbers. These kaon decay-at-rest (KDAR) neutrinos offer a distinctive opportunity to study neutrino-nucleus interactions without having to deal with the complications raised by pion decay-in-flight neutrinos with broad energy-distributions.

These monoenergetic neutrinos are important for obtaining a better understanding of the role of e.g. initial and final-state interactions, and correlations in the nuclear medium, and they can help to reduce experimental and theoretical uncertainties and ambiguities in an unprecedented way.

The KDAR charged-current muon interaction occurs in a kinematic region that is strongly affected by nuclear effects such as Pauli-blocking and long-range correlations.

We present cross sections of electron- and neutrino-nucleus scattering in the kinematic region probed by KDAR neutrinos, paying special attention to the low-energy aspects of the scattering process.

Our model takes the description of the nucleus in a mean-field (MF) approach as the starting point, where we solve Hartree-Fock (HF) equations using a Skyrme (SkE2) nucleon-nucleon interaction.

We introduce long-range nuclear correlations by means of the continuum random phase approximation (CRPA) framework where we solve the RPA equations using a Green's function method in configuration space.

We discuss the relevance of a precise determination of KDAR ν_μ-nucleus cross sections for neutrino oscillation experiments. In particular for the MiniBooNE experiment that observes a large excess of electron-like events in a ν_μ beam in the (reconstructed) energy bins that overlap with the KDAR ν_μ energy.

Primary authors: NIKOLAKOPOULOS, Alexis (UGent); Dr PANDEY, Vishvas (University of Florida); JACHOWICZ, Natalie (Ghent University); Dr SPITZ, Joshua (University of Michigan)

Presenter: NIKOLAKOPOULOS, Alexis (UGent)

Session Classification: Flash Talks