

Abstract

In my talk I will give an overview of the recent progress that has been made in describing neutrino-nucleus scattering within the ab-initio coupled-cluster framework, combined with the Lorentz integral transform. These techniques open the door to obtaining nuclear responses (and consequently cross-sections) for medium-mass nuclei starting from first principles. A series of steps has been made in this direction. Firstly, the nuclear 1- and 2-body currents have been re-derived and checked for the case of neutrino-deuteron scattering. Afterwards, the Coulomb sum rule of ^{16}O has been calculated, introducing a new technique to remove the center-of-mass contamination. Most recently, we have calculated for the first time the longitudinal response of ^{40}Ca . These developments allow to extend the applicability of ab-initio methods in the field of neutrino-nucleus interactions to medium size nuclei, contributing this way directly to the neutrino oscillation program.