



Contribution ID: 148

Type: **Contributed Talk**

Benchmarking electron-nucleus scattering within coupled cluster theory on 4He

Tuesday, 1 August 2023 14:55 (15 minutes)

Neutrino oscillation experiments require good understanding of neutrino-nucleus interactions in the range of medium-mass nuclei, especially 40Ar and 16O relevant for DUNE and HyperK. Recently, we have started a program of calculating cross sections in the range of the quasi-elastic peak within the coupled cluster method combined with Lorentz integral transform.

In the first step we benchmarked our method for light systems, in particular 4He , where there are available predictions from various few-body methods. In my talk I will present our recent results for electron scattering on 4He : Coulomb sum rules, the longitudinal and the transverse responses. A special care is taken to remove the centre-of-mass spurious states that appear in the spectrum. Next, I will show the calculation of the spectral function and comparisons with the data in relativistic regime where the final state interactions can be neglected.

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Session Classification: Tuesday Parallel Session: Few- and many-body systems (Atrium Maximum)