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

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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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