GAMOW-TELLER MATRIX ELEMENTS FOR BETA TRANSITIONS IN T=1/2 MIRROR NUCLEI CALCULATED USING DFT-ROOTED NO-CORE METHODS

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Single-reference energy-density-functionals are very successful in reproducing bulk nuclear properties like binding energies, radii or quadrupole moments throughout the entire periodic table. Their extensions, in the first step to multi-reference (MR) framework by restoring spontaneously broken symmetries and further to no-core configuration interaction (NCCI) scheme by mixing good-symmetry states projected from relevant (multi)particle-(multi)hole configurations, constitute complete many-body approach allowing to calculate, apart of bulk properties, also spectra and transition rates for various nuclear reactions.

In the talk we will present the MR Density Functional Theory (DFT) involving isospin and angular-momentum projections [1] and its extension to the NCCI model [2]. We will discuss selected applications of the NCCI model to N≈Z nuclei that are relevant from the point of view of a study of superallowed Fermi beta decays. We will focus, however, on Gamow-Teller (GT) matrix elements in the ^{6}Li and more importantly results in T=1/2 mirror nuclei from sd and fp shells - results corresponding to I_{GS} to I_{GS} transitions, where I_{GS} denotes the ground state spin. We will compare the results to experimental data taken from [3] and from the compilations [4,5] and to the shell model calculations [4] as well.

The formalism is perfectly suited to address, among the others, questions concerning an influence of core polarization on the quenching of GT matrix elements. To the best of our knowledge, this work represents the first attempt to study GT matrix elements within the DFT-rooted no-core framework treating properly rotational and isospin symmetries.

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