DFT-ROOTED CALCULATIONS OF GAMOW-TELLER BETA DECAY

Maciej Konieczka
Institute of Theoretical Physics, Faculty of Physics, University of Warsaw, Warsaw, Poland

P. Bączyk[1], W. Satuła[1,2]

1 Institute of Theoretical Physics, Faculty of Physics, University of Warsaw, Warsaw, Poland
2 Helsinki Institute of Physics, Helsinki, Finland

Extending Single Reference Density Functional Theory (DFT) into a multireference (MRDFT) scheme by means of projection techniques allows one to restore symmetries and, in turn, to calculate transition rates for various nuclear reactions [1]. The scheme can be further generalized to include correlations from relevant (multi)particle-(multi)hole excitations by performing configuration-interaction (CI) calculations.

The aim of this presentation is to introduce the MRDFT model involving angular momentum and isospin projections and its extension to the no-core CI (NCCI) scheme developed by our group [2]. We shall present applications of the MRDFT and NCCI models to the structure of selected nuclei focusing on their capability to investigate Gamow-Teller (GT) beta decay channel in $N \approx Z$ nuclei ranging from $A = 6$ up to $A = 100$.

In particular, we shall discuss the following issues: 1) influence of core polarization on the quenching of GT matrix elements [3] by comparing our results to the state-of-the-art shell model calculations, 2) spin-orbit dependence of the GT matrix elements [3], and 3) the GT strength distribution for the ^{24}Al $\succ$ ^{24}Mg decay. Special attention will be paid to study the influence of isospin symmetry breaking correlations (ISB) on the GT transitions. It will be shown, that the calculated differences between GT matrix elements corresponding to the mirror transitions in $N \approx Z$, $T=1$ nuclei in *p*- and *sd*- shells are in a very good agreement with the experimental values [4,5] in a handful of cases where such data are available. To the best of our knowledge, this is the very first study of the effect of ISB correlations on the spin-isospin channel of an axial-current-mediated beta decay.

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