Spectral Distribution Method for Neutrinoless Double Beta Decay: ^{82}Se and ^{76}Ge Examples

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Spectral distribution method (SDM), based on Central Limit Theorems generated by random matrix theory, starts with the same set of single particle orbits, single particle energies and effective interaction as in the shell model. SDM for nuclear level densities is now well developed with the past work from Rochester, Ohio and Ahmedabad combined with the most recent and decisive contributions from Michigan. SDM for transition strength densities, and thereby for transition strengths, is also available albeit under several plausible approximations. Transition strength is the square of the matrix element connecting an eigenstate of an initial system, by a transition operator, to an eigenstate of a final system. Similarly, transition strength density is transition strength multiplied by the density of states at the initial and final eigenstates involved. In this talk, SDM formulation as adopted for neutrinoless double beta decay (NDBD) nuclear transition matrix elements (NTME) will be described. The NTME are transition strengths generated by the NDBD two-body transition operator changing two neutrons to two protons. The final SDM formula for NTME contains a bivariate correlation coefficient and energy dependent spin-cutoff factors as parameters. Their values are constrained using the results from embedded random matrix ensembles and numerical calculations. As a first example, SDM formulation is applied to ^{82}Se and this is a candidate of the SuperNEMO experiment. Results for NTME obtained using JUN45 interaction in $^{1}f_{5/2}$, $^{2}p_{3/2}$, $^{2}p_{1/2}$ and $^{1}g_{9/2}$ space are close to the shell model values obtained using the same interaction. As a further example ^{76}Ge, candidate of MAJORANA and GERDA, is considered and here also SDM results for NTME are close to the available shell model results.