Contribution ID : **62** Type : **Plenary/section talk**

DELAYED MULTI-NEUTRON EMISSION IN HEAVY CA REGION

Wednesday, 4 October 2017 09:00 (15)

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Performance of the global self-consistent models of nuclear beta decay is analysed. We compare the results of the interacting shell-model [1], continuum quasiparticle random phase approximation DF+CQRPA based on the Fayans functional [2], relativistic Hartry-Bogolubov QRPA [3], and Finite Amplitude Method [4] based on the Skyrme functional. All the frameworks include both the allowed Gamow–Teller and first-forbidden beta decays on the same microscopic footing. The beta-decay half-lives and delayed multi- neutron emission branchings are confronted for the "reference nuclides" near the major neutron shells-closures at N=50, 82. An emphasis is made on the share of the first-forbidden decays in the total rates. The results are also checked against the known hindrance factors and for consistency with available experimental decay schemes. A detailed beta decay study is performed for the K, Ca, Sc nuclides near the new neutron sub-shells at N=32, 34. In a view of recently discovered anomalous nuclear radii in heavy Ca isotopes [5], a special attention is payed to possible constraints imposed by the beta-decay strength functions, half-lives and delayed multi-neutron emission branchings on the strength of quasiparticle-phonon coupling. Taking an account of this effect has been found to be of prime importance for solving the problem of "Ca anomaly" [6].

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Session Classification : Nuclear physics - 1

Track Classification : Nuclear physics