Abstract

We discuss the relevance of the single particle (sp) properties of the well seasoned Skyrme SIII interaction to describe within self-consistent Hartree-Fock plus BCS (with blocking when needed) calculations, some spectroscopic properties of heavy nuclei using a simple seniority pairing residual interaction ($V_{res}$). To fit $V_{res}$ we took stock of the excellent consistency found in the rare-earth region between its adjustment from both moments of inertia (MoI) of well-deformed nuclei and odd-even mass differences. For simplicity reasons we thus made a fit on MoI. Our sample was defined by all even-even isotopes of actinide and heavier elements, with two criteria: i) be well and rigidly deformed in their ground states, as assessed by a ratio $E(4^+_1)/E(2^+_1) > 3.2$, ii) present some isomeric activity with suggested isomeric ($E_{isom}$) and spin/parity characterization. We have thus considered 14 actinide isotopes (from Uranium to Nobelenium) plus $^{256}$Rf. With a simple law of variation of the matrix elements according to N or Z, we get a fair reproduction of MoI excepted around the neutron number $N = 152$ where SIII exaggerates its well documented magicity (for normally deformed solutions). Such a study of MoI assesses thus also the sp spectra, of which a further evaluation of the quality is provided by the comparison of the corresponding experimental and theoretical $E_{isom}$. Our calculations were limited to single quasi-particle (uncoupled) configuration seniority 2 states because higher seniority states are likely to present coupling between various quasi-particle configurations and/or with collective degrees of freedom, which are beyond the current capacities of our calculations. Preliminary results on some of the considered isotopes will be discussed particularly by comparing them with a particle number conserving approach.