

MASSES AND DEFORMATIONS OF HEAVY AND SUPERHEAVY NUCLEI

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SUMMARY

A calculation of ground state masses and deformations has been performed. It is based on the shell correction method developed by Strutinsky involving a modification of the liquid drop mass formula and shell and pairing corrections from a single-particle model. The single-particle model employed is the modified harmonic oscillator potential developed by Nilsson and coworkers with two deformation coordinates ϵ , ϵ_4 representing elongation and neck-in respectively. The parameters in the model are adjusted to reproduce optimally the observed single particle level order in the rare earth and actinide regions and are not fitted directly to the nuclear masses. Shell corrections are obtained by means of the sixth-order Strutinsky prescription, and the pairing corrections are calculated by the BCS method. The liquid parameters employed are those of Myers and Swiatecki. The resulting masses and deformations show very good agreement with experimental values.

Actually the agreement in the Pb region seems excessively good in view of the fact that the spherical shell model spectra around Pb are relatively poorly reproduced.

Tables of calculated masses, shell corrections, deformations as well as particle separation energies of protons, neutrons, alpha particles, and Q-values for beta-decay are presented for heavy and super-heavy nuclei ($150 < A < 330$).