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ENERGY SURFACE AROUND A DEFORMED EVEN-EVEN NUCLEI WITH 150<A<190

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If an ideal energy surface around a deformed nucleus with even N and Z existed and were linear and quadratic in deviations s and t from N and Z respectively ($|s|/N \ll 1, |t|/Z \ll 1$)

$$E(N+s,Z+t) = M(N+s,Z+t) - m_n(N+s) - m_p(Z+t) = E(N,Z) + d_{1n}s + d_{1p}t + \\ + d_{2n}s^2/2 + d_{2p}t^2/2 + d_{1n1p}st$$

(E, M are nuclear energy and mass, m_n, m_p are nucleon masses), then parameters $E(N,Z)$ and d_{inkp} should not depend on those adjacent nuclei which are used for calculations of these parameters. In particular, a measured $E(N,Z)$ has to coincide with a calculated parameter $E(N,Z)$.
For determination of $E(N,Z) - E(N,Z)$ and other parameters three groups of even-even nuclei are applied: s -Appr. (Approximation, $s = \pm2, \pm4, t = 0$, i. e. isotopes); t -Appr. ($s = 0, t = \pm2, \pm4,$ i.e. isotones) and $(st)-$ Appr. in which $s = \pm2, t = \mp2; s = \pm4, t = \mp4$

Calculated quantities $E(N,Z) - E(N,Z)$ are given in Table [1], which shows
that these quantities are sign variable in different approximations and a maximum divergence attains $\simeq 120\text{keV}$. Approximately the same difference is found in other parameters. Thus, description of the energy surface around a deformed even-even nucleus by Eq. (1) is rather approximate. This information is useful for prediction of unknown masses and calculations of the pairing energies.

Nucleus	$E(N,Z)-\mathscr{E}(N,Z)$		
	s-Appr.	t-Appr.	(st)-Appr.
$^{154}_{64}\text{Gd}_{90}$	128.6±2.0	–8.9±19.2	121.8±10.3
$^{160}_{66}\text{Dy}_{94}$	–29.6±8.6	–53.1±9.2	–68.2±18.4
$^{170}_{70}\text{Yb}_{100}$	37.7±1.4	29.9±16.9	–8.8±33.9
$^{180}_{74}\text{W}_{106}$	74.6 ±13.6	77.6±11.3	–55±61
$^{188}_{76}\text{Os}_{112}$	–21.0±1.1	–179.0±7.2	12.4±9.7

Figure 1:

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