

THE CODE BARON – THE TOOL FOR MODEL DESCRIPTION OF NUCLEAR ROTATIONAL BANDS

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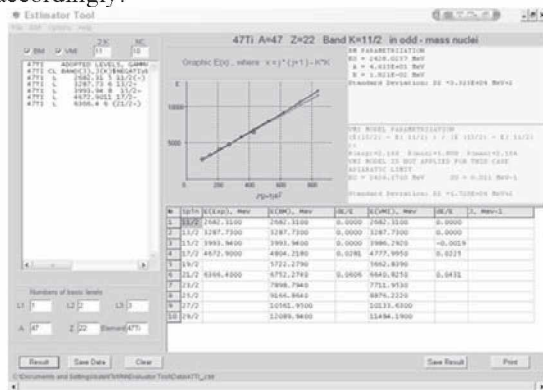
Code BARON (BANDs in ROTating Nuclei) is intended for determination of model parameters of the rotational bands depending on the energies $E(I, K)$ of the band levels by a method of the least squares. We used two the most popular parameterizations: polynomial one

$$E(I, K) = E_0 + A[I(I+1) - K^2] + B[I(I+1) - K^2]^2 + \dots,$$

and the variable moment-of-inertia model

$$E(I, K) = E_0 + \frac{I(I+1) - K^2}{2J(I)} + \frac{C}{2}(J(I) - J_0)^2, \quad \frac{\partial E(I, K)}{\partial J(I)} = 0.$$

Both approaches take into account signature corrections for the bands with $K = 1/2$ for odd-A nuclei [1], with $K=0$ and 1 for odd-odd nuclei [2] and with $K=2$ for even-even nuclei. Any sequence of levels (not less than three) with the differing values of the spin I and the fixed value of its projection K can be considered to be rotational band. To describe the signature effects in "short" bands with three levels we used the adiabatic approximation, $B=0$ and $C \rightarrow \infty$, accordingly.



The code BARON is supplied by the friendly interface facilitating its use. Initial data can be entered by user from a file or introduced manually. Any updating of the entered values or the extracting of separate levels from the fit procedure is possible. With the values of the parameters found the code

BARON calculates a spectrum of the rotational band and builds the graphs for visual comparison and the control.

The code allows to keep results of the calculations in a standard form for the further use.

1. T.V.Alenicheva *et al.* Atlas of rotational bands in odd-A nuclei. PNPI. Saint-Petersburg, 2003. P.164.
2. L.P.Kabina, I.A.Mitropolsky // Izvestia RAN. Ser. Fiz. 2007. V.71. P.897.