

Possible Collapse of Pairing at Low Spins in the
A = 100 Region

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Recently we pointed out [1] the possibility that in A = 100 odd-odd nuclei a very strong $p(g_{9/2})n(g_{7/2})$ coupling in combination with a blocking effect from 2 unpaired nucleons may cause the collapse of pairing at low spins and energies. In $^{100,102}\text{Y}$, $^{102,104}\text{Nb}$ -nuclei, we showed that the moment of inertia \mathcal{J} of low energy states is very close to \mathcal{J}_{rig} expected for pairing free states. In the considered bands, however, only 2 excited states were observed, and therefore, it was impossible to test other features expected for pairing free bands. For example, for such bands (if snell effects on \mathcal{J} may be neglected), all signature terms and other higher order terms have to be absent from the usual formula for $E(I)$, i.e. in the Bohr-Mottelson formula $(E)I = AI(I+1) + B[I(I+1)]^2 + C[I(I+1)]^3 + (-1)^{I+K} A_{2K} r(I,K)$, $B=C=\dots = 0$ as well as $A_{2K} = 0$. This means that oscillations of $E_{\gamma}(I+1)$ observed in $K \neq 0$ bands because of the signature terms have to be absent in pairing free bands.

In $^{98}\text{Y}_{3,3}$, four members of a bands were observed [2] and this expectation can be tested. Comparison of the functions $E_{\gamma}(I+1)$ for the ^{98}Y band and normal bands in the neighbor ^{98}Y nucleus [3], as shown in the figure, clearly demonstrates the sharp difference in their behavior. The practically total absence of oscillations in the ^{98}Y band in addition to $\mathcal{J} > \mathcal{J}_{rig}$ support our suggestion that this band is

probably pairing free.

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REFERENCES

1. Peker, L. K. *et al.*, Phys. Lett. 169, 323 (1986).
2. Lhersonneau, G., Meyer, R. A., Ohm, H. and Sistemich, K., Ann. Rep. (Julich) (1985), p. 91.
3. Monnard, E. *et al.*, Z. Phys. 306, 183 (1982).

