Rotational Bands in $^{182}$Ta (*)

B. Bizzarri, P. Nunberg and D. Prosperi

Laboratorio di Fisica Nucleare Applicata
Centro di Studi Nucleari della Casaccia del CNEN - Roma

Summary. — We have re-examined the decay of the 16-minute isomer $^{182}$Ta in order both to look for hitherto undetected transitions and to obtain further evidence on the multipolarities of the already known ones. We have measured γ-ray and conversion-electron spectra. In agreement with a previous result by Sunyar and Axel we have found that the decay scheme of the isomer involves three states at excitation energies of $(147.0 \pm 0.3), (319.1 \pm 0.6), (504.6 \pm 1.2)$ keV. If the ground-state activation cross-section is taken as 21 barn, the corresponding value for the isomer is $(13 \pm 2)$ mb. The half-life is $T_\frac{1}{2} = (15.84 \pm 0.10)$ min. We have further attempted to fit all the presently known data on $^{182}$Ta in a single level scheme. The experimental results obtained by the decay of the isomer and by $^{181}$Ta(d, p) reactions have been compared with the predictions of the unified model. The relative positions of the rotational bands in $^{182}$Ta are strongly affected by the properties of the effective (n, p) residual interaction introduced in the calculation.

1. - Introduction.

In the course of a general review of the properties of odd-odd deformed nuclei, we have been struck by the fact that although many authors have investigated the structure of $^{182}$Ta, no attempt has yet been made to fit the presently known data into a single level scheme.

After describing the results of some measurements performed in our laboratory we shall therefore attempt to fix the energies and quantum numbers of the lowest-lying levels.

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Our interpretation is still tentative but we believe that its main features have a good chance of being correct.

2. Review of existing data.

The main sources of experimental evidence on $^{182}$Ta are:

a) the $^{181}$Ta(d, p) reaction,
b) the $^{181}$Ta(n, γ) reaction,
c) the decay of the 16 min isomeric state of $^{182}$Ta.

Let us now comment briefly on these three points.

![Figure 1](image)

Fig. 1. - Review of existing data (all energies in keV).

a) $^{181}$Ta(d, p) reaction. – The best experiment on the (d, p) reaction is that due to [1], the energy resolution being about 8 keV. The levels found in this experiment are shown in Fig. 1, a) together with