LOW ENERGY COLLECTIVE STATES IN THE SOFT $^{182}_{78}Pt$ NUCLEUS

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Abstract

Nuclear spectroscopy has been done on ^{182}Pt nucleus ; a particle level scheme is given.

In 1973 at the end of Isolde 1 (CERN) continuing our platinum nuclei systematics[1], we studied on-line the ^{182}Hg decay products. The ^{182}Hg mass separated ion-beam was weak ; it was sufficient to obtain rather precise γ and conversion electron spectra of the different decays (Hg → Au, T 1/2 = 11.2 sec ; Au → Pt T 1/2 = 22.1 sec ; Pt → Ir, T 1/2 = 156 sec) ; detailed coincidence experiments were not possible at that time and we proposed a very partial level scheme, based mainly on energy combinations[2].

With the recently rebuilt 600 MeV proton S.C. and Isolde 2, the activity collected from the separator was roughly ten times higher than Isolde 1 and permitted triple e^--γ-γ coincidence experiment. The activity was transported to the counting devices with a new tape transport system. The coincidence events we recorded on a magnetic tape unit driven by a Plurimat (Intertechnique) computer system. The sorting of the data was realised on disks with the A.R.I.E.L system in Orsay (IBM 370-135). Analysis of the gated spectra either or electron side, or in both γ-γ sides lead to a more precise level scheme of the ^{182}Pt nucleus up to 1.3 MeV. The main results are the following :

- the ground state band is fed till the 4^+_1 state instead of the 8^+ in $^{184,186}Pt$; this can be in favour of a rather low spin for the ^{182}Au ground state (similar to the $^{190,192}Au$),

- we confirm the spin, parity and location of the 0^+ excited state at 499.5 keV (see fig.1),

- the states 499.5 keV (0^+), 855.3 keV (2^+) appear to be the lowest numbers of a "quasi β" band,

- a perturbed "γ band" can be constructed on the 667 keV (2^+) state ; this indicates still a γ instability for the ^{182}Pt nucleus and a large odd-even effect for the excited states of this'band" .

We had located some years ago[3] the oblate-prolate shape transition between ^{188}Pt ^{186}Pt. It appears that the 3 transitionnal $^{182,184,186}_{78}Pt$ nuclei are very similar (see fig.2). The band structure remains after the transition but an evolution toward a pure axialy symetry rotational structure is not seen.

References

1) M. Finger et al. Nucl. Phys. A188 (1972) 369-408.

2) M. Cailliau, R. Foucher, J.P. Husson et J. Letessier, J. Phys. Lettres, 1974, 35 L233.

3) R. Foucher et al., International Conf. on properties of Nuclear states, Montréal 1969, Presses Université de Montréal, p.682.

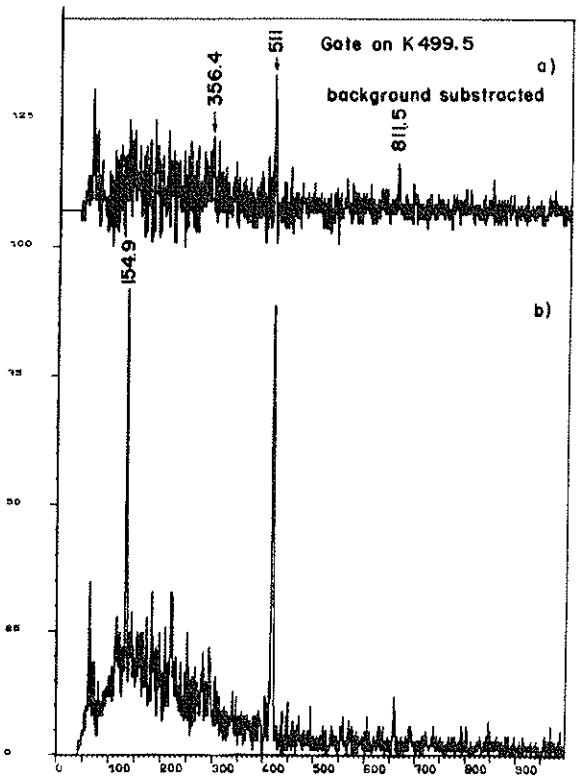

Fig. 1

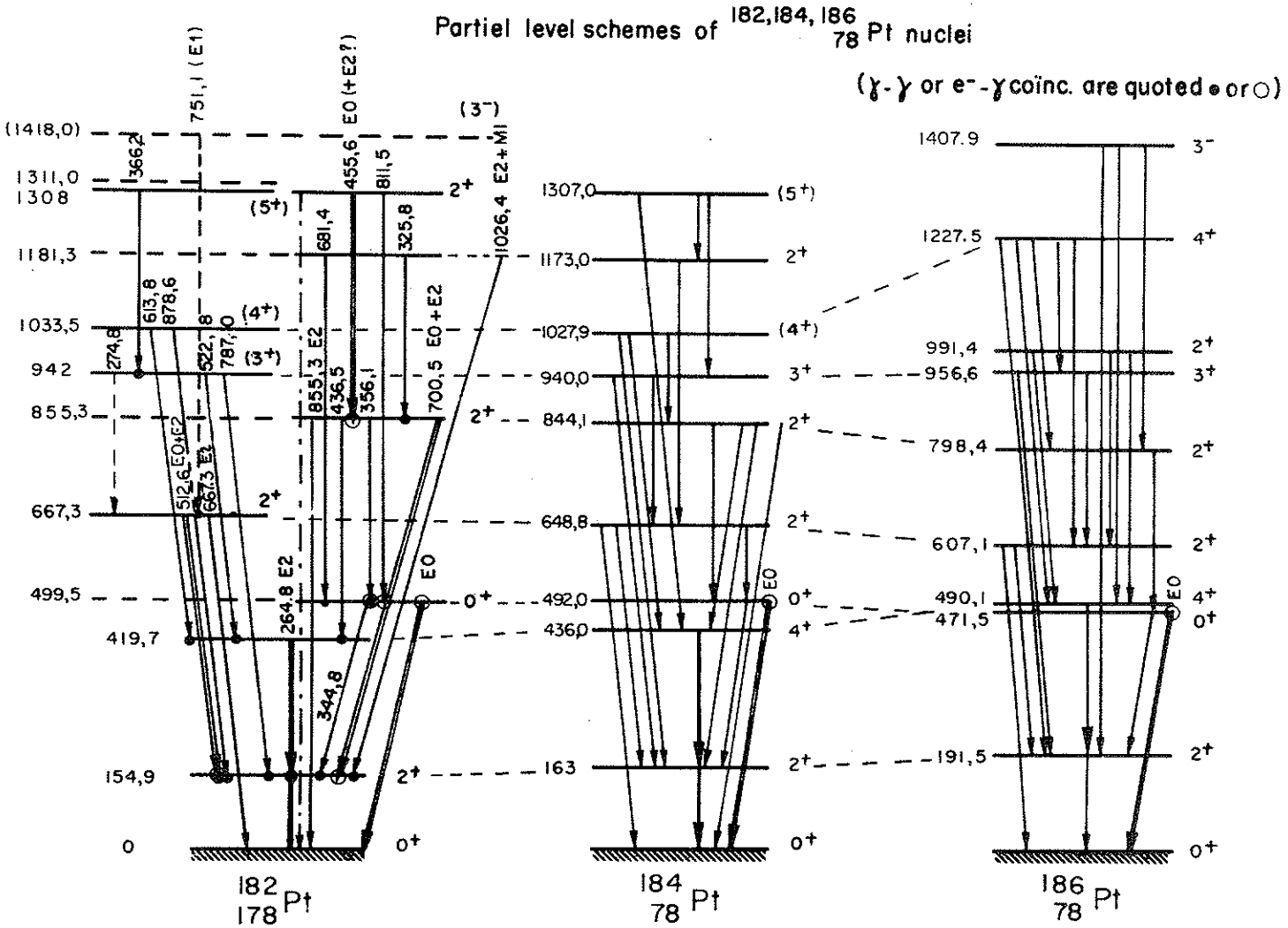
Partiel level schemes of 182,184,186 78 Pt nuclei
(γ-γ or e⁻-γ coïnc. are quoted ● or ○)
(1418,0)
1311,0
1308
1181,3
1033,5
942
855,3
667,3
499,5
419,7
154,9
0
751,1 (E1)
E0 (+E2?)
(3⁻)
455,6
811,5
2⁺
(5⁺)
681,4
325,8
1026,4 E2+M1
366,2
613,8
878,6
(4⁺)
522,8
787,0
(3⁺)
274,8
855,3 E2
436,5
356,1
700,5 E0+E2
2⁺
512,6 E0+E2
667,3 E2
2⁺
264,8 E2
E0
0⁺
344,8
2⁺
0⁺
182 178 Pt
1307,0
(5⁺)
1173,0
2⁺
1027,9
(4⁺)
940,0
3⁺
844,1
2⁺
648,8
2⁺
492,0
0⁺
E0
436,0
4⁺
163
2⁺
0⁺
184 78 Pt
1407.9
3⁻
1227.5
4⁺
991,4
2⁺
956,6
3⁺
798,4
2⁺
607,1
2⁺
490,1
4⁺
E0
471,5
0⁺
191,5
2⁺
0⁺
186 78 Pt

Fig. 2