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Effective Charges of the $[\pi h_{9/2}^2]J^+$ States in ^{210}Po

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The half-lives of the 6^+ and 4^+ states of ^{210}Po have been determined to be $T_{1/2}(6^+) = 40.9 \pm 1.0$ ns and $T_{1/2}(4^+) = 1.60 \pm 0.06$ ns, respectively, by the γ - γ delayed coincidence method in the decay of ^{210}At . The γ -rays were detected by two NaI(Tl) counters placed with a relative angle of $\theta = 135^\circ$. In the half-

life measurement of the 4^+ state the 1599-keV ($4^- \rightarrow 4^+$) γ -ray was used to start a time-to-amplitude converter and the 1180-keV ($2^+ \rightarrow 0^+$) γ -ray to stop. As to the 6^+ state, the 1436-keV ($5^- \rightarrow 6^+$) γ -ray and both the 245-keV ($4^+ \rightarrow 2^+$) and 1180-keV ($2^+ \rightarrow 0^+$) γ -rays were used.

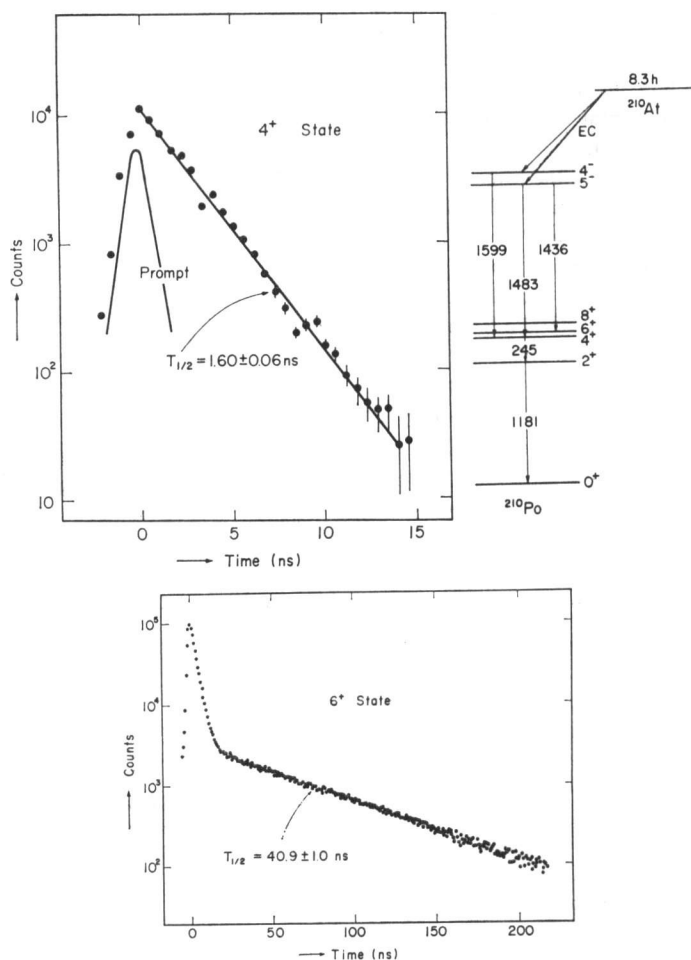


Fig. 1. Decay scheme of the 8.3 h ^{210}At radioisotope and the results of the half-life measurements for the 4^+ and 6^+ states of ^{210}Po .

Table I. Summary of the present results.

Transition	E_γ	$T_{1/2}$	$\alpha_T^{a)}$	$B(E2)_{\text{exp}}$	$B(E2)_{\text{cal}}^{b)}$	$e_{\text{eff}}^{c)}$
	keV	ns		$e_{\text{eff}}^2 \text{fm}^4$	$e^2 \text{fm}^4$	e
$8^+ \rightarrow 6^+$	83.7	$110 \pm 8^{d)}$	16.0 ± 0.5	74 ± 7	31	1.55 ± 0.08
$6^+ \rightarrow 4^+$	46.5	$40.9 \pm 1.0^{e)}$	274 ± 8	231 ± 13	78	1.72 ± 0.05
$4^+ \rightarrow 2^+$	245.3	$1.60 \pm 0.06^{e)}$	0.24 ± 0.01	321 ± 16	112	1.69 ± 0.04

a) Total conversion coefficient.

b) reference 3.

c) $e_{\text{eff}} \equiv (B(E2)_{\text{exp}}/B(E2)_{\text{cal}})^{1/2}$.

d) M. Ishihara, Y. Gono, K. Ishii, M. Sakai and T. Yamazaki: Phys. Rev. Letters **21** (1968) 1814; I. Bergström, B. Fant and K. Wikström: Physica Scripta **3** (1971) 103.

e) Present results.

The $B(E2)$ values deduced from the present results are listed in the Table I., in which the conversion coefficients were taken from refs. 1 and 2. In the 6th column the calculated $B(E2)$ values obtained by Astner *et al.*³⁾ by using the Kuo-Herling wavefunctions⁴⁾ are listed. Effective charges, e_{eff} , for three transitions roughly agree with each other, but the e_{eff} 's for the $6^+ \rightarrow 4^+$ and $4^+ \rightarrow 2^+$ transitions are about 10% larger than that for the $8^+ \rightarrow 6^+$ transition. The origin of such an increment in e_{eff} is still open to further investigations.

References

- 1) R. G. Hager and E. C. Seltzer: Nuclear Data Tables A4 (1968) 1.
- 2) O. Dragon, Z. Plajner and F. Schmutzler: Nuclear Data Tables A9 (1971) 119.
- 3) G. Astner, I. Bergström, J. Blomqvist, B. Fant and K. Wikström: Nuclear Phys. A182 (1972) 219.
- 4) T. T. S. Kuo and G. H. Herling: NRL Memorandum Report 2258 (1971).