

${}^{231}\text{Pa}(\gamma,\gamma)$ :Mossbauer 1978Fr28,1968Cr08

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, Jagdish K. Tuli, and Edgardo Browne		NDS 185, 560 (2022)	31-Aug-2022

**1978Fr28:** measured Mossbauer spectra at 4.2° K and 65° K using  ${}^{231}\text{ThO}_2$  as a source and Pa metal as absorber. Two resonance lines of equal intensity were observed. The spectra were least square fitted to a theoretical line shape for dipole transitions between the quadrupole hyperfine levels of the 5/2 excited state at 84.2 keV and the 3/2 ground state. Deduced quadrupole moment of the 84.2-keV level.

**1968Cr08:** source for the experiment was 25.57-h  ${}^{231}\text{Th}$  in the form of  ${}^{231}\text{ThO}_2$ . The absorber was  ${}^{231}\text{Pa}$  in the form of  ${}^{231}\text{PaO}_2$  and  ${}^{231}\text{Pa}_2\text{O}_5$ . The Mossbauer spectra were obtained at 4.2°K, a wide resonant peak was detected, probably an unresolved doublet, from which no definite conclusions could be made.

[Additional information 1.](#)

 ${}^{231}\text{Pa}$  Levels

E(level) <sup>†</sup>	J <sup>π</sup> <sup>†</sup>	Comments
0.0	3/2 <sup>-</sup>	Q=-1.72 5 (1978Fr28) Q: estimated by 1978Fr28 from B(E2) for 58.6 level.
84.21	5/2 <sup>+</sup>	Q=+0.7 2 (1978Fr28) Q: Mossbauer effect (1978Fr28), deduced from measured Q(84.2 level)/Q(g.s.)=-0.4 1, and estimated Q(g.s.)=-1.72 5.

<sup>†</sup> From the Adopted Levels. Energy of the 84.21 level is rounded value.

 $\gamma({}^{231}\text{Pa})$ 

$E_\gamma$	$E_i(\text{level})$	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult.	Comments
84.21	84.21	5/2 <sup>+</sup>	0.0	3/2 <sup>-</sup>	E1	$E_\gamma$ ,Mult.: from the Adopted Gammas. Energy is rounded value.

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Level Scheme