

$^{232}\text{Th}(\gamma,\gamma')$, $^{232}\text{Th}(e,e')$ 1988He02

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	E. Browne	NDS 107, 2579 (2006)	1-Nov-2004

$^{232}\text{Th}(\gamma,\gamma')$ $E_\gamma=11.387$ MeV (1975Ja08). $E_\gamma=7.9$ - 11.4 MeV (1974Ba51). Deformation $\beta(2)=0.238$ 2, $\beta(4)=0.101$ 3 from $^{232}\text{Th}(e,e')$ of 1976Co08 and $B(E2)=9.21$ 9. $\beta(2)=0.225$ 5, $\beta(4)=0.118$ 18 from Coul. ex. Three-parameter deformed Fermi distribution (1977Mi11). 49.4 2+ level excited by 10.8-MeV γ 's (1974Ja02), Raman scattering studied (1975Ja08,1974Ba51). Bremsstrahlung source $E_\gamma(\text{max})=2.9$ - 4.1 MeV, $\gamma(\theta)$ Ge(Li). γ 's to g.s. and first excited 2+ state observed. M1 excitation ascribed to scissors mode (1988He02). Others: 1971Ha40, 1974Ja02, 1983Ku03.

(e,e') studied for $E(e)=20$ - 56 MeV, magnetic spectrometer; form factors measured at $\theta=117^\circ$ - 165° , the $B(M1)$ values deduced from (e,e') are consistent with the more accurate values measured in (γ,γ') by the same authors (1988He02). Others: 1976Co08, 1987Ra30, 1990Fa12.

(e,e') studied for $E(e)=40$ MeV, magnetic spectrometer, form factors measured for 1- state; results compared to octupole-vibrational model, isoscalar transition density deduced (1989Gu17).

Measured E-E+ coin (1993Ba39).

$^{232}\text{Th}(\gamma,\gamma')$ from γ rays produced by 10-GeV electrons (2003Ko53).

 ^{232}Th Levels

E(level)	J^π @	Comments
0	0 ⁺	
49.4	2 ⁺	
718 [‡]	1 ⁻	$B(E1)<0.001$ (electron scattering is consistent with pure isoscalar transition).
774 [#]		
785 [#]		
≈ 1090 [‡]		E(level): possibly includes the 1077-keV ($J^\pi=1^-$) and the 1105-keV ($J^\pi=3^-$) levels.
1387 [#]		
1554 [#]		
2043 [†] 1	1 ⁺	E(level): from 1990He03. $B(M1)=1.48$ 9, $\Gamma_0^2/\Gamma=30.5$ meV 17, $\Gamma_1/\Gamma_0=0.53$ 2.
2248 [†] 2	1 ⁺	$B(M1)=0.56$ 7, $\Gamma_0^2/\Gamma=16.3$ meV 20, $\Gamma_1/\Gamma_0=0.42$ 7.
2274 [†] 5	1 ⁺	$B(M1)=0.25$ 3, $\Gamma_0^2/\Gamma=6.2$ meV 7, $\Gamma_1/\Gamma_0=0.62$ 13.
2296 [†] 5	1 ⁺	$B(M1)=0.31$ 6, $\Gamma_0^2/\Gamma=8.3$ meV 8, $\Gamma_1/\Gamma_0=0.69$ 29.

[†] Level energies, widths, and $B(M1)$ values are from table 2 of 1988He02 (labeled erroneously as ^{238}U). Γ_1 refers to branching to the first excited state in ^{232}Th . ΔE estimated by evaluator.

[‡] Level energies, $B(E1)$ from 1989Gu17.

[#] From 2003Ko53.

@ From 1988He02, based on $\gamma\gamma(\theta)$ and π from electron form factors.