^{233}U(d,d′) 1976Th01,1978St11

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	B. Singh, J. K. Tuli, E. Browne	NDS 170, 499 (2020)	8-Oct-2020

1976Th01: E(d)=16 MeV. Measured scattered deuterons at 90° and 125° using Enge split-pole magnetic spectrograph at the University of Rochester tandem Van de Graaff accelerator. FWHM=10-14 keV. A total of 28 levels reported up to 1071 keV. Deduced band structures.

1978St11: E(d)=13.1 MeV. Measured scattered deuterons at 90° and 125° using Elbek magnetic spectrograph at the tandem accelerator of the Niels Bohr Institute in Copenhagen. FWHM≈14 keV. A total of 30 levels reported up to 1931 keV. Deduced band structures.

See 1978St11 for B(E2) and B(E3) values deduced by assuming that [dσ/dΩ(90°)(mb/sr)]/B(E2)=0.6, and [dσ/dΩ(90°)(mb/sr)]/B(E3)=0.3.

^{233}U Levels

R=[dσ/dΩ(90′)]/[dσ/dΩ(125′)] from 1978St11.

E(level)†	Jπ‡	L#	Comments
0&	5/2+		dσ/dΩ=44.3 mb/sr (90°), 9.3 mb/sr (125°) (1976Th01). dσ/dΩ=166.0 mb/sr (90°), 41.0 mb/sr (125°); R=4.1 (1978St11).
39& *1*	7/2+	(2)	E(level): 41 *6* (1978St11). dσ/dΩ=3755 μb/sr (90°), 1378 μb/sr (125°) (1976Th01). dσ/dΩ=4010 μb/sr (90°), 2250 μb/sr (125°); R=1.8 (1978St11).
91& *2*	9/2+	(2)	E(level): 93 *6* (1978St11). dσ/dΩ=1740 μb/sr (90°), 588 μb/sr (125°) (1976Th01). dσ/dΩ=1873 μb/sr (90°), 1167 μb/sr (125°); R=1.6 (1978St11).
153& *2*	11/2+	(4)	E(level): 157 *6* (1978St11). dσ/dΩ=374 μb/sr (90°), 142 μb/sr (125°) (1976Th01). dσ/dΩ=190 μb/sr (90°), 183 μb/sr (125°); R=1.0 (1978St11).
197@ *4*			dσ/dΩ=8 μb/sr (90°), 4 μb/sr (125°) (1976Th01).
228& *2*	13/2+	(4)	E(level): 234 *6* (1978St11). dσ/dΩ=152 μb/sr (90°), 70 μb/sr (125°) (1976Th01). dσ/dΩ=54 μb/sr (90°), 58 μb/sr (125°); R=0.9 (1978St11).
298a *3*	(5/2−)		E(level): 297 *6* (1978St11). dσ/dΩ=25 μb/sr (90°), 14 μb/sr (125°) (1976Th01). dσ/dΩ=7 μb/sr (90°), <≈4 μb/sr (125°); R≈1.7 (1978St11).
318 *3*	15/2+&7/2−	(6)	E(level): 321 *6* (1978St11). dσ/dΩ=61 μb/sr (90°), 27 μb/sr (125°) (1976Th01). Assumed doublet; assigned to 15/2+, 5/2[633] and 7/2−, 5/2[752] states. dσ/dΩ=8 μb/sr (90°), 7 μb/sr (125°); R=1.1 (1978St11).
353a *2*	9/2−		E(level): 358 *6* (1978St11). dσ/dΩ=27 μb/sr (90°), 11 μb/sr (125°) (1976Th01). dσ/dΩ=8 μb/sr (90°), 5 μb/sr (125°); R=1.6 (1978St11).
403a *4*	(11/2−)		E(level): 398 *6* (1978St11). dσ/dΩ=11 μb/sr (90°), 12 μb/sr (125°) (1976Th01). Some of the observed strength may be due to 1/2+, 1/2[631] state seen through an admixture of γ-vibrational state coupled with 5/2[633] state (1976Th01). dσ/dΩ=5 μb/sr (90°), 5 μb/sr (125°); R=1.0 (1978St11).
425& *4*	(17/2+)	(6)	E(level): 419 *6* (1978St11). dσ/dΩ=28 μb/sr (90°), 8 μb/sr (125°) (1976Th01). Some of the observed strength may be due to 3/2+, 1/2[631] state seen through an admixture of γ-vibrational state coupled with 5/2[633] state (1976Th01). dσ/dΩ=4 μb/sr (90°), 4 μb/sr (125°); R=1.0 (1978St11).

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^{233}U(d,d′) 1976Th01,1978St11 (continued)

^{233}U Levels (continued)

E(level)[†]	Jπ[‡]	L[#]	Comments
500[b] 2	7/2−		E(level): 502 6 (1978St11). dσ/dΩ=11 μb/sr (90°), 6 μb/sr (125°) (1976Th01). dσ/dΩ=7 μb/sr (90°), 4 μb/sr (125°); R=1.7 (1978St11).
521 3			E(level): 524 6 (1978St11). dσ/dΩ=8 μb/sr (90°), 5 μb/sr (125°) (1976Th01). May be the 19/2+ member of 5/2[633] band from fit to the band. dσ/dΩ=4 μb/sr (90°), 4 μb/sr (125°); R=1.0 (1978St11).
560[b] 4	(9/2−)	(2)	E(level): 568 6 (1978St11), probably corresponds to 560 and 575 levels in 1976Th01. dσ/dΩ=15 μb/sr (90°), 5 μb/sr (125°) (1976Th01). (1/2+)+(3/2+) states of K=1/2 γ vibration was tentatively suggested by 1978St11. dσ/dΩ=9 μb/sr (90°), 5 μb/sr (125°); R=1.8 (1978St11).
575 4			E(level): see comment for 560 level. dσ/dΩ=6 μb/sr (125°) (1976Th01).
748[c] 2	5/2−	(3)	E(level): 748 6 (1978St11). dσ/dΩ=36 μb/sr (90°), 15 μb/sr (125°) (1976Th01). dσ/dΩ=7 μb/sr (90°), 7 μb/sr (125°); R=1.0 (1978St11).
766[@] 3			dσ/dΩ=15 μb/sr (90°), 7 μb/sr (125°) (1976Th01).
790[c] 2	7/2−	(3)	E(level): 787 6 (1978St11). dσ/dΩ=80 μb/sr (90°), 34 μb/sr (125°) (1976Th01). dσ/dΩ=25 μb/sr (90°), 28 μb/sr (125°); R=0.9 (1978St11).
838[c] 2	9/2−	(3)	E(level): 839 6 (1978St11). dσ/dΩ=85 μb/sr (90°), 30 μb/sr (125°) (1976Th01). dσ/dΩ=26 μb/sr (90°), 26 μb/sr (125°); R=1.0 (1978St11).
898 3			E(level): see comment for 914 level. dσ/dΩ=38 μb/sr (90°), 13 μb/sr (125°) (1976Th01).
914[c] 3	11/2−	(3)	E(level): 907 6 (1978St11); probably corresponds to 898 and 914 levels in 1976Th01. dσ/dΩ=34 μb/sr (90°), 12 μb/sr (125°) (1976Th01). dσ/dΩ=6 μb/sr (90°), 5 μb/sr (125°); R=1.2 (1978St11).
940 3			E(level): see comment for 940 level. dσ/dΩ=58 μb/sr (90°), 13 μb/sr (125°) (1976Th01).
952[d] 4	9/2−	(3)	E(level): 949 6 (1978St11): probably corresponds to 940 and 952 levels in 1976Th01. dσ/dΩ=46 μb/sr (90°), 23 μb/sr (125°) (1976Th01). dσ/dΩ=18 μb/sr (90°), 21 μb/sr (125°); R=0.9 (1978St11).
968[@] 3			dσ/dΩ=22 μb/sr (90°), 8 μb/sr (125°) (1976Th01).
1001[d] 2	11/2−	(3)	E(level): 1000 6 (1978St11). dσ/dΩ=71μb/sr (90°), 34 μb/sr (125°) (1976Th01). dσ/dΩ=22 μb/sr (90°), 23 μb/sr (125°); R=0.9 (1978St11).
1017[@] 4			dσ/dΩ=48 μb/sr (90°), 10 μb/sr (125°) (1976Th01).
1046[@] 4			dσ/dΩ=18 μb/sr (90°), 6 μb/sr (125°) (1976Th01).
1071[e] 3	9/2+	(2)	E(level): 1078 6 (1978St11). dσ/dΩ=43 μb/sr (90°), 15 μb/sr (125°) (1976Th01). dσ/dΩ=11 μb/sr (90°), 5 μb/sr (125°); R=2.1 (1978St11).
1150[e] 6	(11/2+)		dσ/dΩ=6 μb/sr (90°), 4 μb/sr (125°); R=1.5 (1978St11).
1232? 6			dσ/dΩ=15 μb/sr (90°), 11 μb/sr (125°); R=1.3 (1978St11).
1285 6		(3)	dσ/dΩ=13 μb/sr (90°), 15 μb/sr (125°); R=0.9 (1978St11).
1311[f] 6	5/2+	(2)	dσ/dΩ=14 μb/sr (90°), 11 μb/sr (125°); R=1.3 (1978St11).
1347[f] 6	7/2+	(2)	dσ/dΩ=19 μb/sr (90°), 10 μb/sr (125°); R=1.9 (1978St11).
1366[g] 6	7/2−	(3)	dσ/dΩ=6 μb/sr (90°), 9 μb/sr (125°); R=0.7 (1978St11).
1420[g] 6	9/2−	(3)	dσ/dΩ=18 μb/sr (90°), 19 μb/sr (125°); R=0.9 (1978St11).
1482[g] 6	11/2−	(3)	dσ/dΩ=10 μb/sr (90°), 11 μb/sr (125°); R=0.9 (1978St11).
1900 6			dσ/dΩ=13 μb/sr (90°), 10 μb/sr (125°); R=1.3 (1978St11).
1931 6			dσ/dΩ=6 μb/sr (90°), 4 μb/sr (125°); R=1.5 (1978St11).

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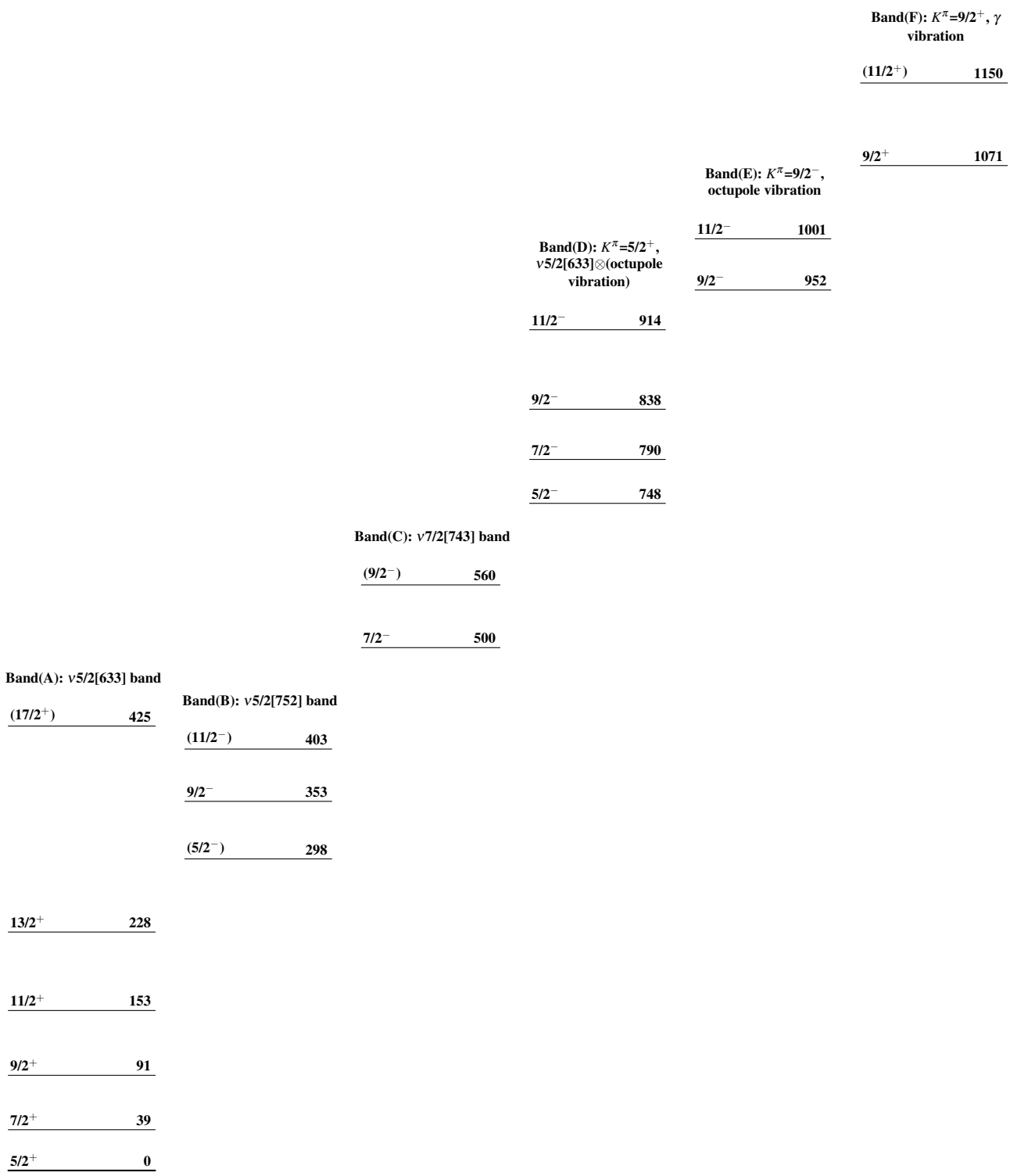
^{233}U(d,d′) 1976Th01,1978St11 (continued)

^{233}U Levels (continued)

† From 1976Th01 for levels up to 1071. Above this energy, levels are reported by 1978St11 only.
‡ J^π and configuration assignments were made by 1976Th01 and 1978St11 from relative population of levels, energy fit to rotational bands, deduced angular momentum transfer, and previously known J^π values.
# Deduced by 1978St11 from R=[dσ/dΩ(90′)]/[dσ/dΩ(125′)], where L=2 is indicated by R≈2, L=3 by R≈1.2, and L=4 by R≈1.0. Evaluators treat these assignments as tentative.
@ Level from 1976Th01 only, not reported by 1978St11.
& Band(A): ν5/2[633] band.
a Band(B): ν5/2[752] band.
b Band(C): ν7/2[743] band. Assignment from 1976Th01 only.
c Band(D): $K^\pi=5/2^+$, ν5/2[633]⊗(octupole vibration).
d Band(E): $K^\pi=9/2^-$, octupole vibration. Band from 1978St11.
e Band(F): $K^\pi=9/2^+$, γ vibration. Band from 1978St11.
f Band(G): $K^\pi=5/2^+$, β vibration. Band from 1978St11.
g Band(H): $K^\pi=7/2^-$, octupole vibration. Band from 1978St11.

^{233}U(d,d′) 1976Th01,1978St11



$^{233}_{92}U_{141}$

^{233}U(d,d′) 1976Th01,1978St11 (continued)

Band(H): $K^{\pi}=7/2^{-}$, octupole vibration

$11/2^{-}$ 1482

$9/2^{-}$ 1420

Band(G): $K^{\pi}=5/2^{+}$, β vibration

$7/2^{+}$ 1347

$5/2^{+}$ 1311

$7/2^{-}$ 1366

$^{233}_{92}U_{141}$