¹¹⁴Cd(⁴⁸Ca,6nγ):2 2011Re06

History								
Туре	Author	Citation	Literature Cutoff Date					
Full Evaluation	C. W. Reich	NDS 113, 2537 (2012)	1-Mar-2012					

Additional information 1.

This study complements an earlier high-spin study (2009Pa17) using the same reaction at the same bombarding energy by some of the same authors. It provides new information on some of the lower-spin non-yrast states in ¹⁵⁶Er, although it does not extend to states having spins as high as those reported in the earlier study.

Reaction initiated using a 215-MeV ⁴⁸Ca beam from the ATLAS facility at ANL. 1-mg/cm² ¹¹⁴Cd target (enrichment not given), backed by a 13-mg/cm² ¹⁹⁷Au layer to stop the recoils and help reduce the effect of Doppler broadening in those instances where the recoils had stopped prior to γ emission. γ radiation studied using the Gammasphere array consisting of 101 HPGe detectors. Report E γ and "angular-intensity ratios". Discuss properties of the γ -vibrational band as relating to nuclear triaxiality, as well as the alignment characteristics of several of the bands.

¹⁵⁶Er Levels

E(level) ^{†‡}	$J^{\pi \#}$	E(level) ^{†‡}	$J^{\pi \#}$	E(level) ^{†‡}	$J^{\pi \#}$	E(level) ^{†‡}	J ^{π#}
0 [@]	0^{+}	2028.1 ^b	7-	3625.9 ^e	12^{+}	5369.3 ^a	18+
344.4 [@]	2+	2367.5 ^d	(7^{+})	3650.0 ^a	12^{+}	5535.6 ^ƒ	18^{+}
796.5 [@]	4+	2375.7 ^c	8+	3834.6 <mark>&</mark>	14^{+}	5713.8 <mark>&</mark>	20^{+}
930.0 ^C	2+	2479.4 ^a	8+	4086.1 <i>f</i>	14+	5927.8 ^e	20^{+}
930.2 ^a	0^{+}	2488.1 ^b	9-	4183.3 ^e	14+	6055.9 ^a	20^{+}
1219.7 <mark>a</mark>	2+	2631.9 [@]	10^{+}	4246.2 ^{<i>a</i>}	14^{+}	6294.1	(20^{+})
1339.7 [@]	6+	2759.6 ^ƒ	8+	4268.7 <mark>d</mark>	(13 ⁺)	6409.6 ^ƒ	(20^{+})
1350.0 ^d	3+	2941.5 ^C	10^{+}	4278.7 ^c	14+	6485.8 <mark>&</mark>	22^{+}
1404.7 ^C	4+	2960.2 ^d	(9 ⁺)	4378.8 <mark>&</mark>	16+	6658.8 ^e	22^{+}
1545.4 <mark>a</mark>	4+	2996.6 ^ƒ	10^{+}	4762.5 ^{<i>f</i>}	16+	6821.9 ^a	(22^{+})
1610.8 <mark>b</mark>	5-	3041.1 ^{<i>a</i>}	10^{+}	4780.3 ^e	16+	7312.8 <mark>&</mark>	24^{+}
1834.2 ^d	5+	3312.8 <mark>&</mark>	12^{+}	4811.6 ^a	16+	7438.8 ^e	24+
1884.7 ^C	6+	3492.2 ^{<i>f</i>}	12^{+}	4966.3 ^d	(15^{+})	8079 <mark>&</mark>	26^{+}
1957.6 [@]	8+	3586.7 ^C	12^{+}	5003.8 <mark>&</mark>	18^{+}	8206 ^e	26^{+}
1968.4 ^a	6+	3598.2 ^d	(11^{+})	5335.9 ^e	18^{+}		

[†] As the level energies increase, the energies reported here differ increasingly from those in the related study of 2009Pa17 as the level energies increase, being lower by≈4 keV at J=26.

[‡] From a least-squares fit using the listed γ -ray energies. Since 2011Re06 list no uncertainties for the E γ values, the evaluator has assigned equal weights to them and has not quoted uncertainties for the resultant level energies.

[#] Primarily from 2011Re06 and based on considerations of expected band structure and multipolarities of γ transitions, using values previously established in earlier studies.

[@] Band(A): g.s. band Band crossed by an aligned $(i_{13/2})$ two-quasineutron (AB) excitation near h ω =0.30 MeV (above J=10).

[&] Band(a): Aligned $i_{13/2}$ two-quasineutron (AB) configuration.

^{*a*} Band(B): First excited 0^+ band.

^b Band(C): Odd-spin negative-parity band.

^{*c*} Band(D): γ -vibrational band, α =0 branch.

^{*d*} Band(d): γ -vibrational band, α =1 branch.

^{*e*} Band(E): Band based on a 12^+ level. Band possibly results from the coupling of the aligned $i_{13/2}$ two-quasineutron (AB) band and the γ -vibrational band.

^{*f*} Band(F): Band based on an 8⁺ level. Possible aligned $((\nu h_{9/2})(n f_{7/2}))_{2+}$ configuration.

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¹¹⁴Cd(⁴⁸Ca,6nγ):2 2011Re06 (continued)

$\gamma(^{156}{\rm Er})$

2011Re06 define the angular-intensity ratio, R, as follows: $R=I_{\gamma\gamma}(\theta=150 \text{ DEG or } 30 \text{ DEG})/I_{\gamma\gamma}(90 \text{ DEG})$. Expected R values are~1.1 for stretched quadrupole transitions and~0.7 for pure stretched dipole transitions.

2772 2996.6 10 ⁺ 779.6 8 ⁺ R=1.31 24. 2855 1219.7 2 ⁺ 90.2 0 ⁺ R R=1.31 24. 2855 1345.4 4 ⁺ 1219.7 2 ⁺ R R </th <th>E_{γ}</th> <th>E_i(level)</th> <th>\mathbf{J}_i^π</th> <th>E_f</th> <th>${ m J}_f^\pi$</th> <th>Mult.[†]</th> <th>Comments</th>	E_{γ}	E _i (level)	\mathbf{J}_i^π	E_f	${ m J}_f^\pi$	Mult. [†]	Comments
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	237.2	2996.6	10^{+}	2759.6	8+		R=1 31 24
235.51545.4471219.72*344.2344.42*00*E2R=1.115.346.4296.610*201.910*R=0.273. The small R value suggests that this transition is a mixed E2/M1 transition with a large negative mixing ratio (2011Re06).392.47759.68*2367.5(7*)4172028.17*1610.85*420.61350.03*930.02*422.4796.54*344.42*E2423.4796.54*344.42*E247501404.74*930.02*479.71884.76*1404.74*483.71834.25*1350.03*490.62375.78*1884.76*491.64780.316*4278.714*E ₇ γ not reported by 2009Pa17.508.6296.610*2488.19*[E1]81.616*4278.714*E ₇ γ not reported by 2009Pa17.508.42996.610*2488.19*51.92479.48*1957.68*52.2383.4614*312.812*53.5235.57.71834.25*53.5735.918*474.48*54.43178.816*884.655.7333.918*841.655.7333.918*841.655.4411.616*R=1.04	289.5	1219 7	2^{+}	930.2	0^{+}		
344224442426000E2R=1.11S.364.62996.6102631.91010R=0.273. The small R value suggests that this transition is a mixed392.42759.682367.5(7')1212.4011transition with a large negative mixing ratio (2011 Re06).392.4771610.8522.4011transition with a large negative mixing ratio (2011 Re06).392.4705.039.3002*22.4122.9196.84545.34*R=1.1812.423.9164.44*2*E2R=1.306.400248.19920.02*14.4433.7184.42*F2R=1.306.405.63492.212*2996.610*R=1.1210.4433.1184.76*1404.74*495.63492.212*2996.610*R=1.1210.92479.48*1957.68*E181.02.478.714*E2;y not reported by 2009Pa17.508.62996.610*2488.19*51.92479.48*1957.68*52.18247.514*53.4133.76*79.553.454.4337.66*53.41330.03*796.554431.1339.76*557.7353.518*841.6563.4 <td>325.5</td> <td>1545.4</td> <td>$\frac{2}{4^{+}}$</td> <td>1219.7</td> <td>2+</td> <td></td> <td></td>	325.5	1545.4	$\frac{2}{4^{+}}$	1219.7	2+		
364.62996.6102631.91010R=0.27 3. The small R value suggests that this transition is a mixed E2/M1 transition with a large negative mixing ratio (2011Re06).392.42759.682367.5 (7^+) 1610.85-4172028.171610.85-200.12+426.61350.03'390.02'R=1.18 12.425.4796.54'344.42'E2R475.01404.74'930.02'R=1.30 6.475.01404.74'930.02'479.71884.76'1404.74'490.62375.78'1884.76'490.62375.78'1884.76'490.62375.78'1884.76'495.63490.212'2996.610'R=1.12 14.501.64780.316'4278.714'Ey; y not reported by 2009Pa17.508.62996.610'2488.19'[E1]R=0.73 6.51.92479.48'1957.68'E1R=0.73 6.52.2383.4614'312.812'12'53.52479.48'139.76'5'53.5133.03'796.54'E254.4437.816'334.614'55.7533.518'4811.616'55.7533.518'4780.316'55.7533.618'481	344.2	344.4	2+	0	$\tilde{0}^{+}$	E2	R=1 11 5
10.1020.10 <th< td=""><td>364.6</td><td>2996.6</td><td>$\frac{2}{10^{+}}$</td><td>2631.9</td><td>10^{+}</td><td></td><td>R = 0.27 3. The small R value suggests that this transition is a mixed</td></th<>	364.6	2996.6	$\frac{2}{10^{+}}$	2631.9	10^{+}		R = 0.27 3. The small R value suggests that this transition is a mixed
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	504.0	2770.0	10	2031.7	10		E2/M1 transition with a large negative mixing ratio (2011Re06).
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	392.4	2759.6	8+	2367.5	(7^{+})		
420.6 1350.0 3^{+} 930.0 2^{+} 422.9 1968.4 6^{+} 1545.4 4^{+} E2 R=1.18 /2. 452.4 796.5 4^{+} 344.4 2^{+} E2 R=1.30 6. 460 248.1 9^{-} 2028.1 7^{-} 479.7 1884.7 6^{+} 1404.7 4^{+} 830.0 2^{+} 479.7 1884.7 6^{+} 1404.7 4^{+} 845.7 14 490.6 2375.7 8^{+} 1884.7 6^{+} 427.7 14 ⁺ E ₇ : γ not reported by 2009Pa17. 508.6 2996.6 10 ⁺ 2488.1 9^{-} [E1] R=0.76 5. 501.9 2479.4 8^{+} 1957.6 8^{+} E1 R=0.73 6. 521.8 2479.4 8^{+} 1957.6 8^{+} E1 R=0.73 6. 533.5 236.75 (7 ⁺) 1834.2 5 ⁺ 543.1 1339.7 6^{+} 796.5 4^{+} E2 R=1.16 6. 544 4378.8 16 ⁺ 3834.6 14 ⁺ 557.3 348.3 14 ⁺ 3625.9 12 ⁺ 557.7 5369.3 18 ⁺ 4481.6 16 ⁺ R=1.10 /3. 565.8 2941.5 10 ⁺ 2475.7 8 ⁺ 585.5 930.0 2^{+} 344.4 2^{+} 8=10.9 6. 565.8 2941.5 10 ⁺ 2375.7 8 ⁺ 585.5 930.0 2^{+} 344.4 2^{+} 8=1.04 9. 565.4 4811.6 16 ⁺ 4246.2 14 ⁺ R=1.09 6. 565.8 2941.5 10 ⁺ 2375.7 8 ⁺ 585.5 930.0 2^{+} 344.4 2^{+} 592.5 927.7 2960.2 (9 ⁺) 2367.5 (7 ⁺) 593.9 408.1 14 ⁺ 3492.2 12 ⁺ R=1.28 /2. 592.5 927.8 20 ⁺ 5335.9 18 ⁺ 592.5 927.8 20 ⁺ 5335.9 18 ⁺ 592.7 1296.2 (9 ⁺) 2367.5 (7 ⁺) 593.9 408.1 14 ⁺ 3492.2 12 ⁺ R=1.28 /2. 595.4 441.6 16 ⁺ 4246.2 14 ⁺ R=1.09 6. 555.8 930.0 2^{+} 344.4 2^{+} 592.5 925.7 527.8 20 ⁺ 5335.9 18 ⁺ 592.5 925.8 20 ⁺ 1339.7 6 ⁺ E2 R=1.14 /1. 596.7 4780.3 16 ⁺ 4183.3 14 ⁺ E ₇ : γ not reported by 2009Pa17. 608.1 1404.7 4 ⁺ 796.5 4 ⁺ 608.9 3650.0 12 ⁺ 304.1 10 ⁺ 617.9 195.7 6 8 ⁺ 1339.7 6 ⁺ E2 R=1.17 9. 625 5003.8 18 ⁺ 4378.8 16 ⁺ 628.6 1968.4 6 ⁺ 1339.7 6 ⁺ E2 R=1.17 9. 625 5003.8 18 ⁺ 4378.8 16 ⁺ 628.6 1968.4 6 ⁺ 1339.7 6 ⁺ E2 R=0.79 20. 635.2 3586.7 (12 ⁺) 2951.2 (0 ⁺) 635.2 3586.7 (12 ⁺) 2951.2 (11 ⁺) 674.1 2631.9 10 ⁺ 1957.6 8 ⁺ E2 R=0.98 19. 674.4 476.5 16 ⁺ 4086.1 14 ⁺ R = 0.97 20. 674.4 476.5 16 ⁺ 4086.1 14 ⁺ R = 0.97 20. 674.4 476.5 16 ⁺ 4086.1 14 ⁺ R = 0.97 20. 674.4 476.5 16 ⁺ 4086.1 14 ⁺ 488.9 47.8 16 ⁺ 674.4 163.1 14 ⁺ 488.19 47.8 16 ⁺ 674.4 163.1 14 ⁺ 488.19 47.8 16 ⁺ 6	417	2028.1	7-	1610.8	5-		
422.41968.4 6^+ 154.5.4 4^+ R=1.1812.452.4796.5 4^+ 344.4 2^+ E2R=1.306.4602488.19^-2028.17^-R=1.306.475.01404.7 4^+ 930.0 2^+ 475.01404.7 4^+ 479.71884.7 6^+ 1404.7 4^+ 930.0 2^+ 483.71834.2 5^+ 1350.0 3^+ 485.63492.212^+495.63492.212^+2996.610^+R=1.12 $IA.$ 501.64780.316^+4278.714^+R=0.755.512.82479.48^+1985.68^+5*52.23834.614^+312.812^+543.1530.4248.19^-1957.68^+E2R=0.73531.41339.76^+796.54^+55533.52367.5(7^+)1834.25^+54557.7535.918^+4780.316^+557.73418.314^+362.5912^+557.7330.518^+4780.316^+557.73418.314^+342.214^+565.4481.1616^+R=1.10561.7304.1110^+2479.4555.5930.02^+344.4547297.58^+552.7296.2(9^+)2375.7565.82941.510^+2375.7 <td>420.6</td> <td>1350.0</td> <td>3+</td> <td>930.0</td> <td>2+</td> <td></td> <td></td>	420.6	1350.0	3+	930.0	2+		
$ \begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	422.9	1968.4	6+	1545.4	4+		R=1.18 12.
	452.4	796.5	4+	344.4	2+	E2	R=1.30 <i>6</i> .
$ \begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	460	2488.1	9-	2028.1	7-		
479.71884.76*1404.74*483.71834.25*1350.03*490.62375.78*1884.76*495.63492.212*2996.610*R=1.12 14.501.6478.0316*4278.714*Ey; y not reported by 2009Pa17.508.62996.610*2488.19*[E1]R=0.76 5.510.92479.48*1957.68*E1R=0.73 6.521.82479.48*1957.68*E1R=0.73 6.533.52367.5(7*)1834.25*5*543.11339.76*796.54*E2R=1.16 6.544478.816*834.614*557.7533.918*481.616*R=1.04 9.557.7535.918*481.616*R=1.04 9.555.4481.616*R=1.04 9.555.5930.02*344.42*592.72902.0(9*)2367.5(7*)593.94086.114*3492.212*594.2200.2(9*)2367.5(7*)595.4431.616*R=1.10 13.555.7533.5918*592.72960.2(9*)2367.5593.918*438.314*592.72960.2(9*)237.576*54*595.7333.5918*595.7333.5918*595.7 <td>475.0</td> <td>1404.7</td> <td>4+</td> <td>930.0</td> <td>2+</td> <td></td> <td></td>	475.0	1404.7	4+	930.0	2+		
483.7 183.4.2 5* 1350.0 3* 490.6 237.7 8* 1884.7 6* 495.6 3492.2 12* 2996.6 10* R=1.12 14. 501.6 4780.3 16* 4278.7 14* E; ; y not reported by 2009Pa17. 508.6 2996.6 10* 2488.1 9* [E1] R=0.76 5. 522 3834.6 14* 3312.8 12* 2 5. 533.5 2367.5 7*) 1834.2 5* 5. 543.1 1339.7 6* 796.5 4* E2 R=1.16 6. 544.4 4378.8 16* 3834.6 14* 55.7 535.9 31* 480.3 16* 557.3 4183.3 14* 362.9 12* 55.7 535.9 31* 481.6 16* R=1.10 13. 565.4 4811.6 16* 421.0 1.4 R=1.09 6. 55.5 930.0 2* 344.4 2* 592.7 2960.2 94.9 2365.5 74 10.9 <td>479.7</td> <td>1884.7</td> <td>6+</td> <td>1404.7</td> <td>4+</td> <td></td> <td></td>	479.7	1884.7	6+	1404.7	4+		
	483.7	1834.2	5+	1350.0	3+		
	490.6	2375.7	8+	1884.7	6+		
501.6 4780.3 16 ⁺ 4278.7 14 ⁺ E _y : γ not reported by 2009Pa17. 508.6 2996.6 10 ⁺ 2488.1 9 ⁻ [E1] R=0.76 5. 51.8 2479.4 8 ⁺ 1968.4 6 ⁺ 521.8 2479.4 8 ⁺ 1957.6 8 ⁺ E1 R=0.73 6. 533.5 2367.5 (7 ⁺) 1834.2 5 ⁺ 530.4 2488.1 9 ⁻ 1957.6 8 ⁺ E1 R=0.73 6. 533.5 2367.5 (7 ⁺) 1834.2 5 ⁺ 544.4 4378.8 16 ⁺ 3834.6 14 ⁺ E2 R=1.16 6. 544 4378.8 16 ⁺ 3834.6 14 ⁺ 555.7 5335.9 18 ⁺ 4780.3 16 ⁺ 557.7 5335.9 18 ⁺ 4780.3 16 ⁺ 557.7 5369.3 18 ⁺ 4780.3 16 ⁺ 557.7 5369.3 18 ⁺ 4780.3 16 ⁺ 557.7 5369.3 18 ⁺ 4811.6 16 ⁺ R=1.10 <i>13</i> . 561.7 3041.1 10 ⁺ 2479.4 8 ⁺ R=1.04 9. 565.8 2941.5 10 ⁺ 2375.7 8 ⁺ 585.5 930.0 2 ⁺ 344.4 2 ⁺ 592 5927.8 20 ⁺ 5335.9 18 ⁺ 592.7 2960.2 (9 ⁺) 2367.5 (7 ⁺) 593.9 4086.1 14 ⁺ 3492.2 12 ⁺ R=1.28 <i>12</i> . 596.2 4246.2 14 ⁺ 8491.6 10 ⁺ 4246.2 14 ⁺ R=1.09 6. 565.8 2941.5 10 ⁺ 2375.7 8 ⁺ 595.7 4780.3 16 ⁺ 4183.3 14 ⁺ E _y : γ not reported by 2009Pa17. 608.1 1404.7 4 ⁺ 796.5 4 ⁺ 617.9 1957.6 8 ⁺ 1339.7 6 ⁺ E2 R=1.17 9. 625. 5003.8 18 ⁺ 4378.8 16 ⁺ 617.9 1957.6 8 ⁺ 1339.7 6 ⁺ R=0.79 20. 638.0 3598.2 (11 ⁺) 260.2 (9 ⁺) 645.2 3586.7 12 ⁺ 2941.5 10 ⁺ 67.4 4762.5 1(⁺) 3598.2 (11 ⁺) 67.4 4262.5 1(⁺) 3598.2 (11 ⁺) 67.4 4262.5 1(⁺) 3598.2 (11 ⁺) 67.4 4262.5 1(⁺) 4368.1 14 ⁺ 67.6 44762.5 1(⁺) 4359.2 (1 ⁺) 67.4 4262.5 1(⁺) 4368.1 14 ⁺ 67.6 4762.5 1(⁺) 4368.1 14 ⁺ 67.6 97.20	495.6	3492.2	12^{+}	2996.6	10^{+}		R=1.12 <i>14</i> .
	501.6	4780.3	16^{+}	4278.7	14^{+}		E_{γ} : γ not reported by 2009Pa17.
$ \begin{aligned} & 510.9 & 2479.4 & 8^+ & 1968.4 & 6^+ \\ & 521.8 & 2479.4 & 8^+ & 1957.6 & 8^+ \\ & 522 & 3834.6 & 14^+ & 3312.8 & 12^+ \\ & 530.4 & 2488.1 & 9^- & 1957.6 & 8^+ & E1 & R=0.73 & 6. \\ & 533.5 & 2367.5 & (7^+) & 1834.2 & 5^+ \\ & 543.1 & 1339.7 & 6^+ & 796.5 & 4^+ & E2 & R=1.16 & 6. \\ & 544 & 4378.8 & 16^+ & 3834.6 & 14^+ \\ & 544.7 & 1884.7 & 6^+ & 1339.7 & 6^+ \\ & 557.3 & 5135.9 & 18^+ & 4780.3 & 16^+ \\ & 557.3 & 5135.9 & 18^+ & 4780.3 & 16^+ \\ & 557.3 & 5136.3 & 14^+ & 3625.9 & 12^+ \\ & 557.7 & 5369.3 & 18^+ & 4811.6 & 16^+ & R=1.10 & 13. \\ & 565.4 & 4811.6 & 16^+ & 4246.2 & 14^+ & R=1.09 & 6. \\ & 565.8 & 2941.5 & 10^+ & 2375.7 & 8^+ \\ & 585.5 & 930.0 & 2^+ & 344.4 & 2^+ \\ & 592 & 5927.8 & 20^+ & 5335.9 & 18^+ \\ & 592.7 & 2960.2 & (9^+) & 2367.5 & (7^+) \\ & 593.9 & 4086.1 & 14^+ & 3492.2 & 12^+ & R=1.28 & 12. \\ & 596.2 & 4246.2 & 14^+ & 3650.0 & 12^+ & R=1.14 & 11. \\ & 596.7 & 4780.3 & 16^+ & 4183.3 & 14^+ & E_{Y}: Y \text{ not reported by } 2009Pa17. \\ & 608.9 & 3650.0 & 12^+ & 3041.1 & 10^+ \\ & 617.9 & 1957.6 & 8^+ & 1339.7 & 6^+ & E2 & R=1.17 & 9. \\ & 628.6 & 1968.4 & 6^+ & 1339.7 & 6^+ & R=0.79 & 20. \\ & 638.0 & 3598.2 & (11^+) & 2602.2 & (9^+) \\ & 645.2 & 3586.7 & 12^+ & 2941.5 & 10^+ \\ & 670.5 & 4268.7 & (13^+) & 3598.2 & (11^+) \\ & 671.4 & 2631.9 & 10^+ & 1957.6 & 8^+ & E2 & R=0.98 & 19. \\ & 676.4 & 4762.5 & 16^+ & 4086.1 & 14^+ & R=0.97 & 20 \\ & 676.4 & 4762.5 & 16^+ & 4086.1 & 14^+ & R=0.97 & 20 \\ & 676.4 & 4762.5 & 16^+ & 4086.1 & 14^+ & R=0.97 & 20 \\ & 676.4 & 4762.5 & 16^+ & 4086.1 & 14^+ & R=0.97 & 20 \\ & 676.4 & 4762.5 & 16^+ & 4086.1 & 14^+ & R=0.97 & 20 \\ & 676.4 & 4762.5 & 16^+ & 4086.1 & 14^+ & R=0.97 & 20 \\ & 676.4 & 4762.5 & 16^+ & 4086.1 & 14^+ & R=0.97 & 20 \\ & 676.4 & 4762.5 & 16^+ & 4086.1 & 14^+ & R=0.97 & 20 \\ & 676.4 & 4762.5 & 16^+ & 4086.1 & 14^+ & R=0.97 & 20 \\ & 676.4 & 4762.5 & 16^+ & 4086.1 & 14^+ & R=0.97 & 20 \\ & 676.4 & 4762.5 & 16^+ & 4086.1 & 14^+ & R=0.97 & 20 \\ & 676.4 & 4762.5 & 16^+ & 4086.1 & 14^+ & R=0.97 & 20 \\ & 676.4 & 4762.5 & 16^+ & 4086.1 & 14^+ & R=0.97 & 20 \\ & 67$	508.6	2996.6	10^{+}	2488.1	9-	[E1]	R=0.76 5.
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	510.9	2479.4	8+	1968.4	6+		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	521.8	2479.4	8+	1957.6	8+		
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	522	3834.6	14^{+}	3312.8	12^{+}		
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	530.4	2488.1	9-	1957.6	8+	E1	R=0.73 6.
543.11339.7 6^+ 796.5 4^+ E2R=1.166.5444378.816^+3834.614^+746.574746.5544.71884.76^+1339.76^+746.574746.5557.75335.918^+4780.316^+757.37569.318^+4811.616^+R=1.10557.75369.318^+4811.616^+R=1.049.766.576.576.5561.73041.110^+2479.48^+R=1.096.76.576.576.5555.9930.02^+344.42^+796.577.775.7	533.5	2367.5	(7^{+})	1834.2	5+		
544 4378.8 16 ⁺ 3834.6 14 ⁺ 544.7 1884.7 6 ⁺ 1339.7 6 ⁺ 553.4 [‡] 1350.0 3 ⁺ 796.5 4 ⁺ 555.7 5335.9 18 ⁺ 4780.3 16 ⁺ 557.3 5183.3 14 ⁺ 3625.9 12 ⁺ 557.7 5369.3 18 ⁺ 4811.6 16 ⁺ R=1.10 <i>13</i> . 561.7 3041.1 10 ⁺ 2479.4 8 ⁺ R=1.04 9. 565.8 2941.5 10 ⁺ 2375.7 8 ⁺ 585.5 930.0 2 ⁺ 344.4 2 ⁺ 592.7 2960.2 (9 ⁺) 2367.5 (7 ⁺) 593.9 4086.1 14 ⁺ 3492.2 12 ⁺ R=1.28 <i>12</i> . 596.2 4246.2 14 ⁺ 3650.0 12 ⁺ R=1.14 <i>11</i> . 596.7 4780.3 16 ⁺ 4183.3 14 ⁺ E _y : γ not reported by 2009Pa17. 608.9 3650.0 12 ⁺ 3041.1 10 ⁺ 617.9 1957.6 8 ⁺ 1339.7 6 ⁺ E2 R=1.17 9. 625 5003.8 18 ⁺ 4378.8 16 ⁺ 628.6 1968.4 6 ⁺ 1339.7 6 ⁺ R=0.79 20. 638.0 3598.2 (11 ⁺) 2960.2 (9 ⁺) 645.2 3586.7 12 ⁺ 2941.5 10 ⁺ 674.1 2631.9 10 ⁺ 1957.6 8 ⁺ E2 R=0.98 <i>19</i> . 674.4 762.5 16 ⁺ 4086.1 14 ⁺ R=0.79 20. 635.4 2426.7 (13 ⁺) 3598.2 (11 ⁺) 674.1 2631.9 10 ⁺ 1957.6 8 ⁺ E2 R=0.98 <i>19</i> . 674.4 762.5 16 ⁺ 4086.1 14 ⁺ R=0.79 20. 635.4 2426.7 (13 ⁺) 3598.2 (11 ⁺) 674.1 2631.9 10 ⁺ 1957.6 8 ⁺ E2 R=0.98 <i>19</i> . 675.4 4762.5 16 ⁺ 4086.1 14 ⁺ R=0.99 200	543.1	1339.7	6+	796.5	4+	E2	R=1.16 <i>6</i> .
544.7 1884.7 6^+ 1339.7 6^+ 553.4 [‡] 1350.0 3^+ 796.5 4^+ 557.7 5335.9 18^+ 4780.3 16^+ 557.3 4183.3 14^+ 3625.9 12^+ 557.7 5369.3 18^+ 4811.6 16^+ R=1.10 <i>13</i> . 561.7 3041.1 10^+ 2479.4 8^+ R=1.04 9. 565.4 4811.6 16^+ 4246.2 14^+ R=1.09 6. 565.8 2941.5 10^+ 2375.7 8^+ 585.5 930.0 2^+ 344.4 2^+ 592 5927.8 20^+ 5335.9 18^+ 592.7 2960.2 (9^+) 2367.5 (7^+) 593.9 4086.1 14^+ 3492.2 12^+ R=1.28 <i>12</i> . 596.7 4780.3 16^+ 4183.3 14^+ E _y : γ not reported by 2009Pa17. 608.1 1404.7 4^+ 796.5 4^+ 608.9 3650.0 12^+ 3041.1 10^+ 617.9 1957.6 8^+ 1339.7 6^+ E2 R=1.17 9. 625 5003.8 18^+ 4378.8 16^+ 628.6 1968.4 6^+ 1339.7 6^+ E2 R=1.17 9. 625 5003.8 18^+ 4378.8 16^+ 628.6 1968.4 6^+ 1339.7 6^+ E2 R=0.98 <i>19</i> . 670.5 4268.7 (13^+) 3598.2 (11^+) 674.1 2631.9 10^+ 1957.6 8^+ E2 R=0.98 <i>19</i> . 674.4 4762.5 16^+ 40486.1 14^+ R=0.07 20	544	4378.8	16+	3834.6	14^{+}		
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	544.7	1884.7	6+	1339.7	6+		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	553.4 [‡]	1350.0	3+	796.5	4+		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	555.7	5335.9	18+	4780.3	16 ⁺		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	557.3	4183.3	14^{+}	3625.9	12^{+}		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	557.7	5369.3	18+	4811.6	16+		R=1 10 13
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	561.7	3041.1	10^{+}	2479.4	8+		R = 1.04.9
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	565.4	4811.6	16+	4246.2	14^{+}		R = 1.09.6
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	565.8	2941.5	10^{+}	2375.7	8+		R 1.07 0.
592 5927.8 20^+ 5335.9 18^+ 592.7 2960.2 (9^+) 2367.5 (7^+) 593.9 4086.1 14^+ 3492.2 12^+ R=1.28 $12.$ 596.2 4246.2 14^+ 3650.0 12^+ R=1.14 $11.$ 596.7 4780.3 16^+ 4183.3 14^+ $E_{\gamma}: \gamma$ not reported by 2009Pa17. 608.1 1404.7 4^+ 796.5 4^+ 608.9 3650.0 12^+ $304.1.1$ 10^+ 617.9 1957.6 8^+ 1339.7 6^+ $E2$ $R=1.17$ $9.$ 625 5003.8 18^+ 4378.8 16^+ $R=0.79$ $20.$ 638.0 3598.2 (11^+) 2960.2 (9^+) 645.2 3586.7 12^+ 2941.5 10^+ 674.4 2631.9 10^+ 1957.6 8^+ $E2$ $R=0.98$ $19.$ 674.4 4762.5 16^+ 4086.1 14^+ $R=0.97$ 20 10^+	585.5	930.0	2+	344.4	2^{+}		
592.72960.2 (9^+) 2367.5 (7^+) 593.94086.114 ⁺ 3492.212 ⁺ R=1.28 I2.596.24246.214 ⁺ 3650.012 ⁺ R=1.14 I1.596.74780.316 ⁺ 4183.314 ⁺ E_{γ} : γ not reported by 2009Pa17.608.11404.74 ⁺ 796.54 ⁺ 608.93650.012 ⁺ 3041.110 ⁺ 617.91957.68 ⁺ 1339.76 ⁺ E2R=1.179.6255003.818 ⁺ 4378.816 ⁺ 628.61968.46 ⁺ 1339.76 ⁺ R=0.79638.03598.2(11 ⁺)2960.2(9 ⁺)645.23586.712 ⁺ 2941.510 ⁺ 670.54268.7(13 ⁺)3598.2(11 ⁺)674.12631.910 ⁺ 1957.68 ⁺ E2R=0.9819.674.44762.516 ⁺ 4086.114 ⁺ R=0.9720	592	5927.8	$\frac{-}{20^{+}}$	5335.9	18+		
593.94086.1 14^+ 3492.2 12^+ R=1.28 <i>12</i> .596.24246.2 14^+ 3650.0 12^+ R=1.14 <i>11</i> .596.74780.3 16^+ 4183.3 14^+ E_{γ} : γ not reported by 2009Pa17.608.1 1404.7 4^+ 796.5 4^+ 608.9 3650.0 12^+ 3041.1 10^+ 617.91957.6 8^+ 1339.7 6^+ E2R=1.179.625 5003.8 18^+ 4378.8 16^+ 628.61968.4 6^+ 1339.7 6^+ R=0.7920. 5398.2 (11^+) 2960.2 (9^+) 645.2 3586.7 12^+ 2941.5 10^+ 670.5 4268.7 (13^+) 3598.2 (11^+) 674.1 2631.9 10^+ 1957.6 8^+ E2R=0.98 $19.$ 674.4 4762.5 16^+ 4086.1 14^+ R=0.97 20	592.7	2960.2	(9^+)	2367 5	(7^+)		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	593.9	4086 1	14^+	3492.2	12+		R=1 28 12
596.7 4780.3 16 ⁺ 4183.3 14 ⁺ E_{γ} : γ not reported by 2009Pa17. 608.1 1404.7 4 ⁺ 796.5 4 ⁺ 608.9 3650.0 12 ⁺ 3041.1 10 ⁺ 617.9 1957.6 8 ⁺ 1339.7 6 ⁺ E2 625 5003.8 18 ⁺ 4378.8 16 ⁺ 628.6 1968.4 6 ⁺ 1339.7 6 ⁺ R=0.79 20. 638.0 3598.2 (11 ⁺) 2960.2 (9 ⁺) 645.2 3586.7 12 ⁺ 2941.5 10 ⁺ 670.5 4268.7 (13 ⁺) 3598.2 (11 ⁺) 68 ⁺ E2 R=0.98 19. 674.1 2631.9 10 ⁺ 1957.6 8 ⁺ E2 R=0.97 20	596.2	4246.2	14+	3650.0	12+		R = 1.14 II
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	596.7	4780.3	16+	4183 3	14+		$F_{\rm eff} \sim 10^{-1} {\rm m}^{-1}$
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	608.1	1404 7	4+	796 5	4+		
	608.9	3650.0	12+	3041.1	10+		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	617.9	1957.6	8+	1339.7	6+	F2	R=1 17 9
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	625	5003.8	18+	4378.8	16+		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	628.6	1968 4	6+	1339.7	6+		R=0.79.20
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	638.0	3598.2	(11^+)	2960.2	(9^+)		N=0.17 20.
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	645.2	3586.7	12+	2941 5	10+		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	670 5	4268 7	(13^{+})	3598.2	(11^+)		
$676.4 + 4762.5 + 16^{+} + 4086.1 + 14^{+} = R = 0.97 20$	674 1	2631.9	10^{+}	1957.6	8+	F2	R=0.98.19
	676.4	4762.5	16+	4086.1	14 ⁺		R=0.97 20.

Continued on next page (footnotes at end of table)

¹¹⁴Cd(⁴⁸Ca,6nγ):2 2011Re06 (continued)

$\gamma(^{156}\text{Er})$ (continued)

Eγ	E _i (level)	\mathbf{J}_i^{π}	E_f	\mathbf{J}_f^{π}	Mult. [†]		Comments
681	3312.8	12+	2631.9	10+			
684.3	3625.9	12^{+}	2941.5	10^{+}			
686.5	6055.9	20^{+}	5369.3	18^{+}		R=1.29 24.	
688.6	2028.1	7-	1339.7	6+	E1	R=0.64 19.	
692.1	4278.7	14^{+}	3586.7	12^{+}			
697.6	4966.3	(15^{+})	4268.7	(13^{+})			
710	5713.8	20^{+}	5003.8	18+			
731	6658.8	22^{+}	5927.8	20^{+}			
731.4	2759.6	8+	2028.1	7-		R=1.01 14.	
748.7	1545.4	4+	796.5	4+		R=0.65 23.	
758.3	6294.1	(20^{+})	5535.6	18^{+}			
766.0	6821.9	(22^{+})	6055.9	20^{+}			
766	8079	26^{+}	7312.8	24+			
767	8206	26^{+}	7438.8	24+			
772	6485.8	22^{+}	5713.8	20^{+}			
773.1	5535.6	18^{+}	4762.5	16^{+}		R=1.05 18.	
780	7438.8	24+	6658.8	22^{+}			
814	1610.8	5-	796.5	4+			
827	7312.8	24+	6485.8	22^{+}			
870.4	4183.3	14^{+}	3312.8	12^{+}			
873.8	6409.6	(20^{+})	5535.6	18^{+}			
875.4	1219.7	2^{+}	344.4	2^{+}			
924	5927.8	20^{+}	5003.8	18^{+}			
930.4	930.0	2^{+}	0	0^{+}			
946	4780.3	16^{+}	3834.6	14^{+}			
957	5335.9	18^{+}	4378.8	16^{+}			
1006.0	1350.0	3+	344.4	2+			
1027.8	2367.5	(7^{+})	1339.7	6+			
1036.3	2375.7	8+	1339.7	6+			
1038.0	1834.2	5+	796.5	4+		R=0.55 9.	
1060.0	1404.7	4+	344.4	2+			
1088.4	1884.7	6+	796.5	4+			
1139.7	2479.4	8+	1339.7	6+			
1172.1	1968.4	6+	796.5	4+		R=1.1 4.	
1201.2	1545.4	4+	344.4	2+		R=0.9 3.	
1219.4	1219.7	2+	0	0^{+}			

[†] 2011Re06 list mults for a number of γ 's, some of them from other sources. These are listed here. [‡] Placement of transition in the level scheme is uncertain.

¹¹⁴Cd(⁴⁸Ca,6nγ):2 2011Re06

Level Scheme







¹⁵⁶₆₈Er₈₈





¹⁵⁶₆₈Er₈₈

¹¹⁴Cd(⁴⁸Ca,6nγ):2 2011Re06 (continued)



¹⁵⁶₆₈Er₈₈