¹⁴⁶Nd(²⁶Mg,5nγ) **1999Cr01,1999Sm13**

	Hist	ory	
Туре	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 191,1 (2023)	22-Aug-2023

Includes 141 Pr(30 Si,p3n γ) from 1999Sm13.

1999Cr01: ¹⁴⁶Nd(²⁶Mg,5n γ),E(²⁶Mg)=142 MeV. Measured E γ , I γ , $\gamma\gamma$ -coin, $\gamma\gamma(\theta)$ (DCO) at 37° and 79° using 8 π array with 20 HPGe detectors placed at θ =37°, 79°, 101°, 143°, and 71-element BGO detectors at Chalk River MP tandem accelerator. 97% ¹⁴⁶Nd self-supporting target. On-line Doppler shift correction to gamma-ray spectra. Total routhian plus cranked shell-model calculations.

1999Sm13: ¹⁴¹Pr(³⁰Si,p3n γ),E(³⁰Si)=155 MeV. Measured E γ , I γ , $\gamma\gamma$ -coin, $\gamma\gamma(\theta)$ (DCO) at θ =37°, 79° using NORDBALL detector array with 18 Ge detectors, two low-energy photon spectrometers, and multi-element 4π BaF₂ multiplicity filter at Niels Bohr Institute tandem accelerator facility. Two stacked self-supporting Pr targets were used. Seven rotational bands were discovered, with the $\nu_{13/2}$ band up to (77/2⁺). The γ -ray energies were given in level-scheme Figure to nearest keV, with no intensities. Measured DCO ratios were listed in very few cases. Band assignments and configurations were made using Woods-Saxon cranking model calculations.

¹⁶⁷Hf Levels

The level scheme and band structures are from 1999Cr01 and 1999Sm13, with some differences between the two, e.g. termination of the $v5/2[523],\alpha=-1/2$ band with J=19/2 suggested in 1999Sm13, rather than J=27/2 in 1999Cr01. Reversed order in 1999Sm13 for the 530 γ -542 γ cascade is not adopted since, in (¹⁶O,4n γ), that would place the weaker of the two transitions lower in the γ cascade. Note that the v5/2[523] and $vi_{13/2}$ bands were first established by 1977JoZQ.

E(level) [†]	J ^{π‡}
0.0 [#]	5/2-
92.1 [@] 4	$7/2^{-}$
145.0 <mark>&</mark> 5	$13/2^{+}$
188.6 ^a 5	$11/2^+$
207.2 [#] 3	9/2-
349.6 <mark>&</mark> 4	$17/2^{+}$
355.3 [@] 4	$11/2^{-}$
401.7 ^{<i>a</i>} 4	$15/2^{+}$
504.6 [#] 3	13/2-
692.6 <mark>&</mark> 4	$21/2^+$
706.5 [@] 4	15/2-
767.2 ^a 4	19/2+
883.7 [#] _3	17/2-
1120.8 [@] 5	19/2-
1151.5 <mark>&</mark> 5	$25/2^+$
1253.5 ^{<i>a</i>} 4	$23/2^{+}$
1323.9 [#] 4	$21/2^{-}$
1561.4 ^e 5	$23/2^{-}$
1704.6 ^{&} 5	$29/2^+$
1797.2 [#] 4	25/2-
1832.1 ^{<i>a</i>} 4	$27/2^+$
1995.3° 5	27/2-
2244.8 ⁰ 4	29/2-
2289.6 ^{<i>a</i>} 5	27/2-
2331.6 ^{&} 5	$33/2^{+}$

¹⁶⁷Hf Levels (continued)

2339.1° 5 292~ E(level): the order of the 542y-530y cascade was reversed in 1999Sm13 leading to E=2326.9 for this level. 2441.5° 5 31/2~ 2479.5° 3 31/2~ 2479.5° 3 31/2~ 2695.3° 4 372~ 2810.3 6 332+ 2803.4° 5 37/2~ 2937.4° 5 37/2~ 2036.8° 4 37/2~ 2066.8° 4 37/2~ 2086.8° 4 37/2~ 2086.8° 4 37/2~ 3802.4° 5 39/2~ 387.9° 4 41/2~ 387.9° 4 41/2~ 387.9° 4 41/2~ 387.9° 4 41/2~ 387.9° 4 41/2~ 387.9° 4 41/2~ 387.9° 4 41/2~ 387.9° 4 41/2~ 387.9° 4 41/2~ 387.9° 4 41/2~ 387.9° 4 41/2~ 387.9° 4 41/2~ 387.9° 4 41/2~ 387.9° 4 41/2~ 387.9° 4 41/2~ 387.9° 4 41/2~ 387.9° 4 41/2~	E(level) [†]	Jπ‡	Comments
2441.5 ⁶ 5 31/2 ⁺ 2695.3 ⁶ 4 33/2 ⁻ 2769.9 ⁴ 5 31/2 ⁻ 2800.0 ⁶ 33/2 ⁺ 2800.0 ⁶ 6 33/2 ⁻ 2800.1 ⁶ 5 37/2 ⁺ 3179.9 ⁴ 6 35/2 ⁺ 3200.8 ³ 4 37/2 ⁻ 3200.8 ³ 4 37/2 ⁻ 3200.8 ³ 6 37/2 ⁺ 3200.8 ³ 4 37/2 ⁻ 320.8 ³ 6 35/2 ⁻ 3302.4 ⁶ 5 39/2 ⁻ 3302.4 ⁶ 5 41/2 ⁺ 3375.3 ⁴ 8 39/2 ⁻ 3302.4 ⁶ 5 41/2 ⁻ 3377.4 ⁷ 39/2 ⁴ 4103.5 ⁶ 7 41/2 ⁻ 4114.1 ⁶ 5 43/2 ⁻ 4333.5 ⁵ 4 15/2 ⁻ 4333.5 ⁵ 4 5/2 ⁺ 4337.5 ⁵ 4 15/2 ⁻ 4337.5 ⁵ 4 15/2 ⁻ 4352.6 ² 9 43/2 ⁻ 4252.6 ⁹ 6 43/2 ⁻ 537.8 ⁴ 10 47/2 ⁻ 537.8 ⁴ 10 47/2 ⁻ 537.8 ⁴ 10 47/2 ⁻ 537.8 ⁴ 6 51/2 ⁻ 5021.0 ⁶ 6 3/2 ⁺ 5027.5 ⁶ 5 3/2 ⁻	2339.1 ^c 5	29/2-	E(level): the order of the 542γ - 530γ cascade was reversed in 1999Sm13 leading to E=2326.9 for this level.
$2479.5^{4} 5 31/2^{-}$ $2695.3^{b} 4 33/2^{-}$ $2769.9^{d} 5 31/2^{-}$ $2810.3 6 33/2^{+}$ $2800.7^{6} 6 33/2^{-}$ $2937.4^{6} 5 35/2^{-}$ $370.8^{5} 4 37/2^{+}$ $370.8^{5} 4 37/2^{-}$ $3208.8^{5} d 35/2^{-}$ $3288.8^{d} 6 35/2^{-}$ $3388.8^{d} 6 35/2^{-}$ $3388.8^{d} 6 35/2^{-}$ $3452.8^{c} 7 37/2^{-}$ $3360.60^{f} 5 41/2^{-}$ $3787.9^{b} 4 41/2^{-}$ $3787.9^{b} 4 41/2^{-}$ $3787.1^{b} 5 41/2^{+}$ $3787.1^{b} 5 41/2^{+}$ $3787.1^{b} 5 41/2^{-}$ $3452.8^{c} 7 37/2^{-}$ $3363.8^{f} 5 45/2^{-}$ $4431.5^{b} 4 45/2^{-}$ $4431.5^{b} 4 45/2^{-}$ $4452.6^{d} 9 43/2^{-}$ $4452.6^{d} 9 43/2^{-}$ $4452.6^{d} 8 45/2^{-}$ $452.6^{d} 8 45/2^{-}$ $452.5^{d} 8 49/2^{-}$ $523.7^{d} 10 47/2^{-}$ $549.2^{d} 5 53/2^{-}$ $562.8^{c} 6 51/2^{-}$ $572.7^{-} 57/2^{-}$	2441.5 ^e 5	$31/2^{-}$	
$2663.0^{9} 4 332^{-}$ $2769.94 5 31/2^{-}$ $2869.0^{6} 332^{-}$ $2869.0^{6} 6 332^{-}$ $3005.1^{6} 5 37/2^{+}$ $370.0^{6} 5 37/2^{+}$ $3200.8^{9} 4 37/2^{-}$ $3260.0^{5} 37/2^{+}$ $3288.5^{4} 6 35/2^{-}$ $3328.5^{4} 6 35/2^{-}$ $3328.5^{4} 6 35/2^{-}$ $3328.5^{4} 6 35/2^{-}$ $3328.5^{4} 6 35/2^{-}$ $3328.5^{4} 6 35/2^{-}$ $3328.5^{4} 6 37/2^{-}$ $3328.5^{4} 6 37/2^{-}$ $3328.5^{4} 6 37/2^{-}$ $332.1^{6} 5 41/2^{+}$ $3378.7^{9} 4 41/2^{-}$ $3378.7^{9} 4 41/2^{-}$ $3378.7^{9} 4 41/2^{-}$ $3378.7^{9} 4 37/2^{-}$ $3321.7^{4} 7 39/2^{+}$ $4141.6^{6} 5 43/2^{-}$ $4141.6^{6} 5 43/2^{-}$ $4141.6^{6} 5 43/2^{-}$ $4333.8^{5} 5 45/2^{-}$ $432.2^{6} 4 3/2^{-}$ $432.2^{6} 4 3/2^{-}$ $432.2^{6} 4 3/2^{-}$ $432.2^{6} 4 3/2^{-}$ $432.2^{6} 4 3/2^{-}$ $432.2^{6} 4 3/2^{-}$ $432.2^{6} 4 3/2^{-}$ $432.2^{6} 4 3/2^{-}$ $432.2^{6} 4 3/2^{-}$ $432.4^{6} 4 9/2^{-}$ $532.7^{6} 5 47/2^{-}$ $532.7^{6} 5 3/2^{-}$ $532.7^{6} 5 3/2^{-}$ $532.7^{6} 5 3/2^{-}$ $532.7^{6} 5 3/2^{-}$ $532.7^{6} 5 3/2^{-}$ $532.7^{6} 5 3/2^{-}$ $532.7^{6} 5 3/2^{-}$ $532.7^{6} 5 3/2^{-}$ $532.7^{6} 5 3/2^{-}$ $532.7^{6} 5 3/2^{-}$ $532.7^{6} 5 3/2^{-}$ $532.7^{6} 5 3/2^{-}$ $532.7^{6} 5 3/2^{-}$	2479.5 ^{<i>a</i>} 5	$31/2^{+}$	
$\begin{aligned} 2^{60,96'} 5 & 33/2^+ \\ 2^{80,06'} 6 & 33/2^+ \\ 2^{87,4'} 5 & 55/2^- \\ 3^{77,94'} 6 & 35/2^+ \\ 3^{77,99'} 6 & 35/2^+ \\ 3^{77,99'} 6 & 35/2^- \\ 3^{72,95'} 7^{72,95'} \\ 3^{72,95'} 7^{72,95'} \\ 3^{72,95'} 7^{72,95'} \\ 3^{72,95'} 7^{72,95'} \\ 3^{72,95'} 7^{72,95'} \\ 3^{72,95'} 7^{73,95'} 7^{73,95'} \\ 3^{73,95'} 4 & 41/2^- \\ 3^{73,75'} 4 & 41/2^- \\ 3^{73,75'} 7^{74,1'2} \\ 3^{73,75'} 4 & 39/2^- \\ 3^{73,75'} 4 & 45/2^- \\ 4^{73,75'} 4 & 45/2^- \\ 4^{73,75'} 4 & 45/2^- \\ 4^{73,75'} 4 & 45/2^- \\ 4^{73,75'} 4 & 45/2^- \\ 4^{72,36'} 9 & 43/2^- \\ 4^{73,75'} 4 & 45/2^- \\ 4^{72,36'} 9 & 43/2^- \\ 4^{72,36'} 9 & 43/2^- \\ 4^{72,36'} 9 & 43/2^- \\ 4^{72,36'} 9 & 43/2^- \\ 4^{72,36'} 9 & 43/2^- \\ 4^{72,36'} 9 & 43/2^- \\ 5^{73,75'} 10 & 47/2^- \\ 5^{73,75'} 10 & 47/2^- \\ 5^{73,75'} 10 & 47/2^- \\ 5^{73,75'} 10 & 47/2^- \\ 5^{73,75'} 10 & 47/2^- \\ 5^{73,75'} 10 & 47/2^- \\ 5^{73,75'} 10 & 47/2^- \\ 5^{73,75'} 10 & 47/2^- \\ 5^{73,75'} 10 & 47/2^- \\ 5^{73,75'} 5 & 3/2^- \\ 6^{73,75'} 5 & 53/2^- \\ 6^{73,96'} 7 & 53/2^- \\ 6^{73,96''} 7 & 53/2^- \\ 6^{73,96''} 7 & 53/2^- \\ 6^{73,96''} 7 & 53/2^- \\ 6^{73,96'''} 6 & 57/2^- \\ 6^{73,96'''''} 6 & 57/2^- \\ 6^{73,96''''''''''''''''''''''''''''''''''''$	2695.3 ^b 4	33/2-	
$\begin{aligned} 2810.3 \ 6 & 33/2^+ \\ 2830.9 \ 6 & 33/2^- \\ 2937.4^{e} \ 5 & 35/2^- \\ 3005.18^{e} \ 5 & 37/2^+ \\ 3206.8^{b} \ 4 & 37/2^- \\ 3260.0 \ 5 & 37/2^- \\ 3288.5^{d} \ 6 & 55/2^- \\ 3452.8^{e} \ 7 & 37/2^- \\ 3302.4^{e} \ 5 & 39/2^- \\ 3502.4^{e} \ 5 & 39/2^- \\ 3502.4^{e} \ 5 & 39/2^- \\ 3787.9^{b} \ 4 & 41/2^- \\ 3787.9^{b} \ 4 & 51/2^- \\ 4103.5^{e} \ 7 & 41/2^- \\ 4103.5^{e} \ 7 & 41/2^- \\ 4333.8^{f} \ 5 & 55/2^+ \\ 4437.5^{b} \ 4 \ 45/2^- \\ 4526.2^{d} \ 9 & 43/2^- \\ 5598.8^{e} \ 9 & 49/2^- \\ 5237.8^{d} \ 10 \ 47/2^- \\ 5598.8^{e} \ 9 & 49/2^- \\ 5592.10^{f} \ 6 \ 53/2^+ \\ 5597.5^{b} \ 5 \ 53/2^- \\ 676.5^{b} \ 6 \ 57/2^- \end{aligned}$	2769.9 ^d 5	$31/2^{-}$	
$\begin{aligned} 2869.0^{\circ} 6 & 33/2^{-} \\ 397.4^{\circ} 5 & 37/2^{+} \\ 3179.9^{\circ} 6 & 35/2^{+} \\ 3208.8^{\circ} 4 & 37/2^{-} \\ 3502.4^{\circ} 5 & 39/2^{-} \\ 3873.9^{\circ} 4 & 41/2^{-} \\ 3873.3^{\circ} 8 & 39/2^{-} \\ 3873.7^{\circ} 4 & 41/2^{-} \\ 3873.8^{\circ} 5 & 41/2^{+} \\ 4103.5^{\circ} 7 & 41/2^{-} \\ 4141.6^{\circ} 5 & 43/2^{-} \\ 4333.8^{\circ} 5 & 45/2^{+} \\ 4437.5^{\circ} 4 & 45/2^{-} \\ 4437.5^{\circ} 4 & 45/2^{-} \\ 4432.0^{\circ} 8 & 45/2^{-} \\ 4526.2^{\circ} 9 & 43/2^{+} \\ 4822.0^{\circ} 8 & 45/2^{-} \\ 4822.0^{\circ} 8 & $	2810.3 6	$33/2^+$	
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	2869.0 [°] 6	33/2-	
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	2937.4 ^e 5	35/2-	
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	3005.1 [∞] 5	37/2+	
$\begin{aligned} 3206.8'' 4 & 37/2'' \\ 3288.5'' 6 & 37/2'' \\ 3288.5'' 6 & 37/2'' \\ 3382.4'' 5 & 39/2'' \\ 3502.4'' 5 & 39/2'' \\ 3787.9'' 4 & 41/2'' \\ 3787.9'' 4 & 41/2'' \\ 3787.3'' 8 & 39/2'' \\ 4103.5'' 7 & 41/2'' \\ 4103.5'' 7 & 41/2'' \\ 4133.8'' 5 & 45/2'' \\ 4337.5'' 4 & 45/2'' \\ 4337.5'' 4 & 45/2'' \\ 4352.6'' 9 & 43/2'' \\ 4352.6'' 9 & 43/2'' \\ 4520.9'' 8 & 45/2'' \\ 4520.9'' 8 & 45/2'' \\ 4520.9'' 8 & 45/2'' \\ 4520.9'' 8 & 45/2'' \\ 4520.9'' 8 & 45/2'' \\ 4520.9'' 8 & 45/2'' \\ 4520.9'' 8 & 45/2'' \\ 4520.9'' 8 & 45/2'' \\ 4520.9'' 8 & 45/2'' \\ 4520.9'' 8 & 45/2'' \\ 4520.9'' 8 & 45/2'' \\ 4520.9'' 8 & 45/2'' \\ 4520.9'' 8 & 45/2'' \\ 5588.8'' 9 & 49/2'' \\ 5598.8'' 9 & 53/2'' \\ 5490.4''' 10 & 47/2'' \\ 5598.8'' 9 & 53/2'' \\ 5490.4''' 10 & 47/2'' \\ 5598.8'' 9 & 53/2'' \\ 5490.4''' 10 & 47/2'' \\ 5598.8'' 9 & 53/2'' \\ 5490.4''' 10 & 47/2'' \\ 5598.8'' 9 & 53/2'' \\ 5490.4''' 10 & 47/2'' \\ 5598.8'' 9 & 53/2'' \\ 5490.4''' 10 & 47/2'' \\ 5598.8'' 9 & 53/2'' \\ 5490.4''' 10 & 47/2'' \\ 5598.8'' 9 & 53/2'' \\ 5490.4''' 10 & 47/2'' \\ 5598.8'' 9 & 53/2'' \\ 5490.4''' 10 & 47/2'' \\ 5598.8'' 9 & 53/2'' \\ 5490.4''' 10 & 47/2'' \\ 5598.8'' 9 & 53/2'' \\ 5490.4'''' 10 & 47/2'' \\ 5598.8'' 9 & 53/2'' \\ 5490.4'''''''''''''''''''''''''''''''''''$	3179.9 ^{<i>a</i>} 6	$35/2^+$	
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	3206.8° 4	37/2-	
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	3260.0 5	37/2+	
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	3288.5 ^{<i>a</i>} 6	35/2-	
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	3452.8° /	$\frac{31}{2}$	
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	3502.4 5	39/2 41/0+	
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	3000.0^{5} 3	41/2	
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	3/8/.98 4	41/2	
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	38/2.1 5	41/2+	
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	3875.3 ^{<i>a</i>} 8	$39/2^{-}$	
$\begin{array}{rcl} 410.6^{\circ} 5 & 43/2^{-} \\ 4131.6^{\circ} 5 & 43/2^{-} \\ 4333.8^{\circ} 5 & 45/2^{+} \\ 4437.5^{\circ} 4 & 45/2^{-} \\ 4526.2^{\circ} 9 & 43/2^{-} \\ 4626.9^{\circ} 5 & 45/2^{+} \\ 4672.3^{\circ} 9 & 43/2^{+} \\ 4672.3^{\circ} 9 & 43/2^{+} \\ 4820.0^{\circ} 8 & 45/2^{-} \\ 4850.9^{\circ} 5 & 47/2^{-} \\ 5082.7^{\circ} 5 & 49/2^{+} \\ 5151.6^{\circ} 4 & 49/2^{-} \\ 5237.8^{\circ} 10 & 47/2^{-} \\ 5429.5^{\circ} 6 & 49/2^{+} \\ 5490.4^{\circ} 10 & 47/2^{-} \\ 5498.8^{\circ} 9 & 49/2^{-} \\ 5598.8^{\circ} 9 & 49/2^{-} \\ 5598.8^{\circ} 9 & 49/2^{-} \\ 5598.8^{\circ} 9 & 49/2^{-} \\ 55921.0^{\circ} 6 & 51/2^{-} \\ 5921.0^{\circ} 6 & 53/2^{+} \\ 5927.5^{\circ} 5 & 53/2^{-} \\ 6457.9^{\circ} 7 & 55/2^{-} \\ 6765.7^{\circ} 6 & 57/2^{-} \end{array}$	3921./ ^a /	39/2 ' 41/2-	
$\begin{array}{rcrcrc} 4333 & 8^{7} & 5 & 45/2^{+} \\ 4333 & 8^{7} & 5 & 45/2^{+} \\ 4437 & 5^{5} & 4 & 45/2^{-} \\ 4526 & 2^{6} & 9 & 43/2^{-} \\ 4626 & 9^{6} & 5 & 45/2^{+} \\ 4672 & 3^{9} & 43/2^{+} \\ 4822 & 0^{6} & 8 & 45/2^{-} \\ 4820 & 9^{6} & 5 & 47/2^{-} \\ 5082 & 7^{f} & 5 & 49/2^{+} \\ 5151 & 6^{b} & 4 & 49/2^{-} \\ 5237 & 8^{d} & 10 & 47/2^{-} \\ 5237 & 8^{d} & 10 & 47/2^{-} \\ 5429 & 5^{8} & 6 & 49/2^{+} \\ 5490 & 47^{a} & 10 & 47/2^{+} \\ 5598 & 8^{c} & 9 & 49/2^{-} \\ 5503 & 8^{c} & 6 & 51/2^{-} \\ 5921 & 0^{f} & 53/2^{+} \\ 5927 & 5^{5} & 53/2^{-} \\ 6249 & 9^{k} & 7 & 53/2^{+} \\ 6457 & 9^{e} & 7 & 55/2^{-} \\ 6765 & 7^{b} & 6 & 57/2^{-} \end{array}$	4103.5° 7 4141.6° 5	$\frac{41}{2}$ $\frac{43}{2^{-}}$	
$\begin{array}{rcl} 437.5^{b} & 4 & 5/2^{-} \\ 4256.2^{d} & 9 & 3/2^{-} \\ 4626.9^{bc} & 5 & 45/2^{+} \\ 4672.3^{d} & 9 & 43/2^{+} \\ 4822.0^{c} & 8 & 45/2^{-} \\ 4850.9^{c} & 5 & 47/2^{-} \\ 5082.7^{f} & 5 & 49/2^{+} \\ 5151.6^{b} & 4 & 49/2^{-} \\ 5237.8^{d} & 10 & 47/2^{-} \\ 5429.5^{bc} & 6 & 49/2^{+} \\ 5490.4^{ca} & 10 & 47/2^{+} \\ 5598.8^{c} & 9 & 49/2^{-} \\ 5523.8^{c} & 6 & 51/2^{-} \\ 5921.0^{f} & 6 & 53/2^{+} \\ 5927.5^{b} & 5 & 53/2^{-} \\ 6249.9^{bc} & 7 & 53/2^{+} \\ 6457.9^{c} & 7 & 55/2^{-} \\ 6765.7^{b} & 6 & 57/2^{-} \end{array}$	1333 8f 5	45/2+	
$\begin{array}{rcl} 4437.3 & 4 & 43/2 \\ 4526.2d & 9 & 43/2^{-} \\ 4626.9d & 5 & 45/2^{+} \\ 4672.3d & 9 & 43/2^{+} \\ 4822.0c & 8 & 45/2^{-} \\ 4820.9c & 5 & 47/2^{-} \\ 5082.7f & 5 & 49/2^{+} \\ 5151.6b & 4 & 49/2^{-} \\ 5237.8d & 10 & 47/2^{-} \\ 5429.5d & 6 & 49/2^{+} \\ 5490.4?d & 10 & 47/2^{+} \\ 5598.8c & 9 & 49/2^{-} \\ 5598.8c & 9 & 49/2^{-} \\ 5623.8e & 6 & 51/2^{-} \\ 5921.0f & 6 & 53/2^{+} \\ 5927.5b & 5 & 53/2^{-} \\ 6249.9d & 7 & 53/2^{+} \\ 6457.9e & 7 & 55/2^{-} \\ 6765.7b & 6 & 57/2^{-} \\ \end{array}$	4353.8° 5 4427 5 <mark>b</mark> 4	45/2	
$\begin{array}{rcl} 4320.2 & 9 & 45/2 \\ 4626.9^{\&} & 5 & 45/2^+ \\ 4672.3^{a} & 9 & 43/2^+ \\ 4822.0^{c} & 8 & 45/2^- \\ 4850.9^{c} & 5 & 47/2^- \\ 5082.7^{f} & 5 & 49/2^+ \\ 5151.6^{b} & 4 & 49/2^- \\ 5237.8^{d} & 10 & 47/2^- \\ 5429.5^{\&} & 6 & 49/2^+ \\ 5490.47^{a} & 10 & 47/2^+ \\ 5598.8^{c} & 9 & 49/2^- \\ 5623.8^{c} & 6 & 51/2^- \\ 5921.0^{f} & 6 & 53/2^+ \\ 5927.5^{b} & 5 & 53/2^- \\ 6249.9^{\&} & 7 & 53/2^+ \\ 6457.9^{c} & 7 & 55/2^- \\ 6765.7^{b} & 6 & 57/2^- \end{array}$	4457.5 4 4526.2 d 0	43/2	
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	4526.2" 9	45/2	
$\begin{array}{rcl} 4072.5 & 9 & 45/2 \\ 4822.0^{\circ} & 8 & 45/2^{-} \\ 4850.9^{\circ} & 5 & 47/2^{-} \\ 5082.7^{\circ} & 5 & 49/2^{+} \\ 5151.6^{\circ} & 4 & 49/2^{-} \\ 5237.8^{\circ} & 10 & 47/2^{-} \\ 5429.5^{\circ} & 6 & 49/2^{+} \\ 5490.4?^{\circ} & 10 & 47/2^{+} \\ 5598.8^{\circ} & 9 & 49/2^{-} \\ 5623.8^{\circ} & 6 & 51/2^{-} \\ 5921.0^{\circ} & 6 & 53/2^{+} \\ 5927.5^{\circ} & 5 & 53/2^{-} \\ 6249.9^{\circ} & 7 & 53/2^{+} \\ 6457.9^{\circ} & 7 & 55/2^{-} \\ 6765.7^{\circ} & 6 & 57/2^{-} \\ \end{array}$	4626.9° 3	45/2 +	
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	4072.3 9 4822 0 [°] 8	45/2	
$5082.7f 5 49/2^+$ $5151.6b 4 49/2^-$ $5237.8d 10 47/2^-$ $5429.5\& 6 49/2^+$ $5490.4?^a 10 47/2^+$ $5598.8c 9 49/2^-$ $5623.8e 6 51/2^-$ $5921.0f 6 53/2^+$ $5927.5b 5 53/2^-$ $6249.9\& 7 53/2^+$ $6457.9e 7 55/2^-$ $66 57/2^-$	4850.9 ^e 5	$47/2^{-}$	
$5151.6^{b} 4 \qquad 49/2^{-}$ $5237.8^{d} 10 \qquad 47/2^{-}$ $5429.5^{\&} 6 \qquad 49/2^{+}$ $5490.4?^{a} 10 \qquad 47/2^{+}$ $5598.8^{c} 9 \qquad 49/2^{-}$ $5623.8^{e} 6 \qquad 51/2^{-}$ $5921.0^{f} 6 \qquad 53/2^{+}$ $5927.5^{b} 5 \qquad 53/2^{-}$ $6249.9^{\&} 7 \qquad 53/2^{+}$ $6457.9^{e} 7 \qquad 55/2^{-}$ $6765.7^{b} 6 \qquad 57/2^{-}$	5082.7^{f} 5	$49/2^{+}$	
$5237.8^{d} 10 47/2^{-}$ $5429.5^{\&} 6 49/2^{+}$ $5490.4?^{a} 10 47/2^{+}$ $5598.8^{c} 9 49/2^{-}$ $5623.8^{e} 6 51/2^{-}$ $5921.0^{f} 6 53/2^{+}$ $5927.5^{b} 5 53/2^{-}$ $6249.9^{\&} 7 53/2^{+}$ $6457.9^{e} 7 55/2^{-}$ $6765.7^{b} 6 57/2^{-}$	5151.6 ^b 4	$49/2^{-}$	
$5429.5 & 6 & 49/2^{+} \\ 5490.4?^{a} & 10 & 47/2^{+} \\ 5598.8^{c} & 9 & 49/2^{-} \\ 5623.8^{e} & 6 & 51/2^{-} \\ 5921.0^{f} & 6 & 53/2^{+} \\ 5927.5^{b} & 5 & 53/2^{-} \\ 6249.9^{\&} & 7 & 53/2^{+} \\ 6457.9^{e} & 7 & 55/2^{-} \\ 6765.7^{b} & 6 & 57/2^{-} \\ \end{array}$	5237.8 ^d 10	$47/2^{-}$	
$5490.4?^{a} 10 47/2^{+}$ $5598.8^{c} 9 49/2^{-}$ $5623.8^{e} 6 51/2^{-}$ $5921.0^{f} 6 53/2^{+}$ $5927.5^{b} 5 53/2^{-}$ $6249.9^{\&} 7 53/2^{+}$ $6457.9^{e} 7 55/2^{-}$ $6765.7^{b} 6 57/2^{-}$	5429.5 ^{&} 6	$49/2^+$	
$5598.8^{c} 9 49/2^{-}$ $5623.8^{e} 6 51/2^{-}$ $5921.0^{f} 6 53/2^{+}$ $5927.5^{b} 5 53/2^{-}$ $6249.9^{\&} 7 53/2^{+}$ $6457.9^{e} 7 55/2^{-}$ $6765.7^{b} 6 57/2^{-}$	5490.4? ^a 10	$47/2^+$	
$5623.8^{e} 6 51/2^{-}$ $5921.0^{f} 6 53/2^{+}$ $5927.5^{b} 5 53/2^{-}$ $6249.9^{\&} 7 53/2^{+}$ $6457.9^{e} 7 55/2^{-}$ $6765.7^{b} 6 57/2^{-}$	5598.8 [°] 9	49/2-	
$5921.0^{f} 6 53/2^{+}$ $5927.5^{b} 5 53/2^{-}$ $6249.9^{\&} 7 53/2^{+}$ $6457.9^{e} 7 55/2^{-}$ $6765.7^{b} 6 57/2^{-}$	5623.8 ^e 6	$51/2^{-}$	
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	5921.0 ^{<i>f</i>} 6	$53/2^{+}$	
$\begin{array}{rcl} 6249.9^{\&} & 7 & 53/2^+ \\ 6457.9^e & 7 & 55/2^- \\ 6765.7^b & 6 & 57/2^- \end{array}$	5927.5 ^b 5	53/2-	
$6457.9^{e} 7$ $55/2^{-}$ $6765.7^{b} 6$ $57/2^{-}$	6249.9 <mark>&</mark> 7	$53/2^{+}$	
$6765.7^{b}_{c} 6 57/2^{-}$	6457.9 ^e 7	55/2-	
	6765.7 <mark>6</mark> 6	57/2-	
6835.9^{f} 7 $57/2^{+}$	6835.9 ^{<i>f</i>} 7	$57/2^{+}$	
$7103.9^{\&} 12 (57/2^+)$	7103.9 ^{&} 12	$(57/2^+)$	
$7354.6^{e} 8 \qquad 59/2^{-1}$	7354.6 ^e 8	59/2-	
$7667.5^{b} 6 \qquad 61/2^{-}$	7667.5 ^b 6	$61/2^{-}$	
7806.2^{f} 7 $61/2^{+}$	7806.2 ^{<i>f</i>} 7	$61/2^+$	

¹⁶⁷Hf Levels (continued)

E(level) [†]	Jπ‡	E(level) [†]	J π ‡	E(level) [†]	Jπ‡
8013.9 ^{&} 16	$(61/2^+)$	8810.3 ^f 9	65/2+	10687.5 ^b 11	73/2-
8314.3 ^e 9	$63/2^{-}$	9644.3 ^b 10	69/2-	10876.6? ^f 15	$(73/2^+)$
8630.5 ^b 8	$65/2^{-}$	9837.6 ^f 10	$69/2^+$	11939.6? ^f 18	$(77/2^+)$

[†] From a least-squares fit to $E\gamma$ data, using uncertainties for γ -ray energies assigned by the evaluators, based on other studies using 8π array at Chalk River, such as data for ¹⁵⁷Ho in 1992Ra17. Uncertainty of 1 keV was assumed when not stated. Reduced χ^2 =0.98.

[‡] Authors' values, based on measured DCO ratios and deduced band structure, also supported by total routhian plus cranked shell-model calculations (1999Cr01). Assignments for all the excited states are placed in parentheses by evaluators, as strong arguments for low-lying levels are lacking.

[#] Band(A): $v5/2[523], \alpha = +1/2$. Band from 1999Sm13 and 1999Cr01.

[@] Band(a): 5/2[523],α=−1/2. Band from 1999Sm13 and 1999Cr01. See comment for ν5/2[523]⊗ν5/2[642]²,α=−1/2 band concerning J=23/2, 27/2 states.

& Band(B): $v5/2[642], \alpha = +1/2$. Band from 1999Cr01 and 1999Sm13. Probably undergoes $v7/2[633]^2$ crossing around $\hbar\omega = 0.4$ MeV, becoming a three-quasineutron structure at the highest spins.

^{*a*} Band(b): $v5/2[642], \alpha = -1/2$. Band from 1999Cr01 and 1999Sm13. Evolves into a 3-quasineutron structure at the highest spins following ($v5/2[642] \otimes v7/2[633]$) crossing at $\hbar \omega \approx 0.38$ MeV.

- ^b Band(C): $v5/2[523] \otimes v 5/2[642]^2$, $\alpha = +1/2$. Band from 1999Cr01 and 1999Sm13.
- ^{*c*} Band(D): $v3/2[521] \otimes v 5/2[642]^2$, $\alpha = +1/2$. Band from 1999Cr01. 3/2[521] band not observed at frequencies below the first neutron alignment.
- ^d Band(d): $v_3/2[521] \otimes v_5/2[642]^2$, $\alpha = -1/2$. Band from 1999Cr01. 3/2[521] band not observed at frequencies below the first neutron alignment.
- ^{*e*} Band(E): $v5/2[523] \otimes v5/2[642]^2$, $\alpha = -1/2$. Band from 1999Sm13 and 1999Cr01, with the difference that 1999Cr01 assigned the J=23/2 and 27/2 states to the v5/2[523], $\alpha = -1/2$ band, instead.
- ^{*f*} Band(F): $v7/2[633] \otimes v5/2[642]^2$, $\alpha = +1/2$. Band from 1999Cr01 and 1999Sm13. Yrast structure for J≥41/2. Probably becomes a five quasiparticle structure at highest spins after alignment of $(h_{11/2}^2)$ or $(\pi h_{11/2} \otimes \pi h_{9/2})$ proton pair.

$\gamma(^{167}\mathrm{Hf})$

The DCO values, for gates on stretched quadrupole transitions are from 1999Cr01, where expected DCO ratios are 1.0 for $\Delta J=2$, quadrupole and $\Delta J=0$, dipole transitions, and 0.65 for $\Delta J=1$, dipole transitions. Only a few DCO values are from 1999Sm13.

E_{γ}^{\dagger}	$I_{\gamma}^{@}$	E_i (level)	\mathbf{J}_i^{π}	E_f	\mathbf{J}_f^{π}	Mult. ^{&}	Comments
92.3 5	0.9 1	92.1	$7/2^{-}$	0.0 5	$5/2^{-}$		Mult.: M1(+E2) in 1999Cr01.
115.4 5	1.0 1	207.2	9/2-	92.1 7	/2-	D	DCO=0.43 4
							Mult.: M1(+E2) in 1999Cr01.
148.3 [#] 5		355.3	$11/2^{-}$	207.2 9	/2-		Mult.: M1(+E2) in 1999Cr01.
149.6 [#] 5		504.6	$13/2^{-}$	355.3 1	$1/2^{-}$		Mult.: M1(+E2) in 1999Cr01.
177 [‡]		883.7	$17/2^{-}$	706.5 1	5/2-		
202‡		706.5	$15/2^{-}$	504.6 1	3/2-		
203 [‡]		1323.9	$21/2^{-}$	1120.8 1	9/2-		
204.6 1	89.5 27	349.6	$17/2^{+}$	145.0 1	$3/2^{+}$	Q	DCO=1.11 1
							Mult.: E2 in 1999Cr01.
207.1 3	4.4 2	207.2	9/2-	0.0 5	$i/2^{-}$	Q	DCO=1.09 2
							Mult.: E2 in 1999Cr01.
213.1 3	4.4 2	401.7	$15/2^{+}$	188.6 1	$1/2^{+}$	Q	DCO=0.94 4
							Mult.: E2 in 1999Cr01.

$\gamma(^{167}\text{Hf})$ (continued)

E_{γ}^{\dagger}	$I_{\gamma}^{@}$	E _i (level)	\mathbf{J}_i^{π}	E_{f}	J_f^{π}	Mult.&	Comments
237 [‡]		1120.8	$19/2^{-}$	883.7	$17/2^{-}$		
256.8 <i>3</i>	3.5 1	401.7	$15/2^{+}$	145.0	$13/2^+$	D	DCO=0.43 2
263.0 5	1.8 <i>3</i>	355.3	11/2-	92.1	7/2-	Q	Mult.: $M1(+E2)$ in 1999Cr01. DCO=1.07 10 Mult.: E2 in 1000Cr01
297.4 1	24.0 8	504.6	13/2-	207.2	9/2-	Q	DCO= $1.05\ 2$
343.0 1	100.0 30	692.6	$21/2^+$	349.6	17/2+	Q	DCO=1.02 I
351.0 <i>3</i>	3.3 1	706.5	15/2-	355.3	11/2-	Q	Mult.: E2 in 1999Cr01. DCO=1.02 8
365.5 1	14.0 4	767.2	19/2+	401.7	15/2+	Q	Mult: E2 in 1999C101. DCO=0.96 3 Mult: E2 is 1000C=01
379.2 1	26.4 8	883.7	17/2-	504.6	13/2-	Q	Mult. E2 in 1999C101. DCO=0.98 2 Mult. E2 is 1000Cr01
412.8 <i>3</i>	6.9 2	2244.8	29/2-	1832.1	27/2+	D	DCO= $0.62~6$ DCO= $0.64~10~(1999Sm13)$
414.0.2	221	1120.9	10/2-	706 5	15/2-	0	Mult.: E1 in 1999Cr01.
414.2 3	5.2 1	1120.8	19/2	/06.5	15/2	Q	Mult.: E2 in 1999Cr01.
417.6 3	4.3 2	767.2	19/2+	349.6	$17/2^{+}$	D	DCO=0.52.6 Mult : M1(+E2) in 1999Cr01
434.0 3	5.2 2	1995.3	27/2-	1561.4	23/2-	Q	DCO= $1.17 \ 12$ Mult: F2 in 1000Cr01
440.2 1	27.1 8	1323.9	21/2-	883.7	17/2-	Q	DCO = 1.06 3
440.5 3	4.6 2	1561.4	23/2-	1120.8	19/2-	Q	$\begin{array}{l} \text{Mult. E2 in 1999C101.} \\ \text{DCO=}0.88 \ 13 \\ \text{DCO=}0.96 \ 19 \ (1999\text{Sm13}) \\ \text{Mult. E2 in 1999C101.} \end{array}$
446.4 <i>3</i>	9.7 3	2441.5	31/2-	1995.3	27/2-	Q	DCO=1.00 7
447.6 <i>1</i>	21.0 6	2244.8	29/2-	1797.2	25/2-	Q	Mult.: E2 in 1999Cr01. $DCO=1.00 \ 4$ $DCO=0.91 \ 10 \ (1999Sm13)$ Mult.: E2 in 1999Cr01.
449.9 [#] 5 450.5 1	26.9 8	3260.0 2695.3	37/2 ⁺ 33/2 ⁻	2810.3 2244.8	33/2 ⁺ 29/2 ⁻	Q	Mult.: E2 in 1999Cr01. DCO=0.96 4
458.8 <i>1</i>	86.4 26	1151.5	25/2+	692.6	21/2+	Q	Mult.: E2 in 1999Cr01. DCO=0.97 2
473.3 1	23.7 7	1797.2	25/2-	1323.9	21/2-	Q	Mult.: E2 in 1999Cr01. DCO=1.03 4
479.1 5	2.7 1	2769.9	31/2-	2289.6	27/2-	Q	Mult.: E2 in 1999Cr01. DCO= $0.95 \ 15$ E _y : level-energy difference=480.3.
486.3 <i>1</i>	15.7 5	1253.5	23/2+	767.2	19/2+	Q	Mult.: E2 in 1999Cr01. DCO=1.00 4 Mult : E2 in 1999Cr01
495.9 <i>1</i>	15.5 5	2937.4	35/2-	2441.5	31/2-	Q	DCO= 1.005
511.5 <i>1</i>	25.6 8	3206.8	37/2-	2695.3	33/2-	Q	DCO=0.95 3 Mult: E2 in 1999C101.
518.6 <i>3</i>	3.7 2	3288.5	35/2-	2769.9	31/2-	Q	$\begin{array}{c} \text{Mult., E2 in 1999 (101)} \\ \text{DCO=1.18 } 14 \\ \text{Mult., E2 in 1000 (c01)} \end{array}$
529.9 <i>3</i>	4.3 2	2869.0	33/2-	2339.1	29/2-	Q	$\begin{array}{c} \text{Mult.: E2 in 1999 C01.} \\ \text{DCO=}0.99 \ 9 \\ \text{Mult.: E2 in 1000 C01.} \end{array}$
541.9 <i>3</i>	4.2 2	2339.1	29/2-	1797.2	25/2-	Q	DCO= $1.08 \ 8$ Mult.: E2 in 1999Cr01.

$\gamma(^{167}\text{Hf})$ (continued)

543.5 3 3.6 1 1797.2 25/2 ⁻ 1253.5 23/2 ⁺ D DCO=0.64 10 553 1 1 67 3 20 1704 6 29/2 ⁺ 1151 5 25/2 ⁺ O DCO=0.08 2	
$553 1 1 67 3 20 1704 6 29/2^+ 1151 5 25/2^+ 0 DCO=0.08 2$	
$555.11 01.5 \ 20 1107.0 29/2 1151.5 \ 25/2 Q \qquad DCO-0.70 \ 2$	
561.3 5 2.5 l 1253.5 23/2 ⁺ 692.6 21/2 ⁺ D DC0=0.50 7	
565.0 <i>I</i> 14.2 5 3502.4 39/2 ⁻ 2937.4 35/2 ⁻ Q DCO=0.98 6	
$ \begin{array}{c} \text{Mult.: E2 in 1999Cr01.} \\ 578.6 \ l & 11.1 \ 4 & 1832.1 & 27/2^+ & 1253.5 \ 23/2^+ & \text{Q} \\ \end{array} $	
581.1 1 20.9 6 3787.9 41/2 ⁻ 3206.8 37/2 ⁻ Q Mult.: E2 in 1999Cr01. DCO=1.01 6	
583.8 3 3.6 2 3452.8 37/2 ⁻ 2869.0 33/2 ⁻ Q Mult.: E2 in 1999Cr01. DCO=1.08 5	
586.8 5 2.8 <i>l</i> 3875.3 $39/2^-$ 3288.5 $35/2^-$ (O) ^{<i>a</i>} Mult.: E2 in 1999Cr01. DCO=0.87 8	
605.4 3 4.9 2 2937.4 35/2 ⁻ 2331.6 33/2 ⁺ D DCO=0.47 11	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	
Mult.: E2 in 1999Cr01.	
639.2 <i>I</i> 14.5 29 4141.6 43/2 ⁻ 3502.4 39/2 ⁻ Q DCO=1.00 9	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	
$649.6 \ I$ $18.5 \ 6$ 4437.5 $45/2^ 3787.9 \ 41/2^-$ Q DCO=0.98 \ 5 $DCO=0.98 \ 5$	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	
650.9 3 3.0 1 4526.2 43/2 ⁻ 3875.3 39/2 ⁻ Q Mult.: E2 in 1999Cr01. DCO=1.02 23 DCO=1.02 23	
660.9 1 23.6 7 3666.0 41/2 ⁺ 3005.1 37/2 ⁺ Q Mult.: E2 in 1999Cr01. DCO=0.93 5	
Mult.: E2 in 1999Cr01.	
$66/.87$ 15.75 4333.8 $45/2^{+}$ 3666.0 $41/2^{+}$ Q DCO=1.097 Mult.: E2 in 1999Cr01.	
673.5 <i>1</i> 37.1 <i>10</i> 3005.1 37/2 ⁺ 2331.6 33/2 ⁺ Q DCO=0.95 4	
I_{γ} : unrealistic low uncertainty of 0.1 in be a misprint Evaluators assign unc	1 1999Cr01 appears to ertainty of 1.0
Mult.: E2 in 1999Cr01.	ortainty of 1.0.
679.8 5 2.8 1 1832.1 $27/2^+$ 1151.5 $25/2^+$ D DCO=0.45 21	
700.4 3 4.5 2 3179.9 $35/2^+$ 2479.5 $31/2^+$ Q DCO=0.91 12 $DCO=0.91$	
Mult.: E2 in 1999Cr01. 709.3 I 12.1 4 4850.9 47/2 ⁻ 4141.6 43/2 ⁻ Q DCO=1.07 9	
Mult.: E2 in 1999Cr01. 711.6 5 2.7 <i>l</i> 5237.8 47/2 ⁻ 4526.2 43/2 ⁻ Q DCO=0.88 9	
714.1 1 14.6 5 5151.6 49/2 ⁻ 4437.5 45/2 ⁻ Q Mult.: E2 in 1999Cr01. DCO=0.91 6 DCO=0.91 6	
718.5 3 3.6 2 4822.0 45/2 ⁻ 4103.5 41/2 ⁻ Q Mult.: E2 in 1999Cr01. DCO=1.08 10	
727.9 5 1.3 I 2289.6 27/2 ⁻ 1561.4 23/2 ⁻ Q Mult.: E2 in 1999Cr01. DCO=1.05 20 DCO	
737.0 3 9.1 3 2441.5 31/2 ⁻ 1704.6 29/2 ⁺ D Mult.: E2 in 1999Cr01. DCO=0.60 6	

$\gamma(^{167}\text{Hf})$ (continued)

Table 1 Description Description Description 741.8 3 3.7 1 3921.7 $39/2^+$ 3179.9 $35/2^+$ d Description 748.9 1 12.5 4 5082.7 $49/2^+$ 4333.8 $45/2^+$ Q Description 748.9 1 12.5 4 5082.7 $49/2^+$ 4333.8 $45/2^+$ Q Description 756.5 1.4 1 4672.3 $43/2^+$ 3921.7 $39/2^+$ Mult: E2 in 1999Cr01. 772.9 3 8.4 3 5623.8 $51/2^ 4850.9$ $47/2^-$ Q Description 775.0 3 4.6 2 2769.9 $31/2^-$ 1995.3 $27/2^ d$ Description 775.9 1 10.8 3 5927.5 $53/2^-$ 5151.6 $49/2^-$ Q Description 766.8 5 1.7 1 5598.8 $49/2^ 4822.0$ $45/2^-$ Q Description 820.6 3 6.3 2 549.42 4426.9 $45/2^+$ Q Description	E_{γ}^{\dagger}	$I_{\gamma}^{@}$	E_i (level)	\mathbf{J}_i^{π}	E_f	\mathbf{J}_{f}^{π}	Mult.&	Comments
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$								DCO=0.43 <i>19</i> (1999Sm13)
741.8.3 3.7.7 3921.7 3921.7 3179.9 $35/2^+$ a^+ DCO=1.13 28 748.9 1 12.5 4 5082.7 $49/2^+$ 4333.8 $45/2^+$ Q DCO=0.99 16 734.7 7.8.3 4626.9 $45/2^+$ 3872.1 $41/2^+$ Q DCO=1.17 15 772.9.3 8.4.3 5623.8 $51/2^ 4850.9$ $47/2^-$ Q DCO=1.07 10 775.0.3 4.6.2 2769.9 $31/2^-$ 1995.3 $27/2^ a^-$ DCO=0.09 10 775.0.3 4.6.2 2769.9 $31/2^-$ 1995.3 $27/2^ a^-$ DCO=0.02 $mult: E2$ 1999Cr01. 775.0.3 4.6.2 2769.9 $31/2^-$ 1995.3 $27/2^ a^-$ DCO=0.02.9 $mult: E2$ 1999Cr01. 775.0.3 4.6.2 2769.9 $31/2^-$ 1995.3 $27/2^ a^-$ DCO=0.06.16 $mult: E2$ 1999Cr01. 775.9 1 10.8 3 5927.5 53/2^+ 452.9 Q^-								Mult.: E1 in 1999Cr01.
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	741.8 <i>3</i>	3.7 1	3921.7	39/2+	3179.9	35/2+	и	DCO=1.13 28
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	74001	1054	5002 7	40/2+	1222.0	4512+	0	Mult.: E2 in 1999Cr01.
750.6 5 1.4 1 4672.3 $43/2^+$ 3921.7 $39/2^+$ Mult: E2 in 1999Ct01.754.7 37.8 3 4626.9 $45/2^+$ 3872.1 $41/2^+$ QDCO=1.17 15772.9 38.4 3 5623.8 $51/2^ 4850.9$ $47/2^-$ QDCO=1.07 10773.\$\vec{th}}2479.5 $31/2^+$ 1704.6 $29/2^+$ DCO=1.07 10Mult: E2 in 1999Ct01.775.0 34.6 22769.9 $31/2^ 1995.3$ $27/2^ 4$ DCO=1.00 29775.9 110.8 3 5927.5 $53/2^ 5151.6$ $49/2^ Q$ DCO=-0.88 6Mult: E2 in 1999Ct01.DCO=-0.88 6Mult: E2 in 1999Ct01.DCO=-0.99 12Mult: E2 in 1999Ct01.DCO=-0.99 12Mult: E2 in 1999Ct01.802.6 36.3 2 5429.5 $49/2^+$ 4626.9 $45/2^+$ Q B0C=-0.96 16Mult: E2 in 1999Ct01.820.4 34.3 2 6249.9 $53/2^+$ $549/2^+$ Q B0C=-0.96 16Mult: E2 in 1999Ct01.834.1 3 $6.2 2$ 657.7 $57/2^ 523.8$ $51/2^-$ 838.3 38.1 3 5921.0 $53/2^+$ 5927.5 $53/2^ QDC=-0.86 7$ 843.9 112.3 41995.3 $27/2^ 1151.5$ $25/2^+$ DDCO=-0.86 7843.9 34.6 21561.4 $23/2^ 624.9$ $53/2^+$ DDCO=-0.86 7868.9 34.6 21561.4 $23/2^ 629.9$ $53/2^+$ DDCO=-0.86 7 <t< td=""><td>748.9 1</td><td>12.5 4</td><td>5082.7</td><td>49/2</td><td>4333.8</td><td>45/2</td><td>Q</td><td>$DCO=0.99\ 10$ Mult · E2 in 1000Cr01</td></t<>	748.9 1	12.5 4	5082.7	49/2	4333.8	45/2	Q	$DCO=0.99\ 10$ Mult · E2 in 1000Cr01
1703.017131022372.1372.1 372.1 $41/2^+$ QDCC-1.1715772.98.435623.8 $51/2^-$ 4850.9 $47/2^-$ QDCC-1.0710Mult:E2 in 1999Cr01.DCC-1.0710Mult:E2 in 1999Cr01.773.04.622769.9 $31/2^-$ 1995.3 $27/2^-$ 4DCC-1.00775.034.622769.9 $31/2^-$ 1995.3 $27/2^-$ 4DCC-1.00775.0110.855927.5 $53/2^-$ 5151.6 $49/2^-$ QDCC-0.086776.851.715598.8 $49/2^-$ 4822.0 $45/2^-$ QDCC-0.09012802.636.325429.5 $49/2^+$ 4626.9 $45/2^+$ QDCC-0.09616Mult:E2 in 1999Cr01.DCO-0.09616Mult:E2 in 1999Cr01.802.636.325429.5 $49/2^+$ 4626.9 $45/2^+$ QDCC-0.096818.151.615490.42 $47/2^+$ 4672.3 $43/2^+$ Mult:E2 in 1999Cr01.820.434.326249.9 $53/2^+$ 5429.5 $49/2^+$ QDCO-0.096838.27.526765.7 $57/2^ 53/2^-$ QDCO-0.066843.9112.341995.3 $27/2^-$ 1151.5 $25/2^+$ DDCO-0.086843.9112.3<	750.6.5	141	4672 3	$43/2^{+}$	3921.7	$39/2^{+}$		Mult : F_2 in 1999Cr01
772.9 38.4 35623.851/2"4850.947/2"QMult: E2 in 1999Cr01. DCO=1.07 10 Mult: E2 in 1999Cr01.7732479.531/2"1704.629/2"Ey: shown as tentative because y may be doublet in 1999Sm13. E2 in 1999Cr01.775.0 34.6 22769.931/2"1995.327/2"4DCO=1.00 29 	754.7 3	7.8 3	4626.9	$45/2^+$	3872.1	$41/2^+$	0	DCO= $1.17 \ 15$
$\begin{array}{cccccccccccccccccccccccccccccccccccc$				- 1		1	C C	Mult.: E2 in 1999Cr01.
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	772.9 3	8.4 <i>3</i>	5623.8	$51/2^{-}$	4850.9	$47/2^{-}$	Q	DCO=1.07 10
773 ^{3,0} 2479.5 $31/2^+$ 1704.6 $29/2^+$ E_{γ} : shown as tentative because γ may be doublet in 1999Sm13. Ey is somewhat lower than expected for this placement. 775.0.3 4.6.2 2769.9 $31/2^-$ 1995.3 $27/2^-$ 4 DCO=1.00.29 775.9.1 10.8.3 5927.5 $53/2^-$ 5151.6 $49/2^-$ Q DCO=0.09.9 Mult:: E2 in 1999Cr01. 776.8.5 1.7.1 5598.8 $49/2^-$ 4822.0 $45/2^-$ Q DCO=0.09.9 IZ 802.6.3 6.3.2 5429.5 $49/2^+$ 4626.9 $45/2^+$ Q DCO=0.09.12 818.1 ^b 5 1.6.1 5490.4? $47/2^+$ 4672.3 $43/2^+$ Mult:: E2 in 1999Cr01. 820.4.3 4.3.2 6249.9 $53/2^+$ 5429.5 $49/2^+$ Q DCO=0.06.16 Mult:: E2 in 1999Cr01. 838.2.3 7.5.2 6765.7 $57/2^-$ 5927.5 $53/2^+$ $602.6.7$ Mult:: E2 in 1999Cr01. 843.9 J 12.3.4 1995.3 $27/2^-$ 1151.5 $25/2^+$ D DCO=0.56.5 E1 in 1999Cr01.								Mult.: E2 in 1999Cr01.
775.0 $\vec{3}$ 4.6 $\vec{2}$ 2769.9 $31/2^-$ 1995.3 $27/2^ \vec{4}$ DCO=1.00 $\vec{29}$ 775.9 $\vec{1}$ 10.8 $\vec{3}$ 5927.5 $53/2^ 5151.6$ $49/2^-$ QDCO=1.00 $\vec{29}$ 775.0 $\vec{3}$ 10.8 $\vec{3}$ 5927.5 $53/2^ 5151.6$ $49/2^-$ QDCO=0.09 $\vec{6}$ 776.8 $\vec{5}$ 1.7 $\vec{1}$ 5598.8 $49/2^ 4822.0$ $45/2^-$ QDCO=0.99 $\vec{12}$ 802.6 $\vec{3}$ 6.3 $\vec{2}$ 5429.5 $49/2^+$ 4626.9 $45/2^+$ QDCO=0.99 $\vec{12}$ 818.1 \vec{b} 5 1.6 $\vec{1}$ $5490.4?$ $47/2^+$ 4672.3 $43/2^+$ Mult: E2 in 1999Cr01.820.4 $\vec{3}$ 4.3 $\vec{2}$ 6249.9 $53/2^+$ 5429.5 $49/2^+$ QDCO=0.06 $\vec{16}$ 834.1 $\vec{3}$ 6.2 $\vec{2}$ 6457.9 $55/2^ 5623.8$ $51/2^-$ QDCO=0.08 $\vec{16}$ 838.2 $\vec{3}$ 7.5 $\vec{2}$ 6765.7 $57/2^ 5927.5$ $53/2^-$ QDCO=0.084 $\vec{6}$ 838.3 $\vec{3}$ 8.1 $\vec{3}$ 5921.0 $53/2^+$ 5082.7 $49/2^+$ QDCO=0.086 $\vec{7}$ $\vec{8}; 4^{\ddagger}$ 7103.9 $(57/2^+)$ 6249.9 $53/2^+$ DDCO=0.05 $\vec{11}$ BCO=0.5 $\vec{3}$ $7.0 2$ 3872.1 $41/2^+$ 3005.1 $37/2^+$ QDCO=0.05 $\vec{11}$ BCO=0.5 $\vec{3}$ $7.0 2$ 3872.1 $41/2^+$ 3005.1 $37/2^+$ QDCO=0.05 $\vec{11}$ BCO=0.5 $\vec{3}$ $7.0 2$ 3872.1 $41/2^+$ <td>773^{‡b}</td> <td></td> <td>2479.5</td> <td>31/2+</td> <td>1704.6</td> <td>29/2+</td> <td></td> <td>E_{γ}: shown as tentative because γ may be doublet in 1999Sm13. Eγ is somewhat lower than expected for</td>	773 ^{‡b}		2479.5	31/2+	1704.6	29/2+		E _{γ} : shown as tentative because γ may be doublet in 1999Sm13. E γ is somewhat lower than expected for
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	775 0 2	160	07(0.0	21/2-	1005.2	27/2-	a	this placement.
775.9 I10.8 35927.553/2-515.6 $49/2^-$ QDCO=0.89 6776.8 51.7 I5598.8 $49/2^ 4822.0$ $45/2^-$ QDCO=0.99 I2802.6 36.3 25429.5 $49/2^+$ 4626.9 $45/2^+$ QDCO=0.99 I2818.1 ^b 51.6 I5490.4? $47/2^+$ 4626.9 $45/2^+$ QDCO=0.96 I6820.4 34.3 26249.953/2^+5429.5 $49/2^+$ QDCO=0.60 I6834.1 36.2 26457.955/2^-5623.8 $51/2^-$ QDCO=0.02 I838.2 37.5 26765.7 $57/2^-$ 5927.553/2^-QDCO=0.84 6Mult.: E2 in 1999Cr01.838.3 38.1 35921.053/2^+5082.7 $49/2^+$ QDCO=0.95 I843.9 I12.3 41995.327/2^-1151.5 $25/2^+$ DDCO=0.95 I843.9 I12.3 41995.327/2^-151.5 $25/2^+$ DDCO=0.95 IIB66.9 37.0 23872.1 $41/2^+$ 3005.1 $37/2^+$ QDCO=0.95 IIDCO=0.50 5EI in 1999Cr01.Mult.: E2 in 1999Cr01.868.9 34.6 21561.4 $23/2^-$ 692.6 $21/2^+$ DDCO=0.95 IDCO=0.91 I0Mult.: E2 in 1999Cr01.Mult.: E2 in 1999Cr01.Mult.: E1 in 1999Cr01.896.7 33.6 I7354.659/2^-676.7 $57/2^-$ QDCO=0.91 I09018 44.1 I7667.5 $61/2^ 676.7$ <	//5.0 3	4.6 2	2769.9	31/2	1995.3	21/2	u	DCO=1.00.29 Mult - E2 in 1000Cr01
11 10:0 0 521.2 492.4 Q DCO=0.96 16 Mult.: E2 in 1999Cr01. 818.16 5 1.6 1 5490.4? 471.2* 4672.3 43/2* Mult.: E2 in 1999Cr01. Mult.: E2 in 1999Cr01. 820.4 3 4.3 2 6249.9 53/2* 562.7 527.7 527.5 532.7 Q DCO=0.02 7 838.2 3 7.5 2 6765.7 57/2* 5927.5 53/2* Q DCO=0.86 7 E; 841 in 1999Cr01. 843.9 1 12.3 4 1995.3 27/2* 1151.5 25/2* D DCO=0.05 11 <td>77591</td> <td>10.8.3</td> <td>5927 5</td> <td>53/2-</td> <td>5151.6</td> <td>$49/2^{-}$</td> <td>0</td> <td>DCO=0.89.6</td>	77591	10.8.3	5927 5	53/2-	5151.6	$49/2^{-}$	0	DCO=0.89.6
$776.8.5$ $1.7.1$ 5598.8 $49/2^ 4822.0$ $45/2^-$ Q $DCO=0.99.12^-$ Mult: E2 in 1999Cr01. $802.6.3$ $6.3.2$ 5429.5 $49/2^+$ 4626.9 $45/2^+$ Q $DCO=0.96.16$ Mult: E2 in 1999Cr01. 818.1^b 5 $1.6.1$ $5490.4?$ $47/2^+$ 4672.3 $43/2^+$ Mult: E2 in 1999Cr01. $820.4.3$ $4.3.2$ 6249.9 $53/2^+$ 5429.5 $49/2^+$ Q $DCO=0.96.16$ Mult: E2 in 1999Cr01. $834.1.3$ $6.2.2$ 6457.9 $55/2^ 5623.8$ $51/2^-$ Q $DCO=1.02.7$ 	115.71	10.0 5	5721.5	55/2	5151.0	17/2	Q	Mult.: E2 in 1999Cr01.
802.6 3 6.3 2 5429.5 $49/2^+$ 4626.9 $45/2^+$ QMult: E2 in 1999Cr01.818.1 b 51.6 1 5490.4? $47/2^+$ 4672.3 $43/2^+$ Mult: E2 in 1999Cr01.818.1 b 51.6 1 5490.4? $47/2^+$ 4672.3 $43/2^+$ Mult: E2 in 1999Cr01.820.4 34.3 26249.9 $53/2^+$ 5429.5 $49/2^+$ QDCO=-0.96 16 834.1 36.2 26457.9 $55/2^ 5623.8$ $51/2^-$ QDCO=-0.96 16 838.2 3 7.5 26765.7 $57/2^ 5927.5$ $53/2^ Q$ DCO=-0.84 6 Mult: E2 in 1999Cr01.B38.3 3 8.1 3 5921.0 $53/2^+$ 5082.7 $49/2^+$ $Q)^a$ DCO=-0.84 6 Mult: E2 in 1999Cr01.B38.3 3 $8.1 3$ 5921.0 $53/2^+$ 5082.7 $49/2^+$ Q DCO=-0.84 6 Mult: E2 in 1999Cr01.B23.41995.3 $27/2^ 1151.5$ $25/2^+$ DDCO=-0.56 7 EvE1 in 1999Cr01.E2 in 1999Cr01.E2 in 1999Cr01.E1 in 1999Cr01.854 \ddagger 7103.9 $(57/2^+)$ 6249.9 $53/2^+$ DDCO=-0.95 11 BCO=1.0 4 (1999Sm13)Mult: E2 in 1999Cr01.DCO=0.59 5 Mult: E1 in 1999Cr01.868.9 3 4.6 2 1561.4 $23/2^ 692.6$ $21/2^+$ DDCO=0.95 10 B06.7 3 3.6 1 7354.6 $59/2^ 6457.9$ $55/2^-$ QDCO=0.91 10 Mult: E2 in 1999Cr01.Mult: E2	776.8 5	1.7 <i>1</i>	5598.8	$49/2^{-}$	4822.0	$45/2^{-}$	0	DCO=0.99 12
802.6 3 6.3 2 5429.5 $49/2^+$ 4626.9 $45/2^+$ Q DCO=0.96 16 818.1 ^b 5 1.6 1 5490.4? $47/2^+$ 4672.3 $43/2^+$ Mult: E2 in 1999Cr01. 820.4 3 4.3 2 6249.9 $53/2^+$ 5429.5 $49/2^+$ Q DCO=0.96 16 834.1 3 6.2 2 6457.9 $55/2^ 5623.8$ $51/2^-$ Q DCO=1.02 7 838.2 3 7.5 2 6765.7 $57/2^ 5927.5$ $53/2^-$ (Q) ^a DCO=0.84 6 Mult:: E2 in 1999Cr01. 838.3 3 8.1 3 5921.0 $53/2^+$ 582.7 $49/2^+$ Q DCO=0.86 7 Ey: 841 in 1999Sm13. Mult:: E2 in 1999Cr01. Mult: E2 in 1999Cr01. Mult: E2 in 1999Cr01. 843.9 I 12.3 4 1995.3 $27/2^ 1151.5$ $25/2^+$ D DCO=0.95 11 864.9 3 7.0 2 3872.1 $41/2^+$ 3005.1 $37/2^+$ Q DCO=0.59 5 Mult: E2 in 1999Cr01. Mult: E2 in 1999Cr01. Mult: E1 in 1999Cr01. Mult: E2 in 1999Cr01. 868.9 3 4.6 2				,		1		Mult.: E2 in 1999Cr01.
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	802.6 3	6.3 2	5429.5	$49/2^{+}$	4626.9	$45/2^{+}$	Q	DCO=0.96 16
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$								Mult.: E2 in 1999Cr01.
$820.4 \ 3$ $4.3 \ 2$ 6249.9 $53/2^+$ 5429.5 $49/2^+$ Q DCO=0.96 \ 16 Mult: E2 in 1999Cr01. $834.1 \ 3$ $6.2 \ 2$ 6457.9 $55/2^ 5623.8 \ 51/2^-$ Q DCO=-0.96 \ 16 Mult: E2 in 1999Cr01. $838.2 \ 3$ $7.5 \ 2$ 6765.7 $57/2^ 5927.5 \ 53/2^ (Q)^a$ DCO=-0.84 \ 6 Mult: E2 in 1999Cr01. $838.3 \ 3$ $8.1 \ 3$ 5921.0 $53/2^+$ $5082.7 \ 49/2^+$ $(Q)^a$ DCO=-0.86 \ 7 E_{\gamma}: 841 \ in 1999Sm13. Mult: E2 \ in 1999Cr01. $843.9 \ 1$ $12.3 \ 4$ 1995.3 $27/2^ 1151.5 \ 25/2^+$ D DCO=-0.95 \ 1 Mult: E2 \ in 1999Cr01. $854^{\frac{1}{2}}$ $7103.9 \ (57/2^+)$ $6249.9 \ 53/2^+$ D DCO=-0.95 \ 1 Mult: E2 \ in 1999Cr01. $866.9 \ 3$ $7.0 \ 2$ $3872.1 \ 41/2^+$ $3005.1 \ 37/2^+$ Q DCO=-0.95 \ 1 Mult: E2 \ in 1999Cr01. $868.9 \ 3$ $4.6 \ 2$ $1561.4 \ 23/2^ 692.6 \ 21/2^+$ D DCO=-0.91 \ 10 Mult: E2 \ in 1999Cr01. $896.7 \ 3$ $3.6 \ 1$ $7354.6 \ 59/2^ 6457.9 \ 55/2^-$ Q DCO=-0.91 \ 10 Mult: E2 \ in 1999Cr01. $901.8 \ 3$ $4.1 \ 1$	818.1 ⁰ 5	1.6 <i>1</i>	5490.4?	$47/2^{+}$	4672.3	$43/2^{+}$		Mult.: E2 in 1999Cr01.
Mult: E2 in 1999Cr01.834.1 36.2 26457.9 $55/2^ 5623.8$ $51/2^-$ Q $DCO=1.02$ 7 Mult: E2 in 1999Cr01.838.2 37.5 2 6765.7 $57/2^ 5927.5$ $53/2^ (Q)^a$ $DCO=0.84$ 6 Mult: E2 in 1999Cr01.838.3 38.1 3 5921.0 $53/2^+$ 5082.7 $49/2^+$ $(Q)^a$ $DCO=0.86$ 7 $E_{\gamma}: 841 in 1999Sm13.$ Mult: E2 in 1999Cr01.843.9 112.3 41995.3 $27/2^ 1151.5$ $25/2^+$ D $DCO=0.56$ 5 E1 in 1999Cr01.854 \ddagger 7103.9 $(57/2^+)$ 6249.9 $53/2^+$ D $DCO=0.95$ 11 $DCO=1.0$ 4 (1999Sm13) Mult: E2 in 1999Cr01.868.9 34.6 2 1561.4 $23/2^ 692.6$ $21/2^+$ D $DCO=0.59$ 5 Mult: E1 in 1999Cr01.868.9 34.6 2 1561.4 $23/2^ 692.6$ $21/2^+$ D $DCO=0.95$ 11 $DCO=0.59$ 5896.7 3 3.6 1 7354.6 $59/2^ 6457.9$ $55/2^-$ Q $DCO=0.91$ 10 Mult: E2 in 1999Cr01.901.8 34.1 1 7667.5 $61/2^ 6765.7$ $57/2^ (Q)^a$ $DCO=0.97$ 20 Mult: E2 in 1999Cr01.910 \ddagger 8013.9 $(61/2^+)$ 7103.9 $(57/2^+)$ $(57/2^+)$	820.4 3	4.3 2	6249.9	$53/2^{+}$	5429.5	$49/2^{+}$	Q	DCO=0.96 16
834.1 3 $6.2 2$ 6457.9 $55/2^ 5623.8 51/2^-$ Q $DCO=1.02 7$ 838.2 3 $7.5 2$ 6765.7 $57/2^ 5927.5 53/2^ (Q)^a$ $DCO=0.84 6$ 838.3 3 $8.1 3$ 5921.0 $53/2^+$ $5082.7 49/2^+$ $(Q)^a$ $DCO=0.86 7$ E_{γ} : 841 in 1999Sm13. Mult.: E2 in 1999Cr01. 843.9 1 $12.3 4$ 1995.3 $27/2^ 1151.5 25/2^+$ D $DCO=0.56 5$ E1 in 1999Cr01. 854^{\ddagger} 7103.9 $(57/2^+)$ $6249.9 53/2^+$ $BCO=0.95 11$ $866.9 3$ $7.0 2$ 3872.1 $41/2^+$ $3005.1 37/2^+$ Q $DCO=0.95 11$ $BCO=1.0 4$ (1999Sm13) Mult.: E2 in 1999Cr01. $BCO=0.95 5$ Mult.: E1 in 1999Cr01. $868.9 3$ $4.6 2$ 1561.4 $23/2^ 692.6 21/2^+$ D $DCO=0.59 5$ $Mult.: E2$ in 1999Cr01. $BCO=0.91 10$ $Mult.: E1$ in 1999Cr01. $Mult.: E1$ in 1999Cr01. $896.7 3$ $3.6 1$ 7354.6 $59/2^ 6457.9 55/2^-$ Q $DCO=0.91 10$ $Mult.: 83$ $4.1 1$ 7667.5 <			< 1 0				-	Mult.: E2 in 1999Cr01.
Null:E2in 1999Cr01.838.2 37.5 26765.7 $57/2^ 5927.5$ $53/2^ (Q)^a$ DCO=0.84 6838.3 38.1 3 5921.0 $53/2^+$ 5082.7 $49/2^+$ $(Q)^a$ DCO=0.86 7843.9 112.3 41995.3 $27/2^ 1151.5$ $25/2^+$ DDCO=0.56 5843.9 112.3 41995.3 $27/2^ 1151.5$ $25/2^+$ DDCO=0.56 5854 \ddagger 7103.9 $(57/2^+)$ 6249.9 $53/2^+$ $53/2^+$ $0CO=0.95 11$ 866.9 37.0 2 3872.1 $41/2^+$ 3005.1 $37/2^+$ QDCO=0.95 11DCO=1.0 4 (1999Sm13) Mult: E2 in 1999Cr01. $Mult: E2 in 1999Cr01.$ $Mult: E2 in 1999Cr01.$ 868.9 34.6 2 1561.4 $23/2^ 692.6$ $21/2^+$ D $DCO=0.95 5$ 896.7 3 $3.6 1$ 7354.6 $59/2^ 6457.9$ $55/2^-$ Q $DCO=0.91 10$ 901.8 3 $4.1 1$ 7667.5 $61/2^ 6765.7$ $57/2^ (Q)^a$ $DCO=0.97 20$ Mult: E2 in 1999Cr01.910 \ddagger 8013.9 $(61/2^+)$ 7103.9 $(57/2^+)$ 0	834.1 3	6.2 2	6457.9	55/2-	5623.8	$51/2^{-}$	Q	DCO=1.027
$33,23$ $7,32$ $0705,7$ $37/2$ $35/2$ (0) $DCO=0.84$ for Mult.: E2 in 1999Cr01. $838,33$ $8,13$ 5921.0 $53/2^+$ 5082.7 $49/2^+$ $(Q)^a$ $DCO=0.86$ 7 843.9 1 12.3 4 1995.3 $27/2^ 1151.5$ $25/2^+$ D $DCO=0.86$ 7 843.9 1 12.3 4 1995.3 $27/2^ 1151.5$ $25/2^+$ D $DCO=0.95$ 13 843.9 1 12.3 4 1995.3 $27/2^ 6249.9$ $53/2^+$ $DCO=0.95$ 11 866.9 7 7.0 2 3872.1 $41/2^+$ 3005.1 $37/2^+$ Q $DCO=0.95$ 11 $DCO=1.0$ 4 $(1999Sm13)$ Mult.: E2 in 1999Cr01. $Mult.$: E1 in 1999Cr01. 868.9 3 4.6 2 1561.4 $23/2^ 692.6$ $21/2^+$ D $DCO=0.97$ 10 896.7 3 3.6 1 7354.6 $59/2^ 6457.9$ $55/2^-$	02072	752	6765 7	57/2-	5027 5	52/2-	$(\Omega)^{a}$	Mult.: E2 III 1999CT01. DCO $_{-0.84.6}$
838.3 3 8.1 3 5921.0 $53/2^+$ $5082.7 \ 49/2^+$ $(Q)^a$ DCO=0.86 7 E _y : 841 in 1999Sm13. Mult.: E2 in 1999Cr01. 843.9 I 12.3 4 1995.3 $27/2^-$ 1151.5 $25/2^+$ D DCO=0.86 7 E _y : 841 in 1999Cr01. 854 [‡] 7103.9 $(57/2^+)$ $6249.9 \ 53/2^+$ D DCO=0.95 11 DCO=1.0 4 (1999Sm13) Mult.: E2 in 1999Cr01. 868.9 3 4.6 2 1561.4 $23/2^ 692.6 \ 21/2^+$ D DCO=0.95 5 Mult.: E1 in 1999Cr01. 868.9 3 4.6 2 1561.4 $23/2^ 692.6 \ 21/2^+$ D DCO=0.91 10 Mult.: E2 in 1999Cr01. 896.7 3 3.6 I 7354.6 $59/2^ 6457.9 \ 55/2^-$ Q DCO=0.91 10 Mult.: E2 in 1999Cr01. 901.8 3 4.1 I 7667.5 $61/2^ 6765.7 \ 57/2^ Q)^a$ DCO=0.97 20 Mult.: E2 in 1999Cr01. 910 [‡] 8013.9 $(61/2^+) \ 7103.9 \ (57/2^+)$ $(27/2^+)$ $(21/2^+) \ 7103.9 \ (57/2^+)$	030.2 3	1.5 2	0705.7	51/2	3921.3	55/2	(Q)	Mult : F2 in 1999Cr01
$843.9\ 1$ $12.3\ 4$ 1995.3 $27/2^ 1151.5\ 25/2^+$ D $BCO=0.56\ 5$ E1 in 1999Cr01. $843.9\ 1$ $12.3\ 4$ 1995.3 $27/2^ 1151.5\ 25/2^+$ D $DCO=0.56\ 5$ E1 in 1999Cr01. 854^{\ddagger} 7103.9 $(57/2^+)$ $6249.9\ 53/2^+$ $BCO=0.95\ 11$ DCO= $1.0\ 4$ (1999Sm13) Mult.: E2 in 1999Cr01. $868.9\ 3$ $4.6\ 2$ 1561.4 $23/2^ 692.6\ 21/2^+$ D $DCO=0.59\ 5$ Mult.: E1 in 1999Cr01. $868.9\ 3$ $4.6\ 2$ 1561.4 $23/2^ 692.6\ 21/2^+$ D $DCO=0.59\ 5$ Mult.: E1 in 1999Cr01. $866.7\ 3$ $3.6\ 1$ 7354.6 $59/2^ 6457.9\ 55/2^-$ Q $DCO=0.91\ 10$ Mult.: E2 in 1999Cr01. $901.8\ 3$ $4.1\ 1$ 7667.5 $61/2^ 6765.7\ 57/2^ Q)^a$ $DCO=0.97\ 20$ Mult.: E2 in 1999Cr01. 910^{\ddagger} 8013.9 $(61/2^+)\ 7103.9\ (57/2^+)$ $T103.9\ (57/2^+)$ $T103.9\ (57/2^+)$	838.3 <i>3</i>	8.1 <i>3</i>	5921.0	$53/2^{+}$	5082.7	$49/2^{+}$	(O) ^{<i>a</i>}	DCO=0.86 7
$843.9\ 1$ $12.3\ 4$ 1995.3 $27/2^ 1151.5\ 25/2^+$ D $DCO=0.56\ 5$ E1 in 1999Cr01. 854^{\ddagger} 7103.9 $(57/2^+)$ $6249.9\ 53/2^+$ $DCO=0.95\ 11$ DCO= $1.0\ 4\ (1999Sm13)$ Mult.: E2 in 1999Cr01. $868.9\ 3$ $4.6\ 2$ $1561.4\ 23/2^ 692.6\ 21/2^+$ D $DCO=0.59\ 5$ Mult.: E1 in 1999Cr01. $868.9\ 3$ $4.6\ 2$ $1561.4\ 23/2^ 692.6\ 21/2^+$ D $DCO=0.95\ 13$ DCO= $0.59\ 5$ Mult.: E1 in 1999Cr01. $868.9\ 3$ $4.6\ 2$ $1561.4\ 23/2^ 692.6\ 21/2^+$ D $DCO=0.91\ 0$,		1		E_{γ} : 841 in 1999Sm13.
$843.9\ I$ $12.3\ 4$ 1995.3 $27/2^ 1151.5\ 25/2^+$ D DCO=0.56\ 5 E1 in 1999Cr01. 854^{\ddagger} 7103.9 $(57/2^+)$ $6249.9\ 53/2^+$ DCO=0.95\ II $866.9\ 3$ $7.0\ 2$ 3872.1 $41/2^+$ $3005.1\ 37/2^+$ Q DCO=0.95\ II $DCO=1.0\ 4$ $(19998m13)$ Mult.: E2 in 1999Cr01. Mult.: E1 in 1999Cr01. $868.9\ 3$ $4.6\ 2$ 1561.4 $23/2^ 692.6\ 21/2^+$ D DCO=0.59\ 5 $896.7\ 3$ $3.6\ I$ 7354.6 $59/2^ 6457.9\ 55/2^-$ Q DCO=0.91\ IO $901.8\ 3$ $4.1\ I$ 7667.5 $61/2^ 6765.7\ 57/2^ Q)^a$ DCO=0.97\ 20 910^{\ddagger} 8013.9 $(61/2^+)\ 7103.9\ (57/2^+)$ $57/2^+$ $57/2^ 57/2^-$								Mult.: E2 in 1999Cr01.
E1 in 1999Cr01. E1 in 1999Cr01. DCO=0.95 11 DCO=1.0 4 (1999Sm13) Mult.: E2 in 1999Cr01. B68.9 3 4.6 2 1561.4 23/2 ⁻ 692.6 21/2 ⁺ D DCO=0.59 5 Mult.: E1 in 1999Cr01. B96.7 3 3.6 1 7354.6 59/2 ⁻ 6457.9 55/2 ⁻ Q DCO=0.91 10 Mult.: E2 in 1999Cr01. 901.8 3 4.1 1 7667.5 61/2 ⁻ 6765.7 57/2 ⁻ (Q) ^a DCO=0.97 20 Mult.: E2 in 1999Cr01. 910 [‡] 8013.9 (61/2 ⁺) 7103.9 (57/2 ⁺)	843.9 <i>1</i>	12.3 4	1995.3	$27/2^{-}$	1151.5	$25/2^+$	D	DCO=0.56 5
854^{\ddagger} 7103.9 $(57/2^+)$ 6249.9 $53/2^+$ 866.9 7.0 2 3872.1 $41/2^+$ 3005.1 $37/2^+$ Q $DCO=0.95$ 11 $DCO=1.0$ 4 (1999Sm13) Mult.: E2 in 1999Cr01. $Mult.:$ E2 in 1999Cr01. 868.9 3 4.6 2 1561.4 $23/2^ 692.6$ $21/2^+$ D $DCO=0.95$ $Mult.:$ 896.7 3 3.6 1 7354.6 $59/2^ 6457.9$ $55/2^ Q$ $DCO=0.91$ 10 901.8 4.1 1 7667.5 $61/2^ 6765.7$ $57/2^ Q)^a$ $DCO=0.97$ 20 910^{\ddagger} 8013.9 $(61/2^+)$ 7103.9 $(57/2^+)$ 502 502 102								E1 in 1999Cr01.
$866.9\ 3$ $7.0\ 2$ 3872.1 $41/2^+$ $3005.1\ 37/2^+$ Q $DCO=0.95\ 11$ $DCO=1.0\ 4\ (1999Sm13)$ $DCO=1.0\ 4\ (1999Sm13)$ $Mult.: E2\ in\ 1999Cr01.$ $868.9\ 3$ $4.6\ 2$ 1561.4 $23/2^ 692.6\ 21/2^+$ D $DCO=0.95\ 5$ $896.7\ 3$ $3.6\ 1$ 7354.6 $59/2^ 6457.9\ 55/2^-$ Q $DCO=0.91\ 10$ $901.8\ 3$ $4.1\ 1$ 7667.5 $61/2^ 6765.7\ 57/2^ Q)^a$ $DCO=0.97\ 20$ 910^{\ddagger} 8013.9 $(61/2^+)$ $7103.9\ (57/2^+)$ $(57/2^+)$ $(57/2^+)$	854 [‡]		7103.9	$(57/2^+)$	6249.9	53/2+		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	866.9 <i>3</i>	7.0 2	3872.1	$41/2^{+}$	3005.1	$37/2^{+}$	Q	DCO=0.95 11
Mult: E2 in 1999Cr01. 868.9 3 4.6 2 1561.4 $23/2^ 692.6$ $21/2^+$ D DCO=0.59 5 896.7 3 3.6 1 7354.6 $59/2^ 6457.9$ $55/2^-$ Q DCO=0.91 10 901.8 3 4.1 1 7667.5 $61/2^ 6765.7$ $57/2^ (Q)^a$ DCO=0.97 20 910 [‡] 8013.9 $(61/2^+)$ 7103.9 $(57/2^+)$								$DCO=1.0 \ 4 \ (1999Sm13)$
808.9 5 4.0 2 1301.4 $25/2$ 092.0 $21/2$ D $DCO=0.39$ 5 896.7 3 3.6 1 7354.6 $59/2^ 6457.9$ $55/2^ Q$ $DCO=0.91$ 10 901.8 3 4.1 1 7667.5 $61/2^ 6765.7$ $57/2^ Q)^a$ $DCO=0.97$ 20 910^{\ddagger} 8013.9 $(61/2^+)$ 7103.9 $(57/2^+)$	060 0 2	160	1561 /	22/2-	602.6	21/2+	D	Mult.: E2 in 1999Cr01.
896.7 3 $3.6 \ 1$ 7354.6 $59/2^ 6457.9$ $55/2^-$ Q DCO=0.91 \ 10 901.8 3 $4.1 \ 1$ 7667.5 $61/2^ 6765.7 \ 57/2^ Q)^a$ DCO=0.97 \ 20 910 [‡] 8013.9 $(61/2^+)$ 7103.9 ($57/2^+$) $(57/2^+)$	808.9.3	4.0 2	1301.4	23/2	092.0	21/2	D	DCO=0.59.5 Mult - E1 in 1000Cr01
901.8 3 4.1 1 7667.5 $61/2^ 6765.7$ $57/2^ (Q)^a$ $DCO=0.97.16$ $Mult.: E2 in 1999Cr01.$ 910 [‡] 8013.9 $(61/2^+)$ 7103.9 $(57/2^+)$ $Mult.: E2 in 1999Cr01.$	89673	361	7354.6	59/2-	6457 9	55/2-	0	DCO= $0.91.10$
901.8 3 4.1 1 7667.5 $61/2^-$ 6765.7 57/2 ⁻ (Q) ^a DCO=0.97 20 Mult.: E2 in 1999Cr01. 910 [‡] 8013.9 (61/2 ⁺) 7103.9 (57/2 ⁺)	070.7 5	5.0 1	7554.0	572	0457.7	55/2	Q	Mult : E_2 in 1999Cr01
Mult.: E2 in 1999Cr01. 910^{\ddagger} 8013.9 (61/2 ⁺) 7103.9 (57/2 ⁺)	901.8 <i>3</i>	4.1 <i>I</i>	7667.5	$61/2^{-}$	6765.7	$57/2^{-}$	$(0)^{a}$	DCO=0.97 20
910^{\ddagger} 8013.9 (61/2 ⁺) 7103.9 (57/2 ⁺)				- 1		1	(U	Mult.: E2 in 1999Cr01.
	910 [‡]		8013.9	$(61/2^+)$	7103.9	$(57/2^+)$		
914.9 3 5.3 2 6835.9 57/2 ⁺ 5921.0 53/2 ⁺ Q DCO=0.97 I	914.9 <i>3</i>	5.3 2	6835.9	57/2+	5921.0	53/2+	Q	DCO=0.97 1
Mult.: E2 in 1999Cr01.								Mult.: E2 in 1999Cr01.
928.2 3 5.7 2 3260.0 37/2 ⁺ 2331.6 33/2 ⁺ Q DCO=1.00 20	928.2 <i>3</i>	5.7 2	3260.0	$37/2^{+}$	2331.6	$33/2^{+}$	Q	DCO=1.00 20
Mult.: E2 in 1999Cr01.				1015		T O (T	(2) (Mult.: E2 in 1999Cr01.
959.7 5 2.0 I 8314.3 $63/2^{-1}$ 7354.6 $59/2^{-1}$ (Q) ⁴⁴ DCO=1.44 30	959.7 5	2.0 1	8314.3	63/2-	7354.6	59/2-	(Q) ⁴	$DCO=1.44 \ 30$
Mult.: E2 in 1999Cr01. 061 1 3 2 3 2 4626 0 $45/2^+$ 3666 0 $41/2^+$ Mult.: E2 in 1999Cr01.	061 1 2	222	1676 0	45/2+	3666 0	41/2+		Will.: E_2 in 1999Cf01. Mult : E_2 in 1000Cr01
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	901.1.5	5.5 Z 2 T I	4020.9	43/2 65/2-	7667 5	$\frac{+1}{2}$ 61/2 ⁻	а	DCO-0.85.22
Mult.: E2 in 1999Cr01.	/05.05	2.1 1	0050.5	03/2	1001.5	51/2		Mult.: E2 in 1999Cr01.

E_{γ}^{\dagger}	$I_{\gamma}^{@}$	E _i (level)	\mathbf{J}_i^{π}	E_f	\mathbf{J}_{f}^{π}	Mult.&	Comments
970.3 <i>3</i>	3.2 1	7806.2	61/2+	6835.9	57/2+	$(Q)^{a}$	DCO=0.84 8
							E_{γ} : 973 in 1999Sm13.
1004.1.5	171	0010 2	(5/0+	7006 0	(1/0+	$\langle \mathbf{O} \rangle^{\mathbf{d}}$	Mult.: E2 in 1999Cr01.
1004.1 5	1./ 1	8810.3	65/21	/806.2	61/21	(Q) ^u	$DCO=1.40\ 30$ Mult : E2 in 1000Cr01
1013.8.5	131	9644 3	60/2-	8630 5	65/2-		Mult. E2 in 1999C101. Mult : E2 in $1999Cr01$
1027 3 5	1.31 131	9837.6	$69/2^+$	8810.3	$65/2^+$		Mult : E2 in 1999Cr01
$1020^{\pm b}$	1.0 1	10876.62	$(73/2^+)$	0837.6	60/2+		
1043 2 5	091	10687.5	$(73/2^{-})$ 73/2 ⁻	9644 3	$69/2^{-}$		Mult : E2 in 1999Cr01
$1063 \pm b$	0.9 1	11030.62	$(77/2^+)$	10876.62	$(73/2^+)$		
1005		5429.5	(77/2) $49/2^+$	4333.8	(73/2)		F.: from level scheme Fig. 1 absent in Table II of
1095		5129.5	17/2	1555.0	13/2		1999Cr01. Observed and tentatively placed by 1999Sm13.
1105.9 [#] 5		2810.3	33/2+	1704.6	29/2+		E_{γ} : 1108 in 1999Sm13.
							Mult.: E2 in 1999Cr01.
1137.3 5	1.5 1	2289.6	$27/2^{-}$	1151.5	$25/2^+$	(D) <i>a</i>	DCO=0.68 27
							Mult.: E1 in 1999Cr01.

γ (¹⁶⁷Hf) (continued)

[†] From 1999Cr01, except as noted. Uncertainties are not stated by the authors. Note that 1999Cr01 report better values for E γ derived from their (¹⁶O,4n γ) and/or (²⁶Mg,5n γ) studies. 1999Sm13 report E γ to the nearest keV only and do not give uncertainties. Based on other studies using 8π array at Chalk River such as data for ¹⁵⁷Ho in 1992Ra17, evaluators assign 0.1 keV for strong γ rays (I $\gamma \ge 10$), 0.3 keV for medium intensity (I γ =3-9.9) and 0.5 keV for weak γ rays (I $\gamma \le 3$).

^{\ddagger} γ reported only by 1999Sm13.

[#] From ¹⁵⁵Gd(¹⁶O,4n γ) (1999Cr01); γ not observed in ¹⁴⁶Nd(²⁶Mg,5n γ) reaction. 1999Sm13 give an energy to nearest keV.

[@] From 1999Cr01. Values are for ($^{26}Mg,5n\gamma$) at E=142 MeV. The I γ data were not given by 1999Sm13.

[&] From measured DCO ratios. Expected values are 1.00 for stretched quadrupole (or $\Delta J=0$, dipole) and 0.65 for stretched dipole transitions. Note that the reaction (²⁶Mg,5n γ) and/or (¹⁶O,4n γ) in which DCO values were measured is not specified by the authors. These may have been from either of the two reactions. 1999Cr01 assign several multipolarities based simply on ΔJ^{π} values, with no supporting DCO data. Evaluators have listed such assignments only in comments, and have not listed in data records here or in the Adopted dataset.

^{*a*} The DCO value is not uniquely consistent with either stretched quadrupole or $\Delta J=1$ transition, thus, evaluators either assign multipolarity in parentheses or none at all.

^b Placement of transition in the level scheme is uncertain.

		¹⁴⁶ Nd(²⁶ Mg,5nγ)	1999Cr01,1999Sm13	Legend
		Level Intensitie	<u>Scheme</u> s: Relative Ι _γ	$\begin{array}{c c} & I_{\gamma} < 2\% \times I_{\gamma}^{max} \\ & I_{\gamma} < 10\% \times I_{\gamma}^{max} \\ & I_{\gamma} > 10\% \times I_{\gamma}^{max} \\ & \gamma \text{ Decay (Uncertain)} \end{array}$
<u>(77/2⁺)</u>				11939.6
<u>(73/2⁺)</u> <u>73/2⁻</u>	3			<u>10876.6</u> <u>10687.5</u>
<u>69/2+</u> 69/2-	10 ³			<u>9837.6</u> 9644.3
<u>65/2+</u> <u>65/2-</u>				<u>8810.3</u> 8630.5
<u>63/2</u> - (61/2 ⁺) <u>61/2⁺</u>	ś			8314.3 8013.9 7806.2
<u>61/2</u> - <u>59/2</u> - (57/2 ⁺)	······································			7667.5 7354.6 7103.9
$\frac{57/2^+}{57/2^-}$ $\frac{55/2^-}{53/2^+}$ $\frac{53/2^+}{53/2^+}$ $\frac{53/2^+}{51/2^-}$				6835.9 6765.7 6457.9 6249.9 5927.5 5921.0 55921.0 5623.8
$ \frac{49/2^{-}}{49/2^{+}} \\ \frac{49/2^{+}}{47/2^{-}} \\ \frac{49/2^{-}}{49/2^{+}} \\ \frac{49/2^{+}}{47/2^{-}} \\ $				$\begin{array}{c c c c c c c c c c c c c c c c c c c $
$\frac{45/2^{-}}{43/2^{+}}$ $\frac{45/2^{+}}{43/2^{-}}$ $\frac{43/2^{-}}{45/2^{+}}$			↓ ,	4822.0 4672.3 4672.3 4626.9 4526.2 4333.8
5/2-				0.0

 $^{167}_{~72}{\rm Hf}_{95}$

¹⁴⁶Nd(²⁶Mg,5nγ) 1999Cr01,1999Sm13



 $^{167}_{72}{
m Hf}_{95}$



¹⁶⁷₇₂Hf₉₅



 $^{167}_{72}{\rm Hf}_{95}$





 $^{167}_{72}{
m Hf}_{95}$



¹⁶⁷₇₂Hf₉₅