

(HI,xnγ) 1990Ba29,1991Ka05

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	J. Tuli	ENSDF	15-Aug-2015

1990Ba29: ¹⁴⁹Sm(²⁸Si,4n), E(²⁸Si)=145 MeV. Measured excitation functions, E_γ, I_γ, γγ coin, γ-ray angular distributions; used particle-rotor model, cranked-shell model, and three-band-mixing calculations to interpret level structure.

1991Ka05: ¹⁴⁶Nd(³²S,5n), E(³²S)=166 MeV; ¹⁴⁴Sm(³²S,2pn), E(³²S)=163 MeV; enriched ¹⁴⁶Nd target (98%); measured excitation functions, E_γ, I_γ (30 Compton-suppressed germanium detectors in multidetector array), Xγ coin, γγ coin, γ-ray angular distributions and angular correlations; used cranked-shell model to interpret level structure.

The level scheme and all data are from **1991Ka05**, except where noted. Estimate for "x" (<60 keV) and some additional data are from **1990Ba29**. Other: **1989We06**.

¹⁷³Os Levels

E(level)	J ^π †	Comments
0.0 [‡]	5/2 ⁻	
91.6 [#] 1	7/2 ⁻	
141.2 [@] 2	(9/2 ⁺) ^a	
141.2+x [@] 2	13/2 ⁺	x<60 keV, estimated by 1990Ba29 .
169.8 5		
187.5+x ^{&} 3	11/2 ⁺	J ^π : 1990Ba29 proposed (13/2) from mult=dipole for 218.6γ, in disagreement with results from 1991Ka05 .
219.6 [‡] 1	9/2 ⁻	
310 1	(9/2 ⁻) ^a	
373.9+x [@] 3	17/2 ⁺	
388.0 [#] 1	11/2 ⁻	
406.1+x ^{&} 3	15/2 ⁺	
456.5 2		
535.1 [‡] 1	13/2 ⁻	
721.8 [#] 2	15/2 ⁻	
757.2		
764.1+x [@] 3	21/2 ⁺	
769.7+x ^{&} 3	19/2 ⁺	
890.5 [‡] 2	17/2 ⁻	
1094.3 [#] 2	19/2 ⁻	
1215.4+x ^{&} 3	23/2 ⁺	
1249.2+x [@] 3	25/2 ⁺	
1290.9 [‡] 2	21/2 ⁻	
1519.5 [#] 2	23/2 ⁻	
1717.9+x ^{&} 3	27/2 ⁺	
1740.1 [‡] 2	25/2 ⁻	
1785.7+x [@] 3	29/2 ⁺	
1997.1 [#] 2	27/2 ⁻	
2235.1 [‡] 3	29/2 ⁻	
2264.8		
2272.4+x ^{&} 3	31/2 ⁺	
2359.2+x [@] 3	33/2 ⁺	
2523.3 [#] 3	31/2 ⁻	
2769.3 [‡] 3	33/2 ⁻	

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(HI,xn γ) **1990Ba29,1991Ka05 (continued)**

^{173}Os Levels (continued)

E(level)	J π [†]	E(level)	J π [†]	E(level)	J π [†]	E(level)	J π [†]
2878.8+x ^{&} 3	35/2 ⁺	3683.5 [#] 3	39/2 ⁻	4727? 2		6436 [#] 2	55/2 ⁻
2919? 1		3751? 1		4994.6+x ^{&} 3	47/2 ⁺	6605+x ^{&} 1	55/2 ⁺
2969.0+x [@] 3	37/2 ⁺	3950.4 [‡] 3	41/2 ⁻	5023.6 [#] 3	47/2 ⁻	6645+x [@] 1	57/2 ⁺
3087.5 [#] 3	35/2 ⁻	4064? 2		5042.2+x [@] 4	49/2 ⁺	6754 [‡] 1	57/2 ⁻
3148? 1		4243.8+x ^{&} 3	43/2 ⁺	5315.9 [‡] 3	49/2 ⁻	7166 [#] 2	59/2 ⁻
3336.8 [‡] 3	37/2 ⁻	4305.4+x [@] 3	45/2 ⁺	5725 [#] 1	51/2 ⁻	7496+x [@] 2	61/2 ⁺
3444? 1		4335.2 [#] 3	43/2 ⁻	5782.1+x ^{&} 6	51/2 ⁺	7541 [‡] 2	61/2 ⁻
3536.9+x ^{&} 3	39/2 ⁺	4418? 2		5824.8+x [@] 4	53/2 ⁺		
3616.2+x [@] 4	41/2 ⁺	4618.6 [‡] 3	45/2 ⁻	6018.6 [‡] 3	53/2 ⁻		

[†] From γ -ray multiplicities, coincidence data, and analysis of band structure. Bandhead assignments were based on features of the bands and on systematics for the region (1991Ka05). See ^{173}Os ted levels for evaluator's assignments.

[‡] Member of 5/2[523] band, $\alpha=+1/2$.

[#] Member of 5/2[523] band, $\alpha=-1/2$.

[@] Member of 5/2[642] band, $\alpha=+1/2$.

[&] Member of 5/2[642] band, $\alpha=-1/2$.

^a From 1990Ba29.

$\gamma(^{173}\text{Os})$

Unplaced γ rays are from $\gamma\gamma$ coin (1990Ba29).

E_γ	I_γ [†]	E_i (level)	J_i^π	E_f	J_f^π	Mult. [‡]	δ	Comments
49.6 2		141.2	(9/2 ⁺)	91.6	7/2 ⁻	E1		Placement from 1990Ba29; E_γ from ^{173}Ir ϵ decay (2.20 s), ^{173}Ir ϵ decay (9.0 s). Mult.: from $\alpha \approx 0.5$, as deduced from $I_\gamma(49.6\gamma)$, $I_\gamma(91.6\gamma)$, and α for 91.6 γ (1990Ba29).
91.6 1	108 10	91.6	7/2 ⁻	0.0	5/2 ⁻	M1+E2 [@]	-0.7 [@] +3-6	
128.0 1	82 6	219.6	9/2 ⁻	91.6	7/2 ⁻	M1+E2 [@]		$\delta = -2.7 +11-27$ or $-0.16 +17-21$ (1990Ba29).
133.3 [#]		890.5	17/2 ⁻	757.2				
147.0 5	25 5	535.1	13/2 ⁻	388.0	11/2 ⁻	M1 [@]		
168.4 1	78 5	388.0	11/2 ⁻	219.6	9/2 ⁻	M1+E2 [@]	-0.63 [@] +13-52	
168.6 5	14 3	890.5	17/2 ⁻	721.8	15/2 ⁻			
186.7 5	21 5	721.8	15/2 ⁻	535.1	13/2 ⁻			
203.6 5	13 4	1094.3	19/2 ⁻	890.5	17/2 ⁻			
^x 210.9	20 2							
218 ^{&} 1	<15	310	(9/2 ⁻)	91.6	7/2 ⁻			
218.2 5	26 3	388.0	11/2 ⁻	169.8				
218.6 1	94 7	406.1+x	15/2 ⁺	187.5+x	11/2 ⁺	E2		Mult.: data in 1990Ba29 suggest dipole, in disagreement with results from 1991Ka05.
219.6 1	54 5	219.6	9/2 ⁻	0.0	5/2 ⁻	E2 [@]		

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(HI,xn γ) 1990Ba29,1991Ka05 (continued) $\gamma(^{173}\text{Os})$ (continued)

E_γ	I_γ^\dagger	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. ‡
225 1	44 7	535.1	13/2 ⁻	310	(9/2 ⁻)	E2 [@]
232.7 1	880 35	373.9+x	17/2 ⁺	141.2+x	13/2 ⁺	E2
^x 260.4	30 12					
264.9 1	130 8	406.1+x	15/2 ⁺	141.2+x	13/2 ⁺	M1
265.3 1	48 4	721.8	15/2 ⁻	456.5		
^x 277.4	53 13					
296.4 1	218 16	388.0	11/2 ⁻	91.6	7/2 ⁻	E2
310 1	20 5	310	(9/2 ⁻)	0.0	5/2 ⁻	
315.5 1	470 20	535.1	13/2 ⁻	219.6	9/2 ⁻	E2
333.8 1	380 20	721.8	15/2 ⁻	388.0	11/2 ⁻	E2
355.4 1	495 16	890.5	17/2 ⁻	535.1	13/2 ⁻	E2
^x 359.7	30 6					
363.6 1	275 15	769.7+x	19/2 ⁺	406.1+x	15/2 ⁺	E2
372.5 1	383 20	1094.3	19/2 ⁻	721.8	15/2 ⁻	E2
390.2 1	1000 30	764.1+x	21/2 ⁺	373.9+x	17/2 ⁺	E2
395.8 1	112 10	769.7+x	19/2 ⁺	373.9+x	17/2 ⁺	(M1)
400.4 1	490 15	1290.9	21/2 ⁻	890.5	17/2 ⁻	E2
425.2 1	350 18	1519.5	23/2 ⁻	1094.3	19/2 ⁻	E2
445.6 1	290 20	1215.4+x	23/2 ⁺	769.7+x	19/2 ⁺	E2
449.2 1	445 14	1740.1	25/2 ⁻	1290.9	21/2 ⁻	E2
451.4 1	54 7	1215.4+x	23/2 ⁺	764.1+x	21/2 ⁺	M1
468.6 1	45 5	1717.9+x	27/2 ⁺	1249.2+x	25/2 ⁺	M1
477.6 1	340 18	1997.1	27/2 ⁻	1519.5	23/2 ⁻	E2
485.1 1	800 25	1249.2+x	25/2 ⁺	764.1+x	21/2 ⁺	E2
486.8 5	29 9	2272.4+x	31/2 ⁺	1785.7+x	29/2 ⁺	
495.0 1	399 14	2235.1	29/2 ⁻	1740.1	25/2 ⁻	E2
502.6 1	310 23	1717.9+x	27/2 ⁺	1215.4+x	23/2 ⁺	E2
519.2 5	28 10	2878.8+x	35/2 ⁺	2359.2+x	33/2 ⁺	M1
524.7 [#]		2264.8		1740.1	25/2 ⁻	
525 ^{&} 1	40 4	3444?		2919?		
526.2 1	280 16	2523.3	31/2 ⁻	1997.1	27/2 ⁻	E2
534.2 1	315 12	2769.3	33/2 ⁻	2235.1	29/2 ⁻	E2
536.5 1	650 22	1785.7+x	29/2 ⁺	1249.2+x	25/2 ⁺	E2
554.5 1	235 21	2272.4+x	31/2 ⁺	1717.9+x	27/2 ⁺	E2
564.2 1	200 15	3087.5	35/2 ⁻	2523.3	31/2 ⁻	E2
567.5 1	230 10	3336.8	37/2 ⁻	2769.3	33/2 ⁻	E2
573.4 1	510 20	2359.2+x	33/2 ⁺	1785.7+x	29/2 ⁺	E2
^x 585	21 3					
596.0 1	130 11	3683.5	39/2 ⁻	3087.5	35/2 ⁻	E2
^x 601.5	153 10					
603 ^{&} 1	54 7	3751?		3148?		
606.4 1	245 22	2878.8+x	35/2 ⁺	2272.4+x	31/2 ⁺	E2
609.8 1	410 18	2969.0+x	37/2 ⁺	2359.2+x	33/2 ⁺	E2
613.6 1	160 8	3950.4	41/2 ⁻	3336.8	37/2 ⁻	E2
^x 618.4	68 12					
620 ^{&} 1	36 4	4064?		3444?		
625 ^{&} 1	61 8	3148?		2523.3	31/2 ⁻	
647.2 1	275 15	3616.2+x	41/2 ⁺	2969.0+x	37/2 ⁺	E2
651.7 1	110 10	4335.2	43/2 ⁻	3683.5	39/2 ⁻	E2
658.1 1	145 17	3536.9+x	39/2 ⁺	2878.8+x	35/2 ⁺	E2
^x 661.5	60 10					
663 ^{&} 1	35 4	4727?		4064?		
664 ^{&} 1	25 4	3751?		3087.5	35/2 ⁻	
^x 666.7	61 16					

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(HI,xn γ) 1990Ba29,1991Ka05 (continued) $\gamma(^{173}\text{Os})$ (continued)

E_γ	I_γ †	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. ‡
667 & 1	48 5	4418?		3751?		
668.2 1	120 6	4618.6	45/2 ⁻	3950.4	41/2 ⁻	E2
^x 674.3	32 8					
675 & 1	44 4	3444?		2769.3	33/2 ⁻	
^x 683.1	38 9					
684 & 1	53 5	2919?		2235.1	29/2 ⁻	
688.4 1	47 6	5023.6	47/2 ⁻	4335.2	43/2 ⁻	
689.2 1	200 15	4305.4+x	45/2 ⁺	3616.2+x	41/2 ⁺	E2
697.3 1	63 4	5315.9	49/2 ⁻	4618.6	45/2 ⁻	(E2)
701 1	35 6	5725	51/2 ⁻	5023.6	47/2 ⁻	E2
702.7 1	40 4	6018.6	53/2 ⁻	5315.9	49/2 ⁻	
706.9 1	65 7	4243.8+x	43/2 ⁺	3536.9+x	39/2 ⁺	(E2) @
711 1	26 4	6436	55/2 ⁻	5725	51/2 ⁻	
730 1	20 3	7166	59/2 ⁻	6436	55/2 ⁻	
735 1	17 2	6754	57/2 ⁻	6018.6	53/2 ⁻	
736.8 1	100 9	5042.2+x	49/2 ⁺	4305.4+x	45/2 ⁺	E2
750.8 1	40 6	4994.6+x	47/2 ⁺	4243.8+x	43/2 ⁺	(E2)
782.6 1	51 7	5824.8+x	53/2 ⁺	5042.2+x	49/2 ⁺	
787 1		7541	61/2 ⁻	6754	57/2 ⁻	
787.5 5	18 5	5782.1+x	51/2 ⁺	4994.6+x	47/2 ⁺	
820 1	40 6	6645+x	57/2 ⁺	5824.8+x	53/2 ⁺	(E2)
823 1	15 5	6605+x	55/2 ⁺	5782.1+x	51/2 ⁺	
851 1	20 8	7496+x	61/2 ⁺	6645+x	57/2 ⁺	

† From coincidence spectra (1991Ka05); arbitrary units relative to $I_\gamma(390.2\gamma)=1000$ 30.

‡ From γ -ray angular distributions and DCO ratios (1991Ka05), except where noted. Stretched E2 assignments were based on DCO ratios close to 1 or A_2 positive, and dipole, on DCO ratios close to 0.5 or A_2 negative. M1, rather than dipole, assigned from position relative to cascading E2 γ 's.

Placement and E_γ from 1990Ba29.

@ From 1990Ba29.

& Placement of transition in the level scheme is uncertain.

^x γ ray not placed in level scheme.

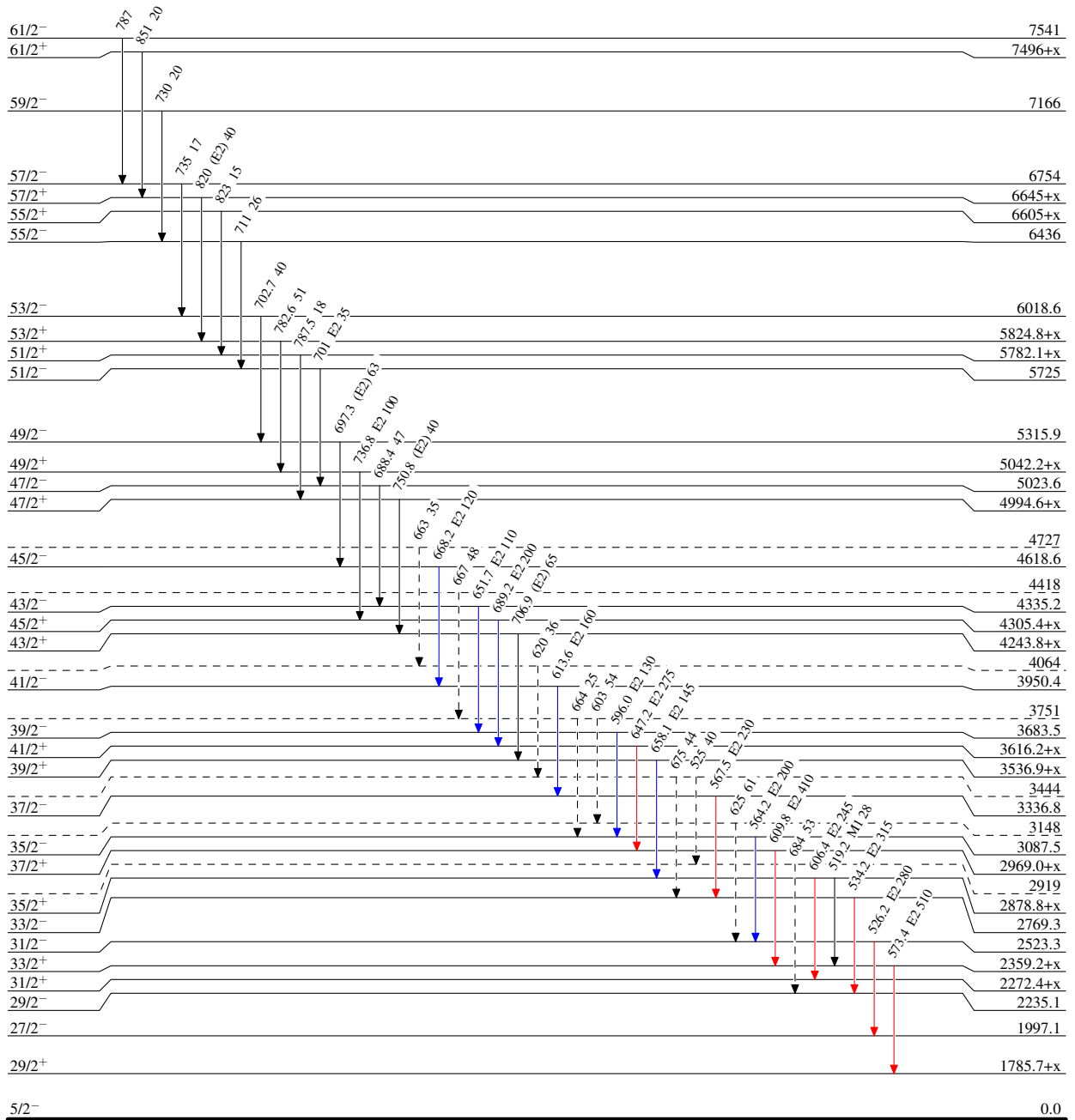
(HI,xn γ) 1990Ba29,1991Ka05

Legend

Level Scheme

Intensities: Relative I_γ for $^{146}\text{Nd}(^{32}\text{S},5n)$, $E(^{32}\text{S})=166$ MeV

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- - - - γ Decay (Uncertain)



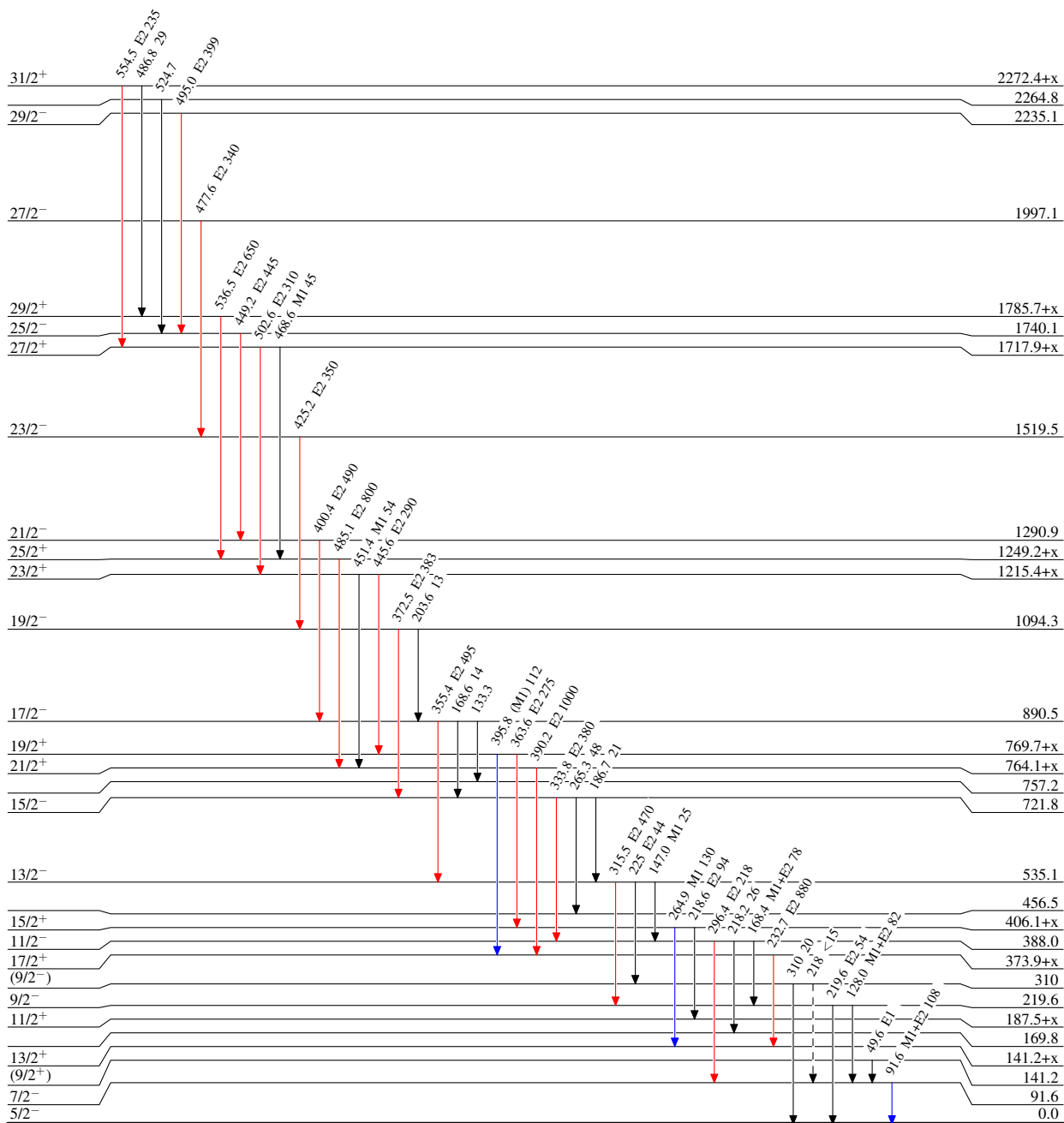
(HI,xn γ) 1990Ba29,1991Ka05

Level Scheme (continued)

Intensities: Relative I_{γ} for $^{146}\text{Nd}(^{32}\text{S},\text{n}), E(^{32}\text{S})=166$ MeV

Legend

- $I_{\gamma} < 2\% \times I_{\gamma}^{\text{max}}$
- $I_{\gamma} < 10\% \times I_{\gamma}^{\text{max}}$
- $I_{\gamma} > 10\% \times I_{\gamma}^{\text{max}}$
- - - - γ Decay (Uncertain)



$^{173}_{76}\text{Os}_{97}$