New NDS production code in JAVA

- Code writing:

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  Scott Geraedts (2008-2010)
  Jeremie Choquette (2010-)

Overall guidance: B. Singh

Comments/Reviews: J.K. Tuli, M. Blennau, C.M. Baglin

Background

- 2007-2008: band drawing code for NDS
- Incorporated in NDS journal Oct 2008
- Currently used in about 75% of the published A chains in NDS
- 2008-2010: continued development of band drawing code for complete tables and drawings.
- October 2010: new JAVA code ready to produce a complete copy of NDS publication with all the details. Example displayed at USNDP-2010.

Aims of the new code

- Immediate: an independent new code to produce tables and drawings almost in the same style/format as current NDS.
- Future:

  - evaluators can use this code on their computers (windows, linux or Mac) to produce an NDS copy which can be sent directly sent for review (thereby removing the pre-review versions). The output of this code is much better than that produced by ENSDAT code
  - flexibility and ease of access when making changes to incorporate new ideas or suggestions
  - long-term maintenance of this program should not be time-intensive
  - The program is built to be clear and easy to edit

The workings of the code

- The program (in JAVA) loads an ENSDF-formatted data file for either a complete mass chain or a set of dataset and a control file
- The control file dictates layout and formatting, as well as which datasets, tables and drawings are to be included
- The program generates an output file in LaTeX (drawings in metapost)
- The LaTeX file is converted to PDF format

^{182}Lu β^- decay (2.0 min) 1982Ki04

Parent: ^{182}Lu: E=0.0; $T_{1/2}$=2.0 min *2*; Q=4180 *SY*; %β^-=100
Q(g.s.): 4180 *200* (syst,2003Au03).
^{182}Lu produced by bombardment of natural tungsten and tantalum targets with ^{136}Xe beam at 9 MeV/nucleon.

^{182}Hf Levels

E(level)	J^π†
0.0	0+
97.77 *20*	2+
321.8 *6*	(4+)
818.4 *4*	(1,2+)
905.9 *6*	

† From Adopted Levels.

$\gamma(^{182}Hf)$

E_γ	E_i^{level}	J_i^π	E_f^{level}	J_f^π	I_γ†	Mult.	α	Comments
97.8 *2*	97.77	2+	0.0	0+	50 *10*	E2	3.85 *7*	Mult.: from Adopted Gammas.
224.0 *5*	321.8	(4+)	97.77	2+	15 *7*	[E2]	0.198 *4*	
720.8 *5*	818.4	(1,2+)	97.77	2+	100 *10*			
808.1 *5*	905.9		97.77	2+	50 *15*			
818.2 *5*	818.4	(1,2+)	0.0	0+	100 *25*			

† For absolute intensity per 100 decays, multiply by 0.30 *3*

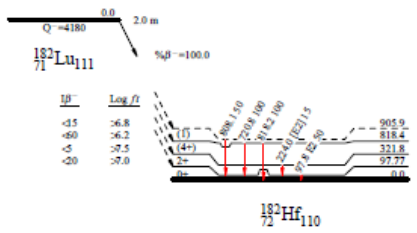
β^- radiations

$E\beta^-$	E(level)	$I\beta^-$†	Log *ft*
(3.3E+3)	905.9	<15	>6.8
(3.4E+3)	818.4	<60	>6.2
(3.9E+3)	321.8	<5	>7.5
(4.1E+3)	97.77	<20	>7.0

† Only the upper limits can be deduced since there is no knowledge of β feeding to g.s., and there is a large energy gap of ≈ 3.3 MeV between $Q(\beta^-)$ and the highest level at 906 keV.

Decay Scheme

Intensities: Relative I_γ

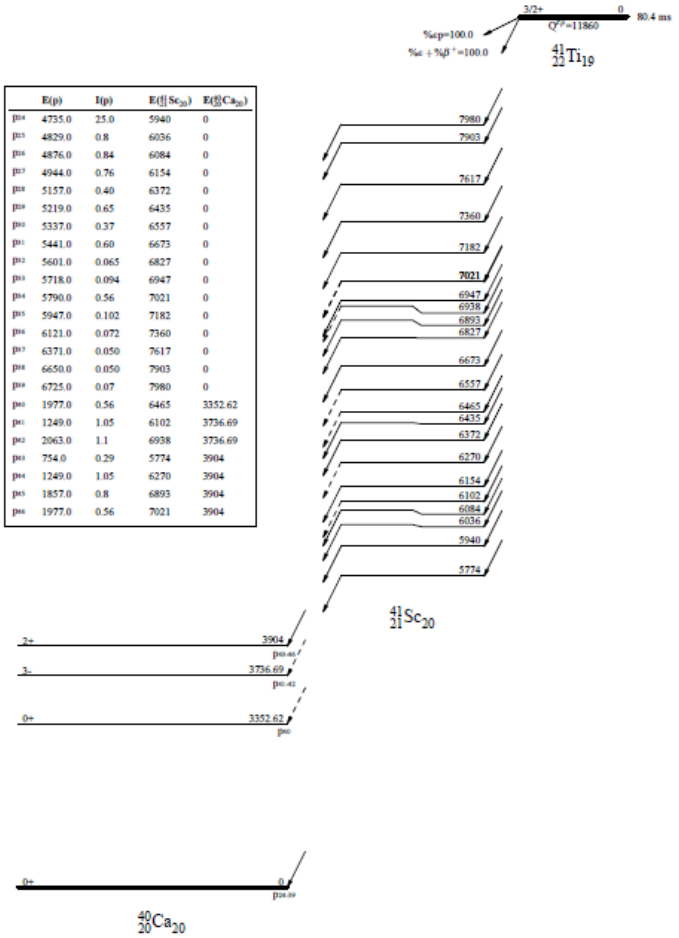


$\gamma(^{182}W)$ (continued)

E_i^{level}	J_i^π	E_f^{level}	J_f^π	E_γ†	I_γ†	Mult.‡	δ‡	α	$I_{(\gamma+ce)}$	Comments
		2273.87	9-	437.1 *1*	100 *18*	Q				
2730.85	(10-)	2455.74	(9-)	275.1 *1*	100 *14*	(D+Q)				
		2204.54	(8)-	526.2 *10*	<14					
2739.15	(10-)	2225.35	(8-)	513.8 *1*	100	Q				
2741.66	(11-)	2301.56	(9-)	440.1 *1*	100 *18*	Q				
		2273.87	9-	467.7 *5*	35 *6*					
2769.26	(10+)	2479.83	(9+)	289.4 *1*	100	D+Q				
		2212.49	(8+)	557.6 *5*	39 *4*					
2775.63	(12+)	2492.76	(11+)	282.8 *1*	100	D+Q				
		2230.63	(10+)	545.1 *2*	18 *3*	Q				
2823.93	(11-)	2563.94	(10-)	260.0 *1*	100	D+Q				
		2327.91	(9-)	496.0 *5*	48 *5*					
2884.1	1	100.10597	2+	2784 *1*	40 *11*					
		0.0	0+	2884 *1*	100					
2892.1	(1)	100.10597	2+	2792 *1*	150 *90*					
		0.0	0+	2892 *1*	100					
2941.0	(1,2+)	0.0	0+	2941 *2*	100					
2972.49	12-	2710.93	11-	261.6 *2*	20 *5*					
		2486.89	10-	485.6 *1*	100 *20*	Q				
2980.58	(11-)	2445.98	(9-)	534.6 *1*	100	Q				
2981.33	(12-)	2507.48	(10-)	473.8 *1*	100 *19*					
		2486.89	10-	494.6 *2*	38 *6*					
2996.1	1	100.10597	2+	2896 *1*	168 *35*					
		0.0	0+	2996 *1*	100					
3027.96	(11-)	2730.85	(10-)	297.1 *1*	100	(D+Q)				
		2455.74	(9-)	575.2 *20*	24 *11*					
3078.23	(13+)	2775.63	(12+)	302.5 *1*	100	D+Q				Iγ(586γ)/Iγ(302)=1.6 *7* in (α,2nγ).
		2492.76	(11+)	585.8 *2*	47 *9*	Q				
3080.1	1	100.10597	2+	2980 *1*	61 *18*					
		0.0	0+	3080 *1*	100					
3106.72	(12-)	2823.93	(11-)	282.8 *1*	100	(D+Q)				
		2563.94	(10-)	542.5 *5*	53 *6*					
3112.87	14+	2372.57	12+	740.3 *1*	100	(E2)		0.00843		B(E2)(W.u.)=1.7×10^2 *5*. α(K)=0.00678 *10*. α(L)=0.001277 *18*. α(M)=0.000297 *5*. α(N)+=8.28×10^{-5} *12*. α(N)=7.10×10^{-5} *10*. α(O)=1.114×10^{-5} *16*. α(P)=6.29×10^{-7} *9*.
3163.1	1	100.10597	2+	3063 *1*	54 *12*					
		0.0	0+	3163 *1*	100					
3198.1	(1,2+)	100.10597	2+	3098 *1*	59 *21*					
		0.0	0+	3198 *1*	100					
3224.53	13-	2710.93	11-	513.6 *1*	100	Q				
3269.56	(13-)	2741.66	(11-)	527.9 *1*	100	Q				
3319.7	(12-)	2739.15	(10-)	580.6 *4*	100					
3343.06	(12-)	3027.96	(11-)	315.1 *1*	100 *14*	(D+Q)				
		2730.85	(10-)	612.6 *10*	43 *29*					
3365.1	1	100.10597	2+	3265 *1*	63 *17*					
		0.0	0+	3365 *1*	100					
3398.33	(14+)	3078.23	(13+)	320.0 *1*	100	D+Q				
		2775.63	(12+)	622.7 *1*	61 *18*	Q				
3410.54	(13-)	3106.72	(12-)	303.8 *1*	100 *13*					
		2823.93	(11-)	586.8 *5*	88 *13*					
3415.90	(12)	2492.76	(11+)	923.1 *1*	100	D+Q				
3422.1	(1,2+)	100.10597	2+	3322 *1*	53 *15*					
		0.0	0+	3422 *1*	100					
3518.04	(14-)	2981.33	(12-)	536.7 *1*	100 *20*					
		2972.49	12-	545.7 *5*	40 *10*					
3549.99	14-	2981.33	(12-)	568.6 *10*	<22					
		2972.49	12-	577.5 *1*	100 *22*	Q				

Continued on next page (footnotes at end of table)

Decay Scheme (continued)



	E(p)	I(p)	E(⁴¹Sc$_{20}$)	E(⁴⁰Ca$_{20}$)
p^{14}	4735.0	25.0	5940	0
p^{15}	4829.0	0.8	6036	0
p^{16}	4876.0	0.84	6084	0
p^{17}	4944.0	0.76	6154	0
p^{18}	5157.0	0.40	6372	0
p^{19}	5219.0	0.65	6435	0
p^{20}	5337.0	0.37	6557	0
p^{21}	5441.0	0.60	6673	0
p^{22}	5601.0	0.065	6827	0
p^{23}	5718.0	0.094	6947	0
p^{24}	5790.0	0.56	7021	0
p^{25}	5947.0	0.102	7182	0
p^{26}	6121.0	0.072	7360	0
p^{27}	6371.0	0.050	7617	0
p^{28}	6650.0	0.050	7903	0
p^{29}	6725.0	0.07	7980	0
p^{0}	1977.0	0.56	6465	3352.62
p^{1}	1249.0	1.05	6102	3736.69
p^{2}	2063.0	1.1	6938	3736.69
p^{3}	754.0	0.29	5774	3904
p^{4}	1249.0	1.05	6270	3904
p^{5}	1857.0	0.8	6893	3904
p^{6}	1977.0	0.56	7021	3904

Further plan

- Goal is to have the program completed by mid summer 2011
- During May and June 2011, Jeremie Choquette is scheduled to work closely at NNDC on the final version of the code
- By July 2011 or so , this code will be handed over to NNDC
- Examples of two full A chains are available.