Evaluated nuclear Structure Data Base

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ENSDF

- Source For
  - Table of Isotopes
    - Nuclear Data Sheets
    - Nuclear Wallet Cards
    - NUDAT
- Update – continuous
- Distributed – six monthly

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ENSDF Content

- Collection of Data Sets by A and Z

  Abstract (Comments)

  Adopted Levels, Gammas

  Experimental Data Sets
  -Radiactive Decay
  -Nuclear Reactions

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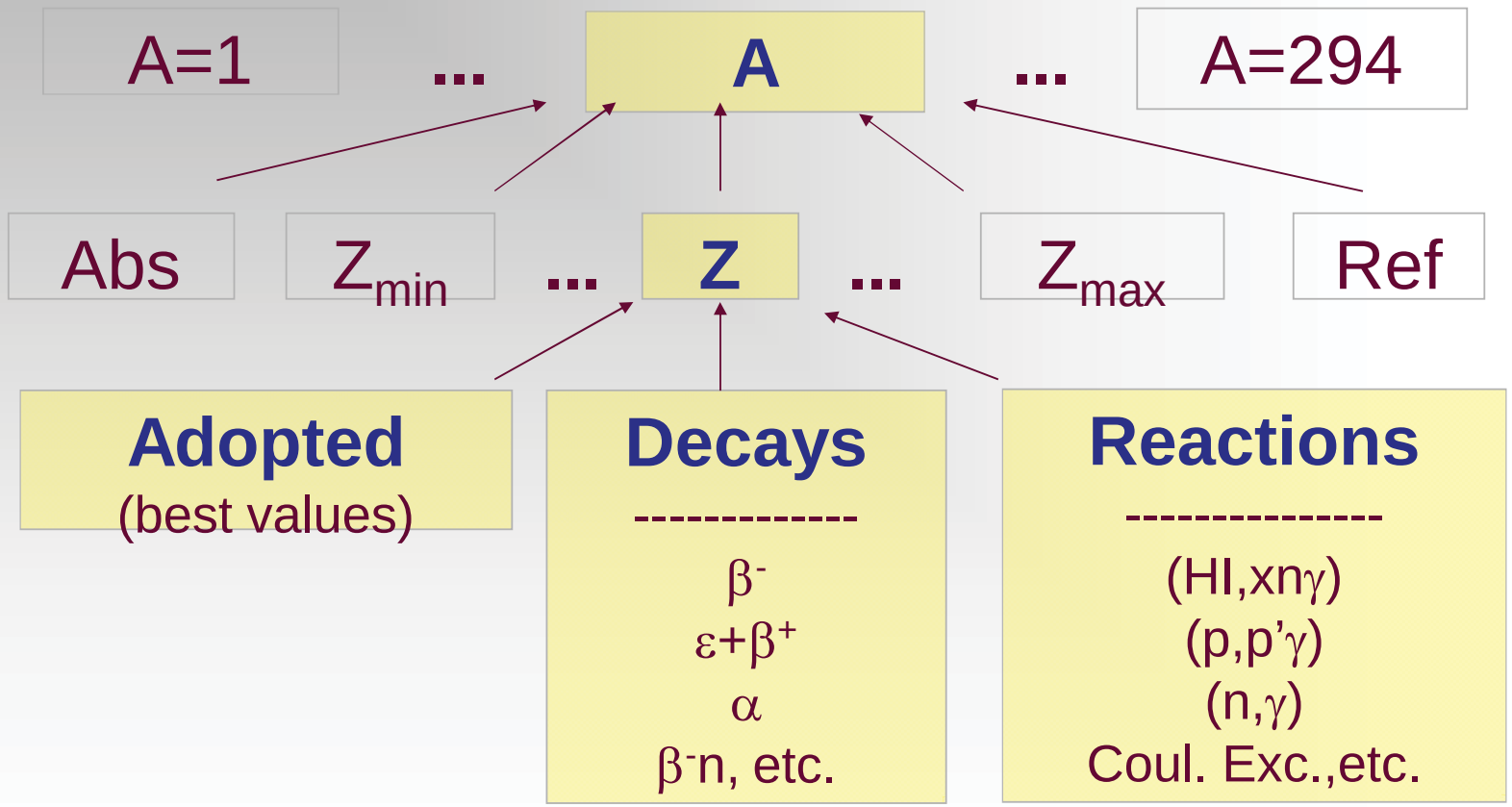
ENSDF Schematic



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Purpose/Philosopy

- Present set of critically evaluated properties of nuclides based on best known experimental information to date
- Present best data available for each type of experiment
- Present best info for each nuclide
- Concise, consistent, and well-documented

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General

- Evaluated results of a single experiment or combined results of a number of experiments yielding basically the same kind of information, e.g., (HI,xng), or Coulomb Excitations. The collection is called a Data Set.
- The adopted Properties of the nucleus.

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Minimum Standards

- A-Chain completeness – All nuclides
- Nuclide Completeness – All data sets
- Data Set Completeness – ID to END record

  Decay Data Sets: Parent record

  Adopted sets: Q record

  etc.

  Uncertainty, units, documentation

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Physical Properties

- Adopted Properties

  General – Q, History, XREF, Comments

  Levels-E,Jpi,T1/2,branching,static mom

  Gammas-E,branching,mult,cc,BLW

- Decay Properties
- Nuclear Reaction Properties

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GS Properties

- Q(beta-)
- N-Separation Energy
- P-Separation Energy
- Alpha-Decay Q value
- Half-life
- Spin-parity
- Decay Modes
- Static Moments

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Level Properties

- Spin-parity
- Half-life
- Angular Momentum transfer
- Spectroscopic Factor
- Decay braching
- Static Moments
- Configuration
- Experiments in which level is seen

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Level Properties –Special Cases

- Configuration assignments
- Band Assignments
- Isomer Shifts, isotope shifts
- Charge distribution of gs, often only a reference
- Deformation parameters of gs (model dependent)
- Excitation Probabilities (BEL, BML) when the T1/2 and gs branching are not known

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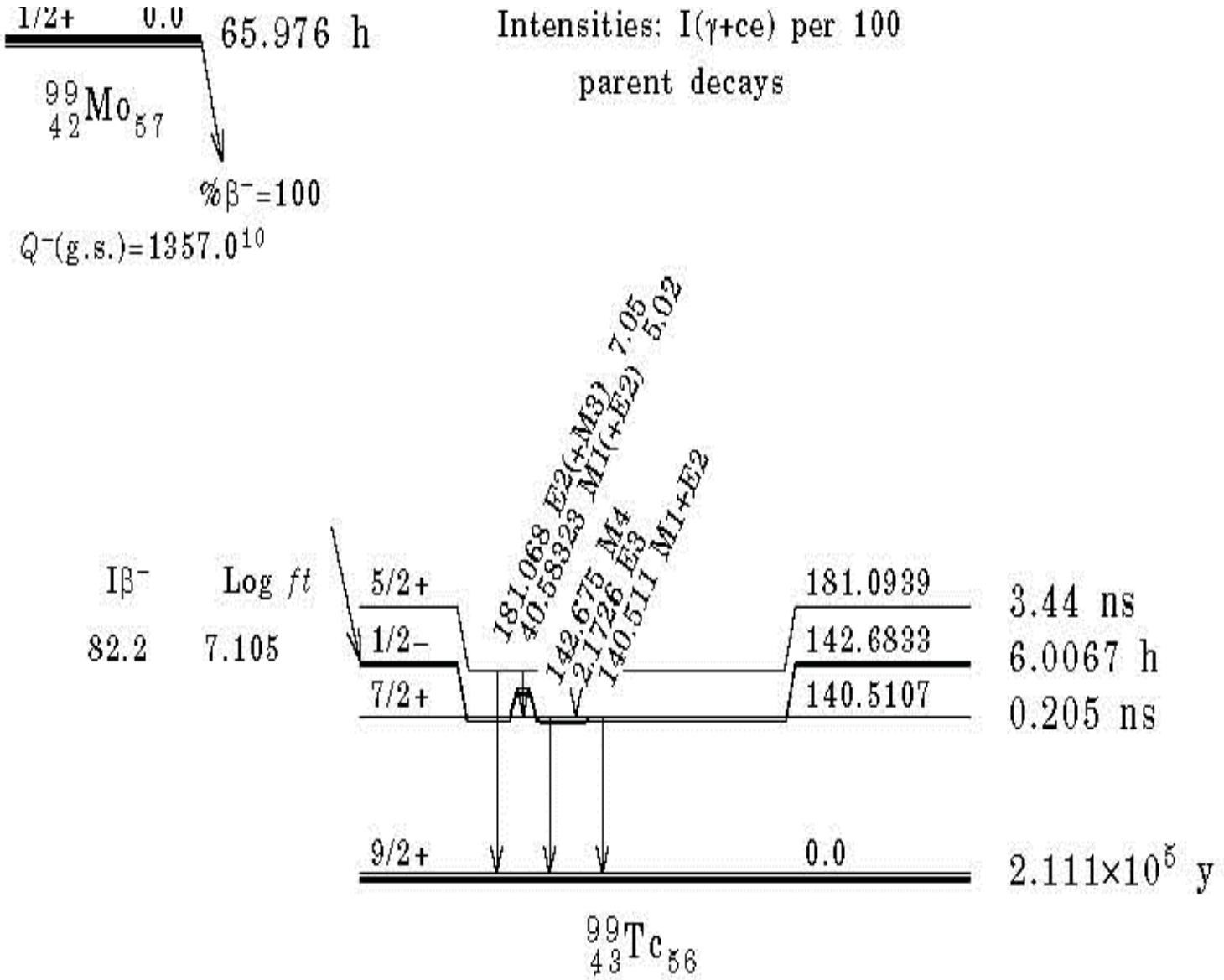
Radiation Properties

- Placement in level scheme
- Energy
- Intensity –Relative and Absolute through Normalization. Per 100 decay modes for Alphas.

  Transition Intensity. EC, B+ decay (theory).

  Partial EC probabilities.
- Multipolarity and Mixing Ratios
- Total internal Conversion Coefficients
- Logft values/ Hindrance Factors
- Reduced Transition Probability-down –W.u.



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```
99TC    99MO B- DECAY                1992GO22                11NDS    201102
99TC c  Measured: |g (1992Go22,1990Me15,1978MeZK); |g, |g|g, |g|g(|q)
99TC2c  (1982Si16); |g, |g|g (1969Co18); |g, |g|g (1968Va14); |g (1980Di16);
99TC cG          The large discrepancies of the measurements of |g|g(|q)
99TC2cG involving the 181 level
99TC cG E        From 1990Me15 and 1978MeZK, if not indicated otherwise.
99TC cG RI       From 1992Go22, if not indicated otherwise
99TC cG RI(A)    From 1990Me15
99TC cG M        From |g|g(|q) and |a(K)exp, if not noted otherwise.
99TC cL J        Adopted values
99MO  P 0          1/2+             65.976 H  24           1357.0    10
99TC  N 0.1226    18          1.0       1.0
99TC  G 89.4      2 0.025   17
99TC  G 455.84    130.011   5                                    A
99TC  G 490.53    150.009   3                                    A
99TC  G   581.30  120.008   4
99TC  G 599.6     5 0.017   8
99TC  L       0    9/2+              2.111E+5 Y12
99TC  L 140.5107  107/2+             0.205 NS  4
99TC  G 140.511   1          M1+E2     +0.129  35    0.113  3
99TC  L 142.6833  111/2-             6.0067 H  5                  M
99TC  B           82.2    5           7.105  3
99TC  G 2.1726    4          E3                 1.37E+1
99TC  G 142.675   25         M4                   40.2
99TC  L 181.0939  105/2+             3.44 NS   3
99TC  G 40.58323  178.68    27M1(+E2)   +0.008  8     3.72
99TC  G 181.068   8 50.1    7 E2(+M3)   -0.002  7     0.1480
```

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Record Types

ID	LEVEL
History	BETA
XREF	EC
Comments	ALPHA
Q-value	PARTICLE
Parent	GAMMA
Normalization	END

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Identification Record

Required for all data sets.Must precede all other records.

Field (Col.)	Name
1-5	NUCID
10-39	DSID
40-65	DSREF
66-74	PUB
75-80	DATE (year/month)

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The History Record

Field (Col.)	Name
1-5	NUCID
6	Blank
7	Blank
8	H
9	Blank
10-80	History

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The Q-value Record

Field (Col.)	Name		
1-5	NUCID		
8	Q	Letter ‘Q’ is required	
10-19	Q^-	20-21	DQ^-
22-29	SN	30-31	DSN
32-39	SP	40-41	DSP
42-49	QA	50-55	DQA
56-80	QREF		

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The Cross-Reference Record

Field (Col.)	Name	
1-5	NUCID	
8	X	Letter ‘X’ is required
9	DSSYM	Any ASCII character
10-39	DSID	*Must* exactly match one of ID’s

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The Comment Record

Field (Col.)	Name	
1-5	NUCID	
7	Letter ‘C’, ‘D’, or ‘T’ is required	
8	RTYPE	Blank or record type
9	PSYM	Blank, or symbol
10-80	CTEXT	Text of the comment.

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The Parent Record

Field	Name	
1-5	NUCID	
8	P (required)	
9	Blank or integer	
10-19	E Energy	20-21 DE
22-39	JPI	
40-49	T	50-55 DT
65-74	QP	75-76 DQP
77-80	Ionization State	

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The Normalization Record

Field	Name	
8	N (required)	
10-19	NR	20-21 DNR
22-29	NT	30-31 DNT
32-39	BR	40-41 DBR
42-49	NB	50-55 DNB
56-62	NP	63-64 DNP

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The Prod Normalization Record

Field	Name	
8	N (required)	
10-19	NR*BR	20-21 DNR
22-29	NT*BR	30-31 DNT
42-49	NB*BR	50-55 DNB
56-62	NP	63-64 DNP
77	Blank or C	78 Opt (1-7)

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The Level Record

Field	Name	
1-5	NUCID	
8	L (required)	
10-19	E Energy	20-21 DE
22-39	JPI	
40-49	T	50-55 DT
56-64	L (angular momentum transfer)	
65-74	S	75-76 DS
77	Flag	78-79 MS
80	Q	

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The Beta Record

Field	Name		
1-5	NUCID		
8	B (required)		
10-19	E Energy	20-21	DE
22-29	IB Intensity	30-31	DIB
42-49	Logft	50-55	DFT
77	Flag		
78-79	Forbiddenness	80	Q

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The EC Record

Field	Name			
1-5	NUCID			
8	E (required)			
10-19	E Energy	20-21	DE	
22-29	IB Intensity	30-31	DIB	
32-39	IE Intensity	40-41	DIE	
42-49	Logft	50-55	DFT	
65-74	TI	75-76	DTI	77 Flag
78-79	Forbiddenness	80	Q	

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The Alpha Record

Field	Name	
1-5	NUCID	
8	A (required)	
10-19	E Energy	20-21 DE
22-29	IA Intensity	30-31 DIA
32-39	HF	40-41 DHF
77	Flag	
80	Q	

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The Gamma Record

Field	Name			
8	G (required)			
10-19	E Energy	20-21 DE		
22-29	RI rel Intensity	30-31 DRI		
32-41	M multipolarity			
42-49	MR mix ratio	50-55 DMR		
56-62	CC total CC	63-64 DCC		
65-74	TI	75-76 DTI		
77	Flag	78 COIN	80	Q

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The (Delayed-) Particle Record

Field	Name		
8	D (for delayed)	9	particle (N,P,..)
10-19	E Energy	20-21	DE
22-29	IP % Intensity	30-31	DIP
32-39	EI lev en intermediate nucleus		
40-49	T Width	50-55	DT
56-64	L angular momentum transfer		
77	Flag	78 COIN	80 Q

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Guidelines-extraction of data

- Quote authors' measured quantities
- Document any deviations
- Note authors' assumptions
- Check for missed references
- Check authors' quoted older values

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Guidelines-presentation of data-1

- Order of Comments
- E= not needed for reaction
- Target JPI should be given
- Keyno: measured, etc.
- Do not combine different kind of data sets
- Specify source of data

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Guidelines-presentation-2

- Gammas order by increasing Eg
- Significant digits
- Uncertainty limited to 25
- Multiplets
- Xsection,Analyzing-power not given
- BEL up for levels, down for gammas
- Delayed gammas-give as IT decay

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Guidelines-presentation-3

- Normalization condition should be given
- Parent record, all fields should be given
- Replace `/' by `:' for multiple ratios
- Unresolved discrepancies should be pointed out
- Uncertainty not error
- E(ec),E(b-) only when accurate, measured

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Guideline-presentation-4

- APS style adopted
- Accepted abbreviations
- Key no. is plural. Space after `,’

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