Horizontal Evaluations

Addendum to Atlas of Nuclear Isomers

Table of MR and AMR bands

Alphad and radius parameters

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With inputs from Swati, Bhoomika, Balraj

Atlas of Nuclear Isomers

ATLAS OF NUCLEAR ISOMERS

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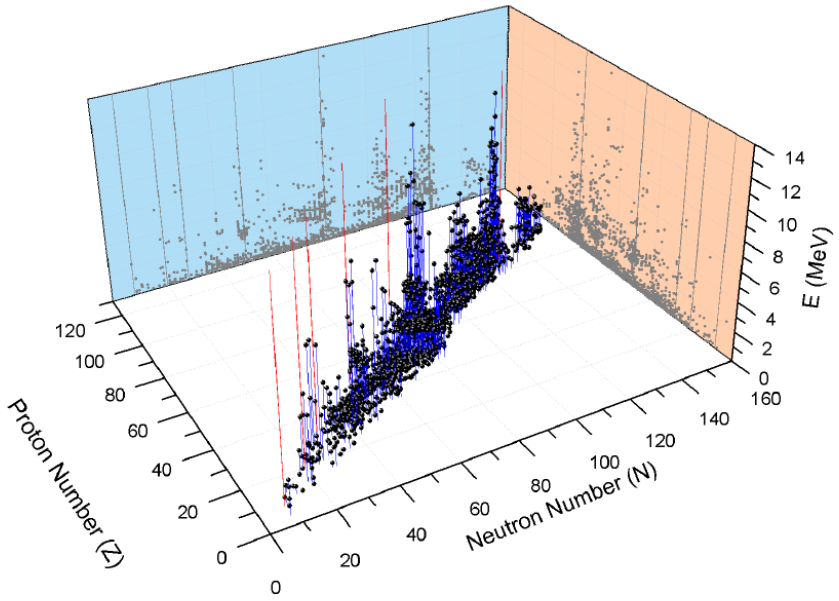

Nuclear Data Sheets, 128 (2015) 1-130

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An Update is under progress – almost done.

Addendum to “Atlas Of Nuclear Isomers-2015”

- We have found 31 new isomers reported since 15 Aug. 2015
- Data of about 40 known isomers has been updated or, corrected.
- A complete search of literature is underway.
- A comparison with NUBASE is yet to be made.
- Most of the new isomers seen lie in heavy mass region reflecting a huge interest in heavier nuclei.
- With more and more short-lived isomers being found, should we lower the limit of 10 ns set by us?

TABLE I

Z	N	^{A}X	E(keV)	J^{π}	$T_{1/2}$	Eγ(keV)	λ	Decay mode	Key No.
12	19	^{31}Mg	50.1 (2)	3/2+	11.9(6) *ns*	50.2(2)	M1	%IT = 100	1993KL02 2005MA96 2017NI02
13	21	^{34}Al	46.6	1+	26(1) *ms*			%β− ≈ 100	2012RO25 2017LI03
21	21	^{42}Sc	616.762 (46)	7+	61.7(4) *s*			%ε+%β+ = 100	2016CH23 2017ER01
27	25	^{52}Co	387 (13)	2+	102(6) *ms*			%ε+%β+ ≈ 100	2016OR08 2016XU10
25	33	^{58}Mn	71.77 (5)	4+	65.4(5) *s*	71.78(5)	M3	%β− ≈ 90 %IT ≈ 10	2010NE01 2015HE28
25	35	^{60}Mn	271.80 (10)	4+	1.77(2) *s*	271.9(1)	M3	%β− = 88.5(8) %IT = 11.5(8)	1985RU05 1988BO06 2006LI15 2015HE28
25	37	^{62}Mn	346 (8)	4(+)	671(5) *ms*			%β− = 100	1999HA05 2010CH51 2015HE28 2015GA38
30	37	^{67}Zn	93.312 (5)	1/2−	9.142(24) *μs*	93.311(5)	E2	%IT = 100	2005HU18 2014DI03 2015CH57
27	45	^{72}Co†	0+X 0+Y	(6−,7−) (0+,1+)	51.5(3) *ms* 47.8(5) *ms*			%β− = 100 %β−n ≥ 4 %β−2n > 0.0 %β−n ≥ 6(2) Decay modes as above are common to both	2005MA95 2014XU07 2014RA20 2016MO07 2016MO07 2005MA95

Summary of Newly appeared MR Bands

31 nuclides having 41 new MR bands with 215 levels

S.No.	Nuclide	Number of Bands	Number of levels	NSR Keynumber
1	^{58}Fe	02	Band 1: 05 Band 2: 08	2012ST06
2	^{60}Ni	04	Band 1: 07 Band 2: 05 Band 3: 07 Band 4: 06	2008TO15
3	^{61}Co	01	08	2015AY02
4	^{85}Sr	01	06	2017KU04 2014Ku19
5	^{86}Sr	01	08	2017KU04 2015Zh18
6	^{86}Y	01	06	2013Li33
7	^{105}Ag	02	Band 1: 08 Band 2: 10	2006De15
8	^{106}Ag	01	10	2010HE05 2006De15
9	^{107}Ag	02	Band 1: 09 Band 2: 07	2014Ya02
10	^{107}Cd	01	11	2015Ch05
11	^{107}In	01	10	2010NE05
12	^{109}In	01	07	2012Ne03
13	^{114}In	01	06	2012Li38
14	^{135}Ba	02	Band 1: 04 Band 2: 08	2010KU15
15	^{133}La	01	09	2016PE21

S.No.	Nuclide	Number of Bands	Number of levels	NSR Keynumber
16	^{134}La	01	11	2007KU13
17	^{135}La	02	Band 1: 06 Band 2: 07	2013GA11
18	^{138}Ce	01	08	2009Bh04
19	^{139}Ce	01	07	2015Ka06
20	^{135}Pr	02	09 08	2015Ga39 2015Ma13
21	^{141}Sm	01	06	2016Ra33
22	^{142}Sm	01	07	2014Ra03
23	^{143}Eu	02	Band 1: 06 Band 2: 07	2014Ra18
24	^{144}Tb	01	10	2014Ch22
25	^{144}Dy	01	09	2009Su09 2010Pr04
26	^{166}Re	01	10	2016Li13
27	^{194}Tl	01	06	2012Pa16
28	^{189}Pb	01	07	2015Ho14 2009Dr03
29	^{201}At	01	08	2015Au01
30	^{204}At	01	08	2008Ha39
31	^{206}Fr	01	10	2008Ha39

FUTURE PLANS: MR BANDS

- Regular updation of table of MR bands
- Table of AMR Bands and its regular updation

Updation of even-even radius parameter

- Updates presented /will be presented by Dr. B. Singh

FUTURE PLANS

- Regular Updates of even-even radius parameters

- A comprehensive evaluation of alpha hindrance factors of even-even, odd-A and odd-odd nuclides.

The calculated alpha hindrance factors is a crucial parameter for deciding J^{π} and nucleonic configuration assignments to the states involved in favored alpha transitions. Thus, this horizontal evaluation will be very **useful for fixing spin, parity and configuration assignments.**

- This evaluation of hindrance factors will also reflect the validity of alpha hindrance factors rules proposed 45 years ago [Y.A.Ellis and M. R. Schmorak, Nuclear Data Sheets B 8 (1972) 345]

• **Updates of revised ALPHAD, RadD presented/will be presented by Dr. B. Singh**

FUTURE PLAN

Deduction of B(M1)/B(E2) ratios from experimental data

Development of a program based on rotational model formulae for deduction of B(M1)/B(E2), which will be useful particularly for the data sets where I_g and E_g are given and B(M1)/B(E2) values are not given in literature but could be deduced using these I_g and E_g. These deduced B(M1)/B(E2) ratios will be automatically written in ENSDF file at appropriate place . A preliminary algorithm for this code has been developed and being tested for 2qp and 3qp states.