Survey of Half life and spin-parity parity values measured

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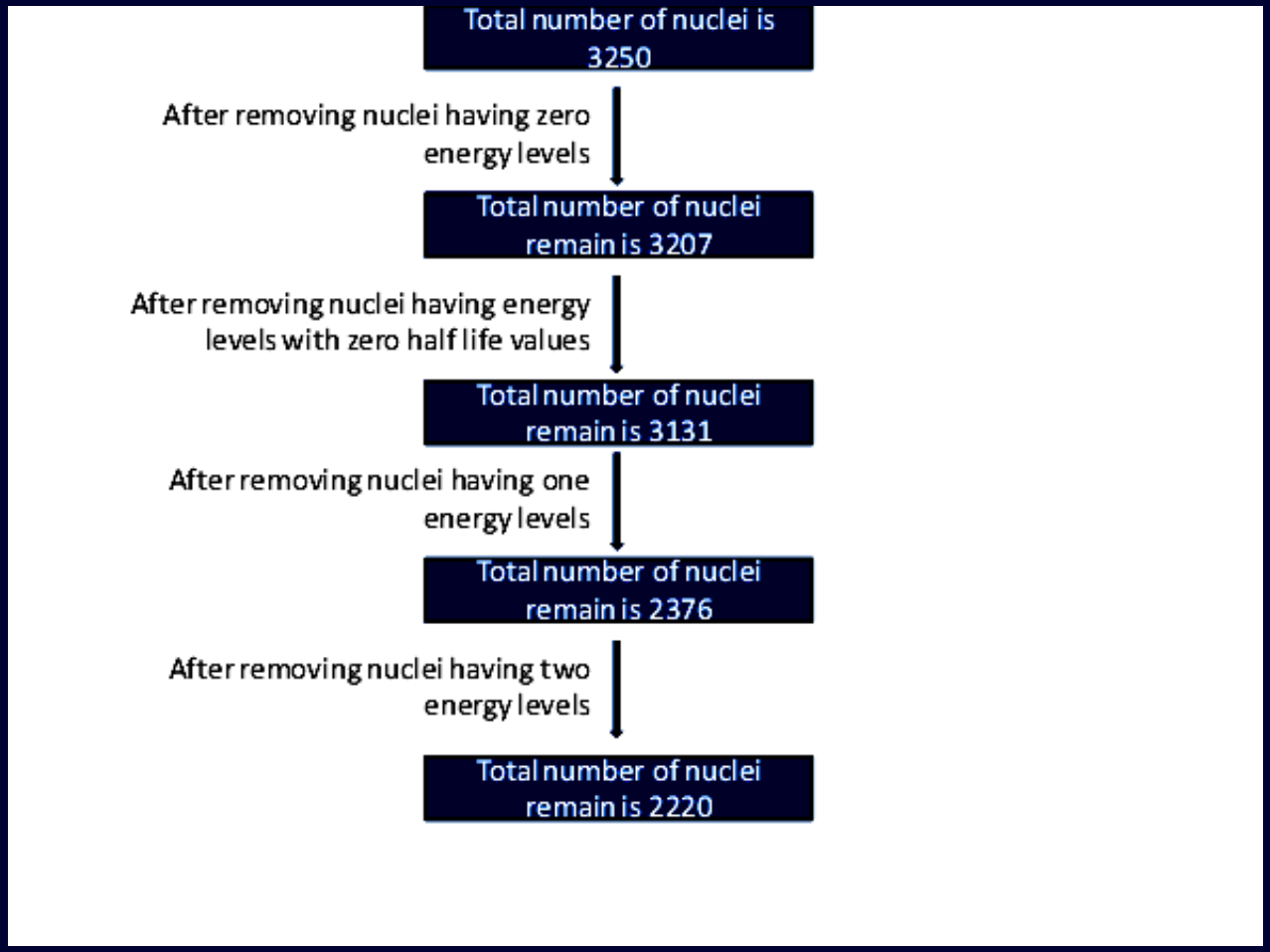
Significance of half-life and spin-parity information is all well established in Nuclear research

Do we have sufficient information?

Full Nuclear Chart (A ≤ 260)



Define P value

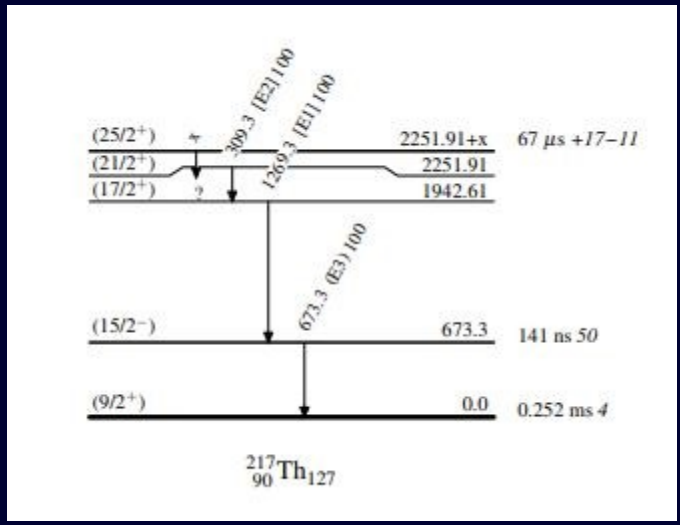
P= Number of levels whose half life is measured x 100
Total number of levels measured/observed in that nuclei

If a nuclei has 137 energy levels and if 17 out of those have their Half life values measured P = 17 x 100/137 = 12.4

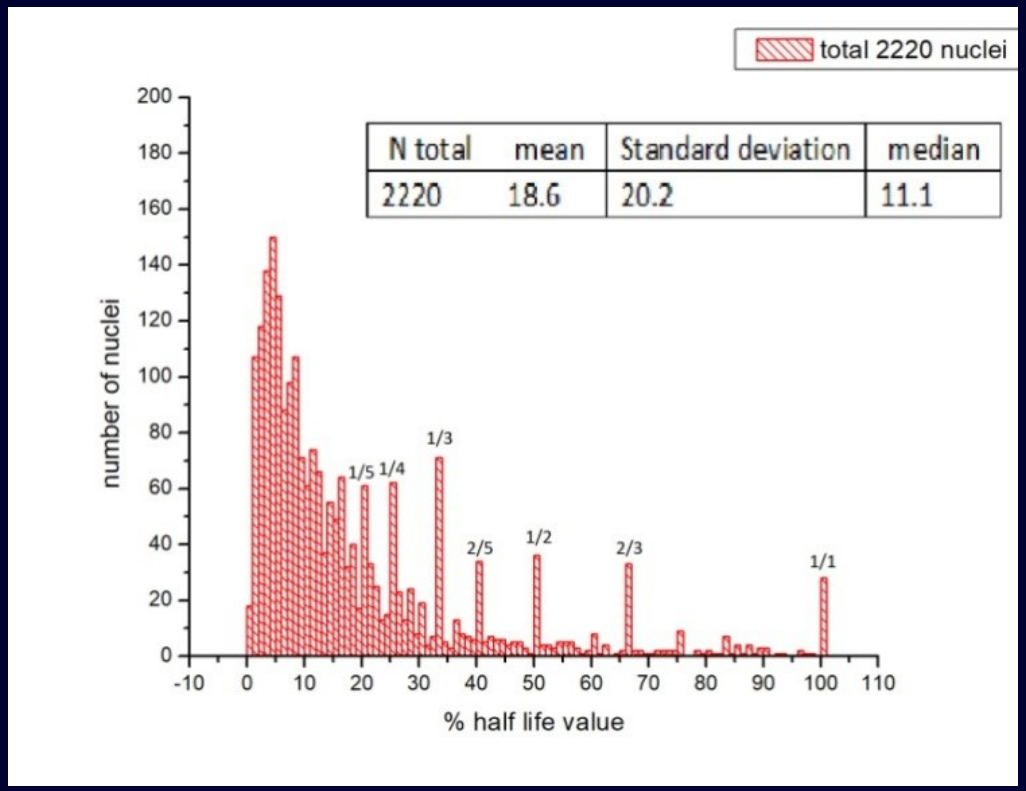
For nuclei with very few levels the P values are kind of discrete.

Eg for nuclei which has only 5 levels the P values can be 20, 40 etc

But nuclei where large number of energy levels are known the values can be in decimal numbers.



P=60.0



For all the nuclei : median of P at 11.1

It means: for 50 percent of nuclei less than 11 % levels have their half life values measured.

Peak of this distribution at **P=4**

If the spikes are “removed” the median is at mere 9.4% !!

Cases with P=absolute 0

There are 76 nuclei with NO half life value for any energy level

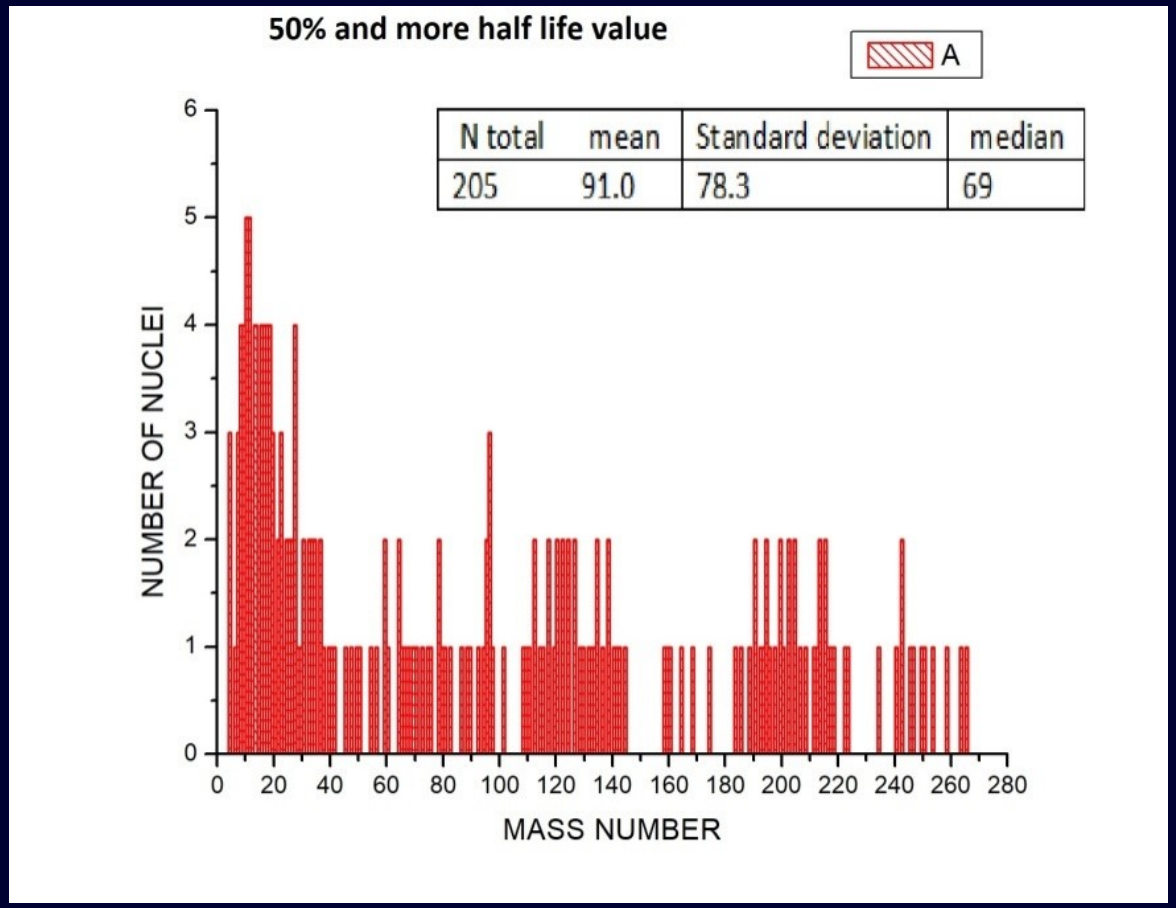
In 65 (out of 76) only ground state is observed

In 8 nuclei there is only GS + 1 excited state

In ^{170}D y and ^{239}Bk There is GS + 2 excited states

In 122Ce there is GS + 7 excited states.

P ≥ 50

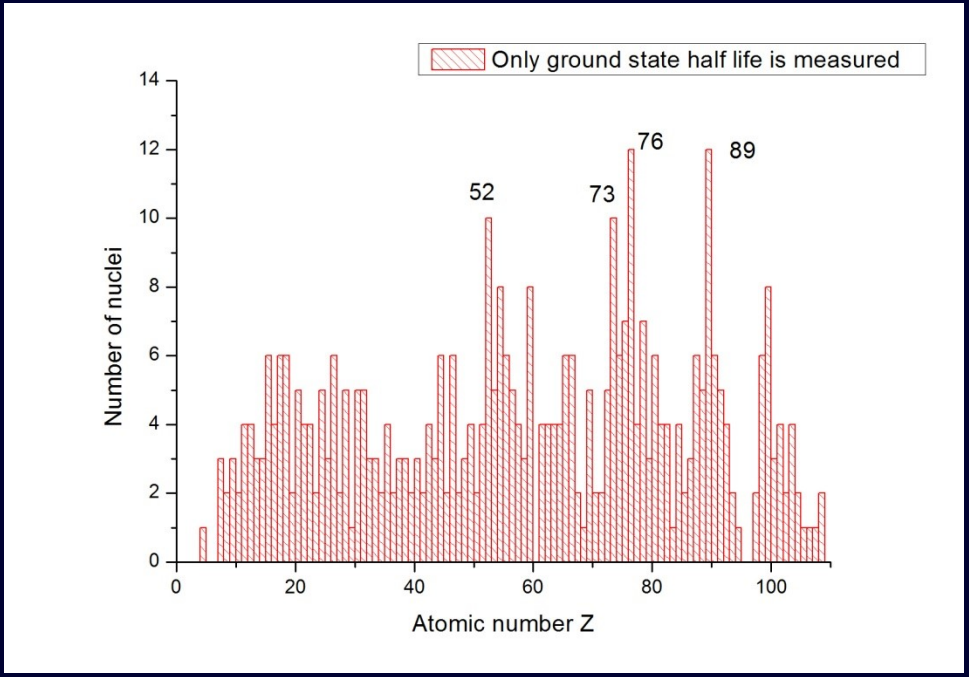


Gaps at A = 100, 150,180,230

Large concentration around low A values and A=120

403 nuclei who have only ground state half-life known.

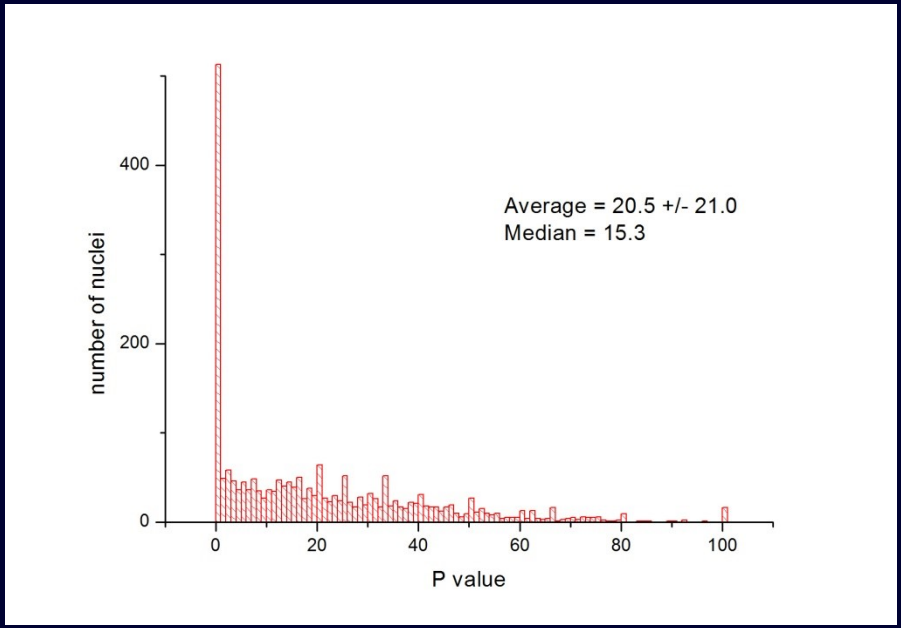
Out of 403 , 227 of them have more than 10 levels observed.



Spin (&Parity) data on nuclear chart.

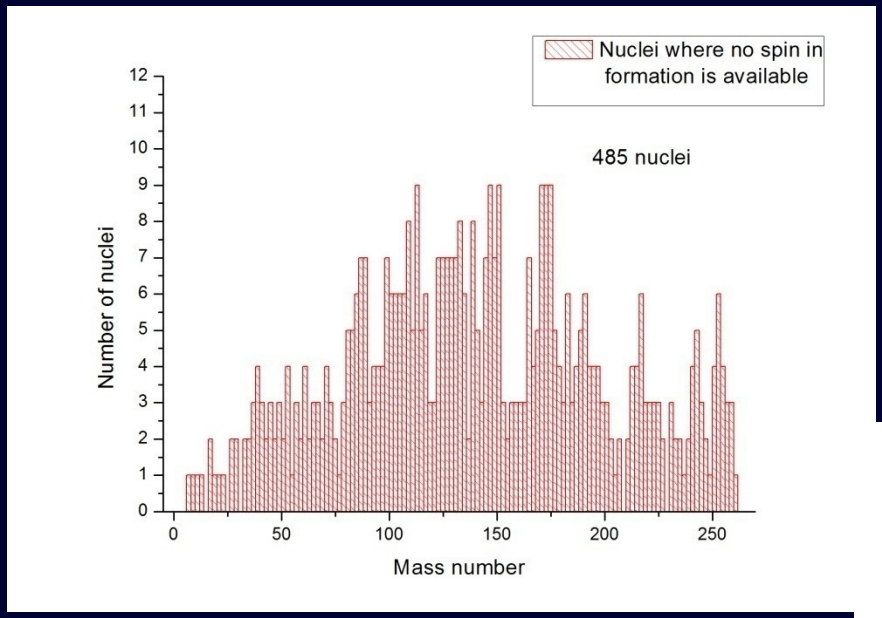
485 Nuclei where there are more than 3 levels but NO **(CONFIRMED)** SPIN information for any level.

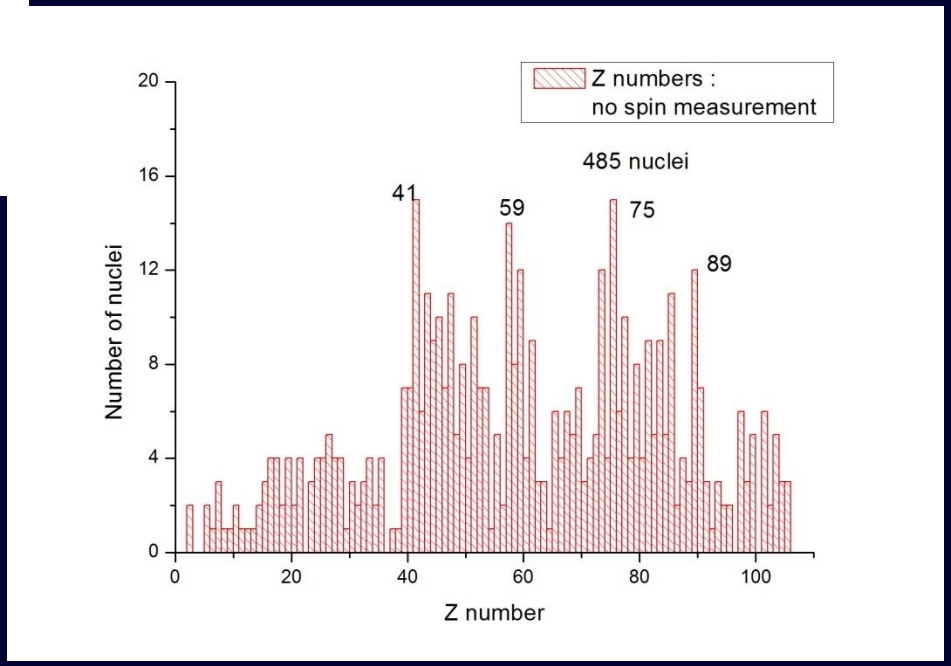
Of these 298 nuclei have more than 10 energy levels known.



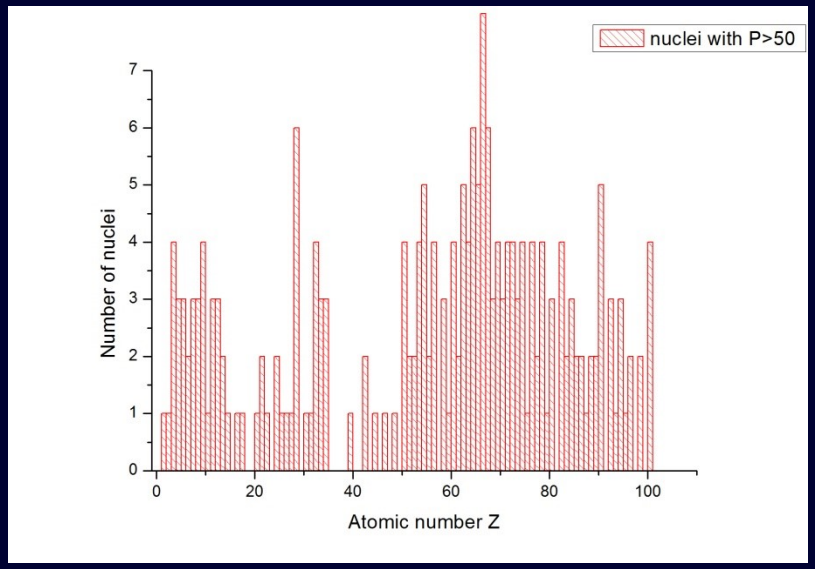
2220 nuclei

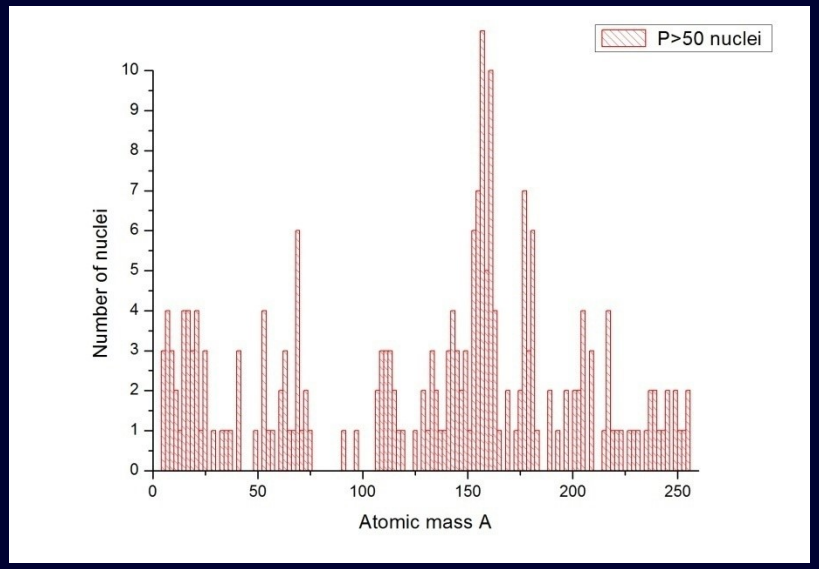
Mass range	Average	Median
1-50	29.1 ±23	26.0
51-100	17.8 ±17.2	14.3
101-150	17.7 ± 19.3	12.0
151-200	21.0 ± 22.2	14.3
201-260	21.5 ±23.0	16.3


Nuclei where no spin in formation is available
485 nuclei
Number of nuclei
Mass number
0
1
2
3
4
5
6
7
8
9
10
11
12
0
50
100
150
200
250


Z numbers :
no spin measurement
485 nuclei
41
59
75
89
Number of nuclei
Z number
0
4
8
12
16
20
0
20
40
60
80
100

215 nuclei have P value more than 50





FUTURE-PLAN

FINAL FORMAT IN WHICH DATA WILL BE PRESENTED (TENTATIVE)

A	Number of levels	P(half life)	P(spin)	Range of spin	Min half life	Max half life	All reactions with beam energy	Key number	Cut-off date	Rdmarks

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Thank You.