



One-Day Workshop On Nuclear Structure and Reactions (With Emphasis on Fusion, Fission, and Superheavy Elements)

Joint Institute for Heavy Ion Research, Oak Ridge, Tennessee, USA

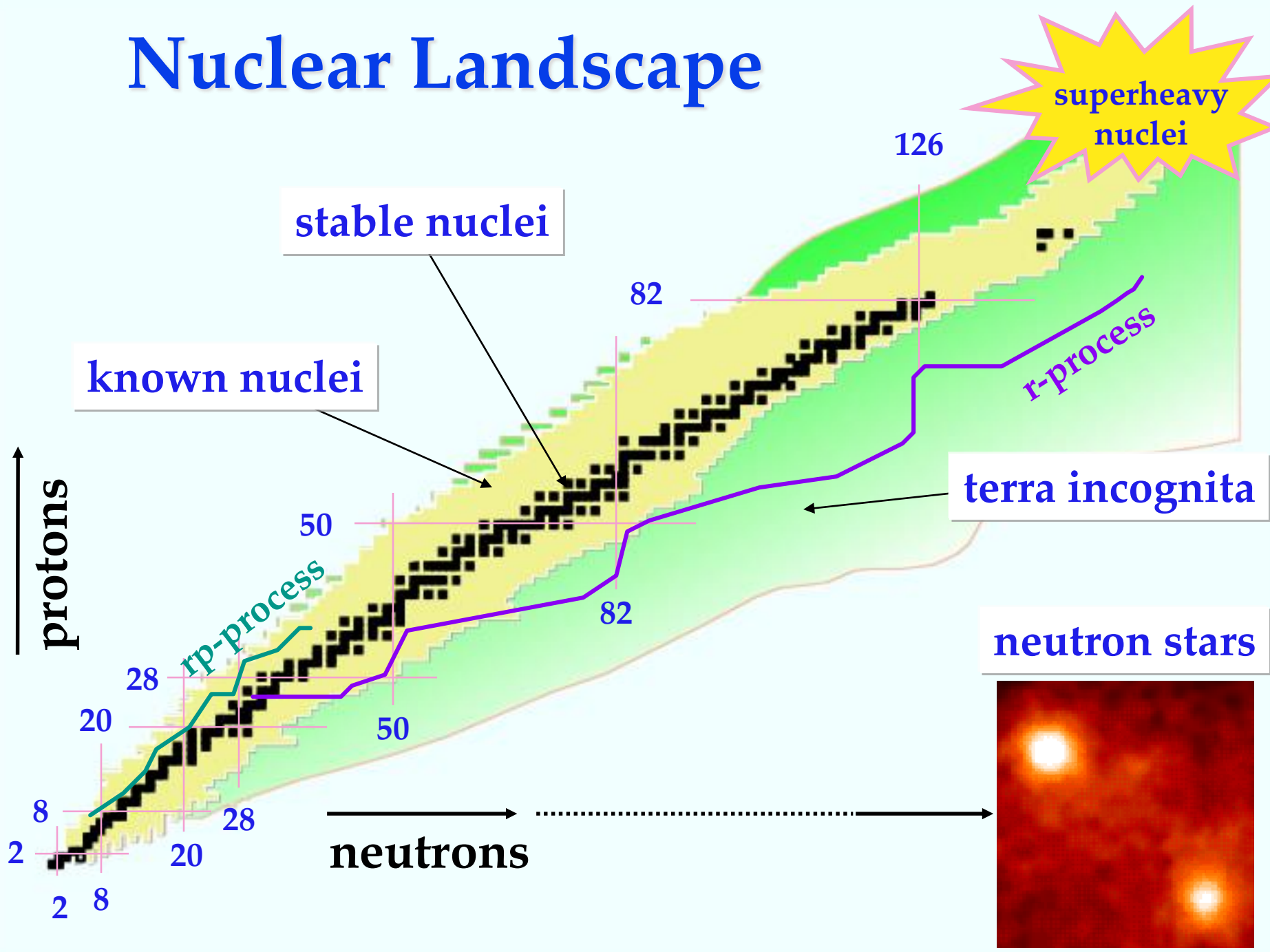
Oak Ridge National Laboratory

Bldg 6008, November 16, 2009

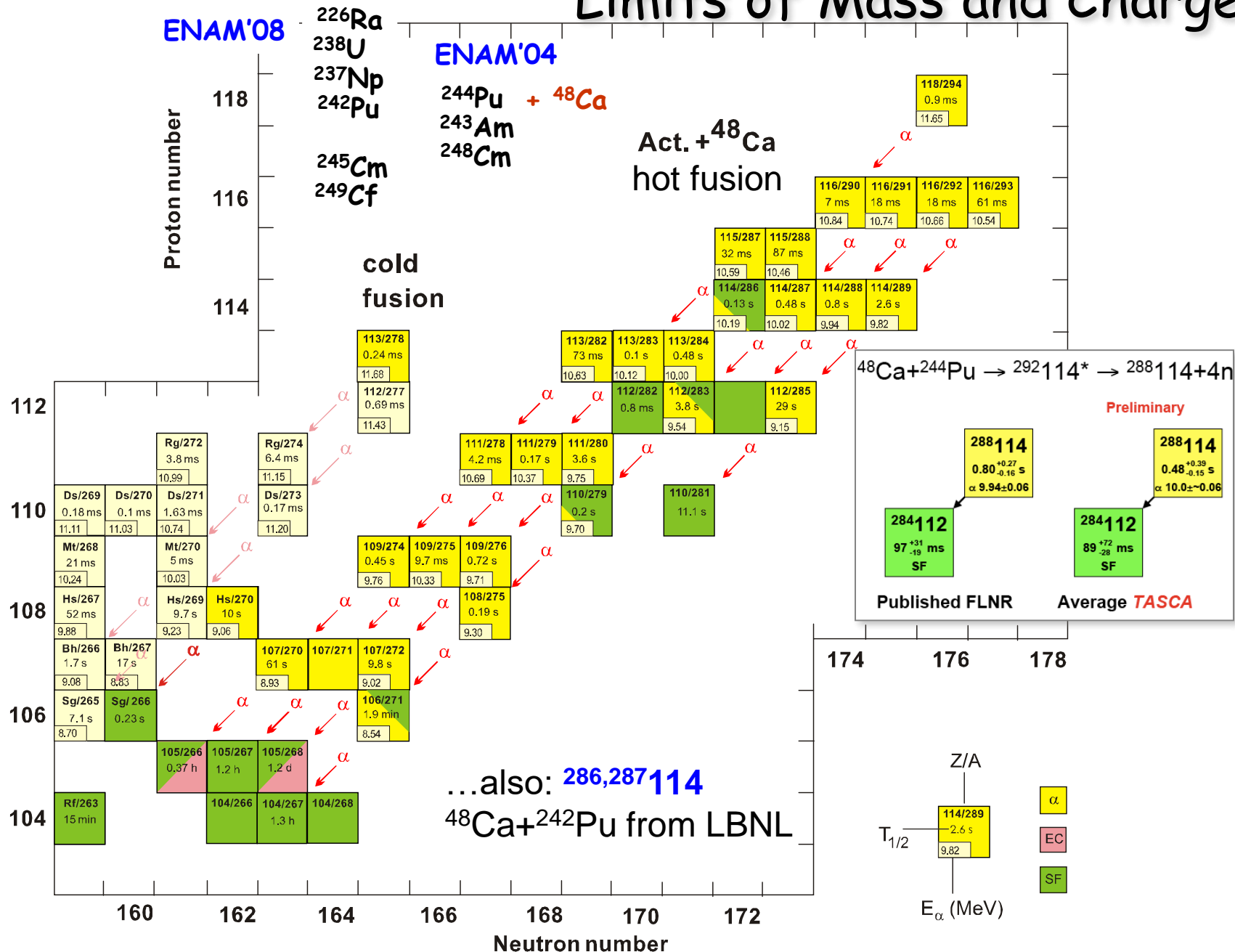
Introduction to workshop and the superheavy elements

Witold Nazarewicz

Nuclear Landscape



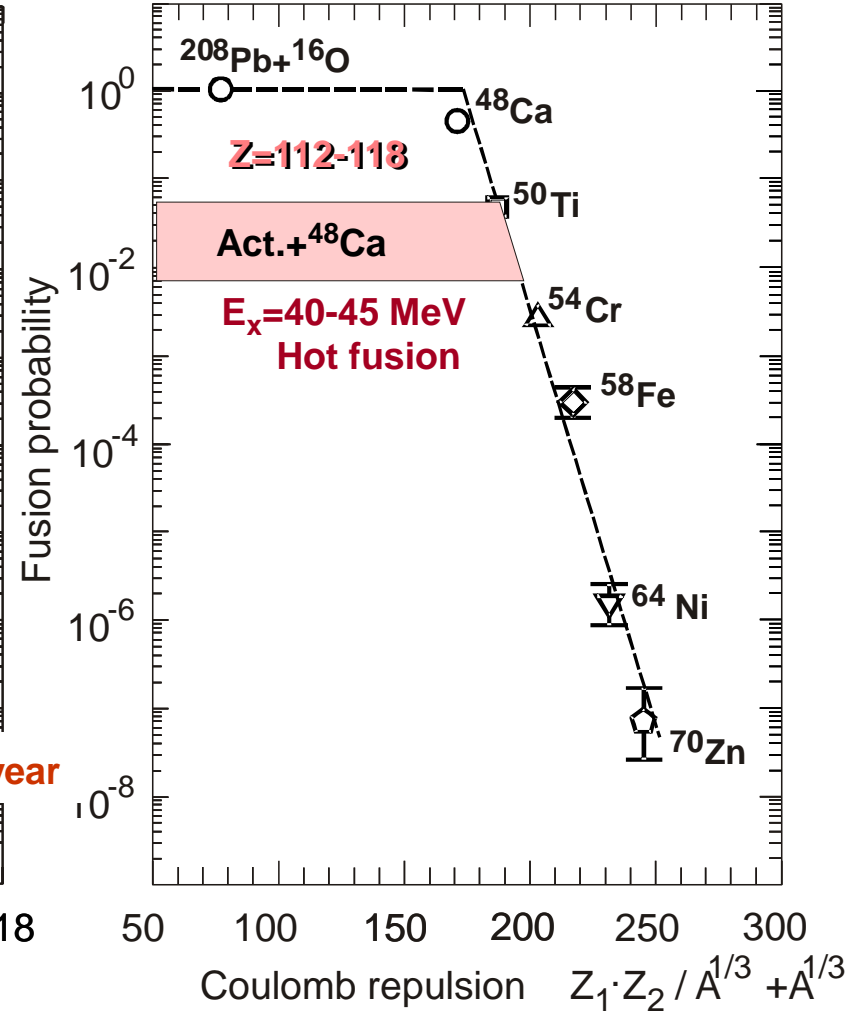
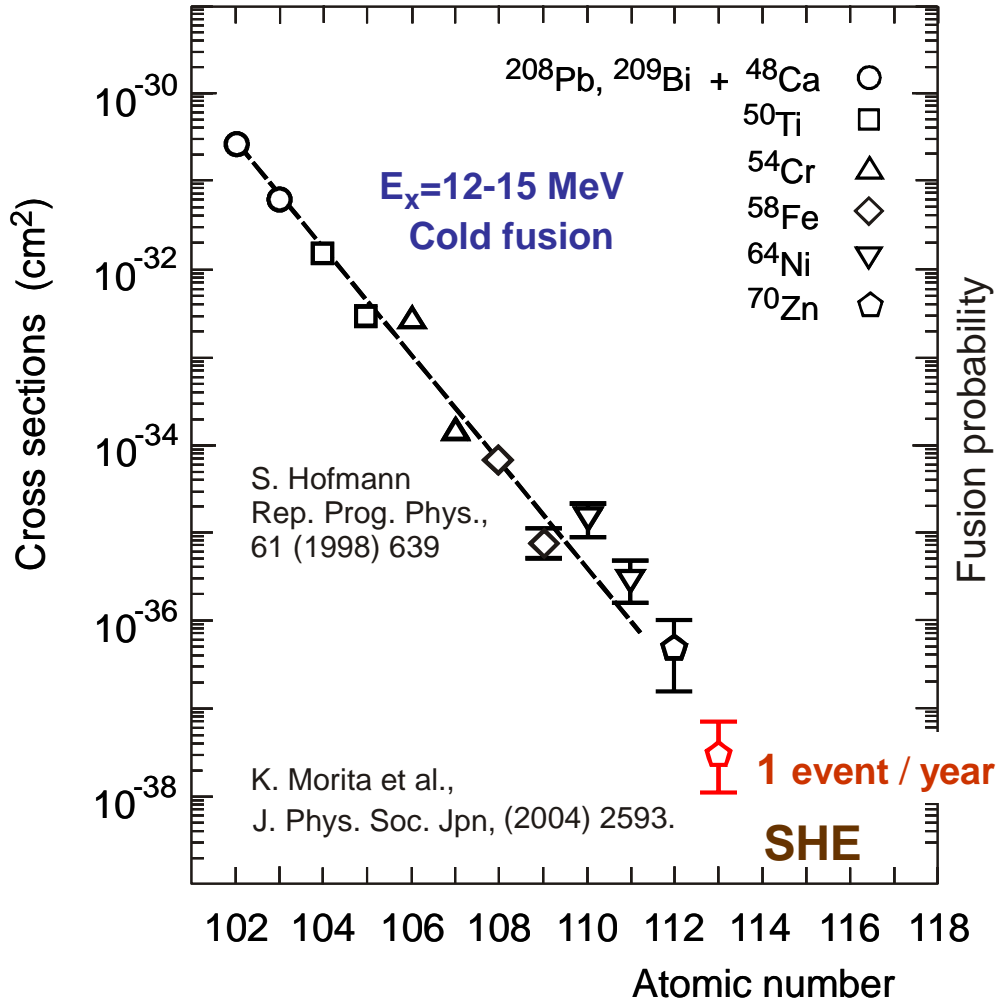
Limits of Mass and Charge

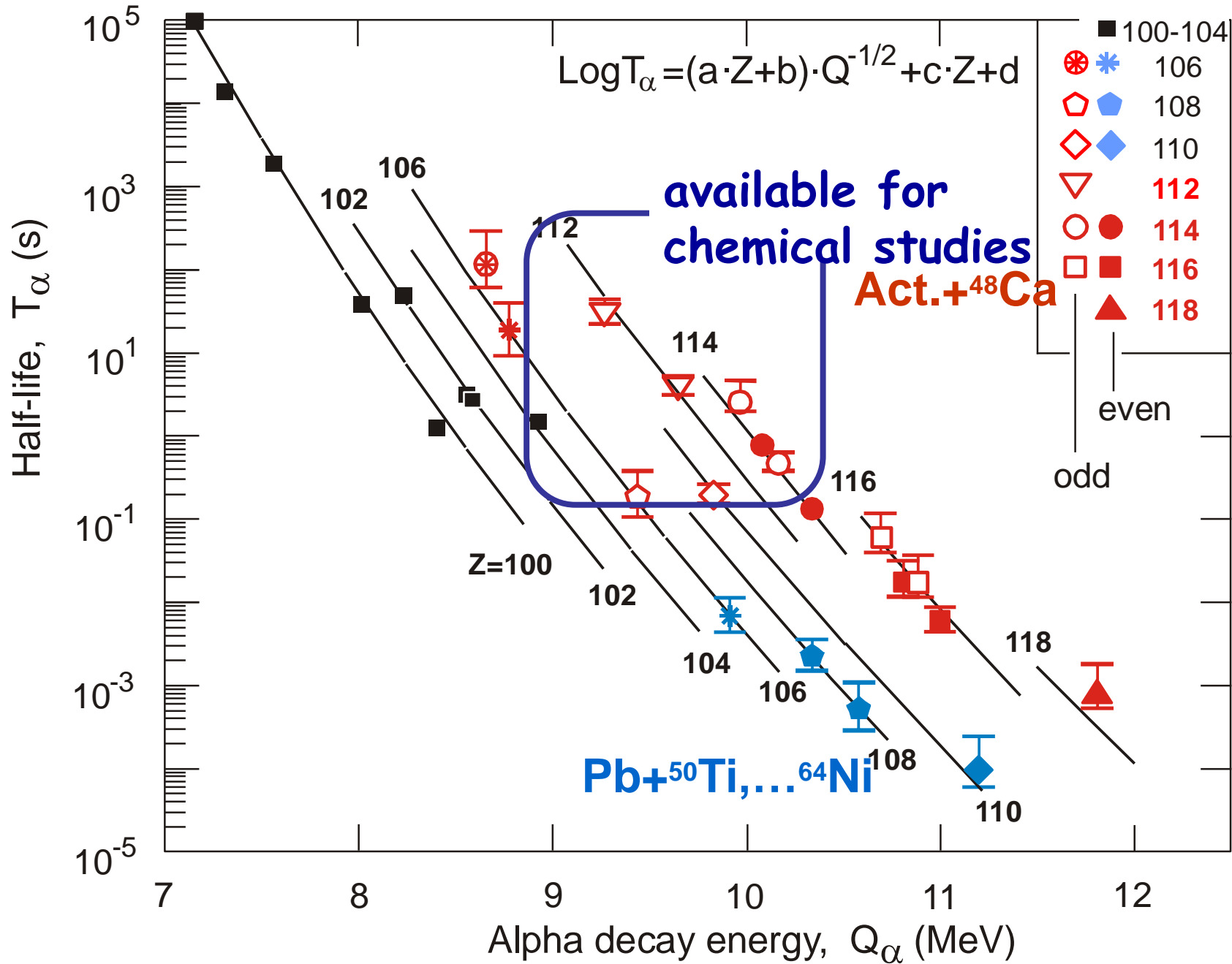


From Y. Oganessian

...also: chemistry

Fusion cross sections and fusion probability





Periodic Table of Elements 2009

1 H																	18 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg	3	4	5	6	7	8	9	10	11	12	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57 La*	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89 Ac ⁺	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113	114	115	116		

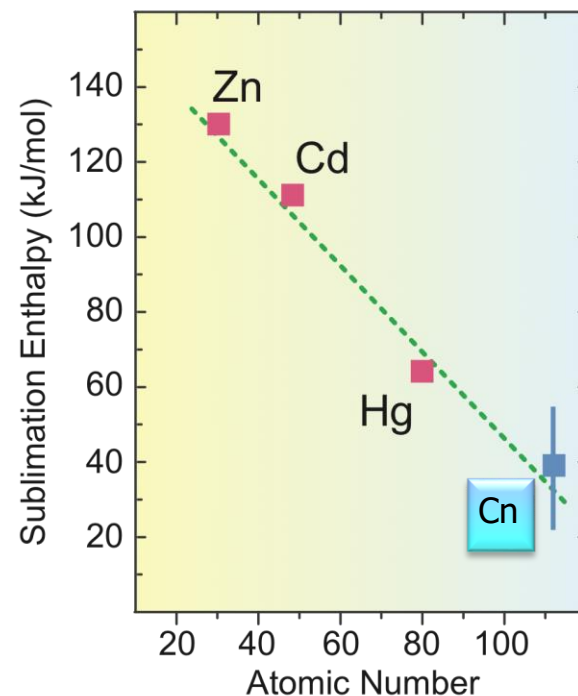
* Lanthanides

58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
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* Actinides

90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr
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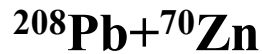
- Metals
- Non-metals
- Not confirmed



Z=112: Copernicium

α decay of $^{277}_{112}_{165}$

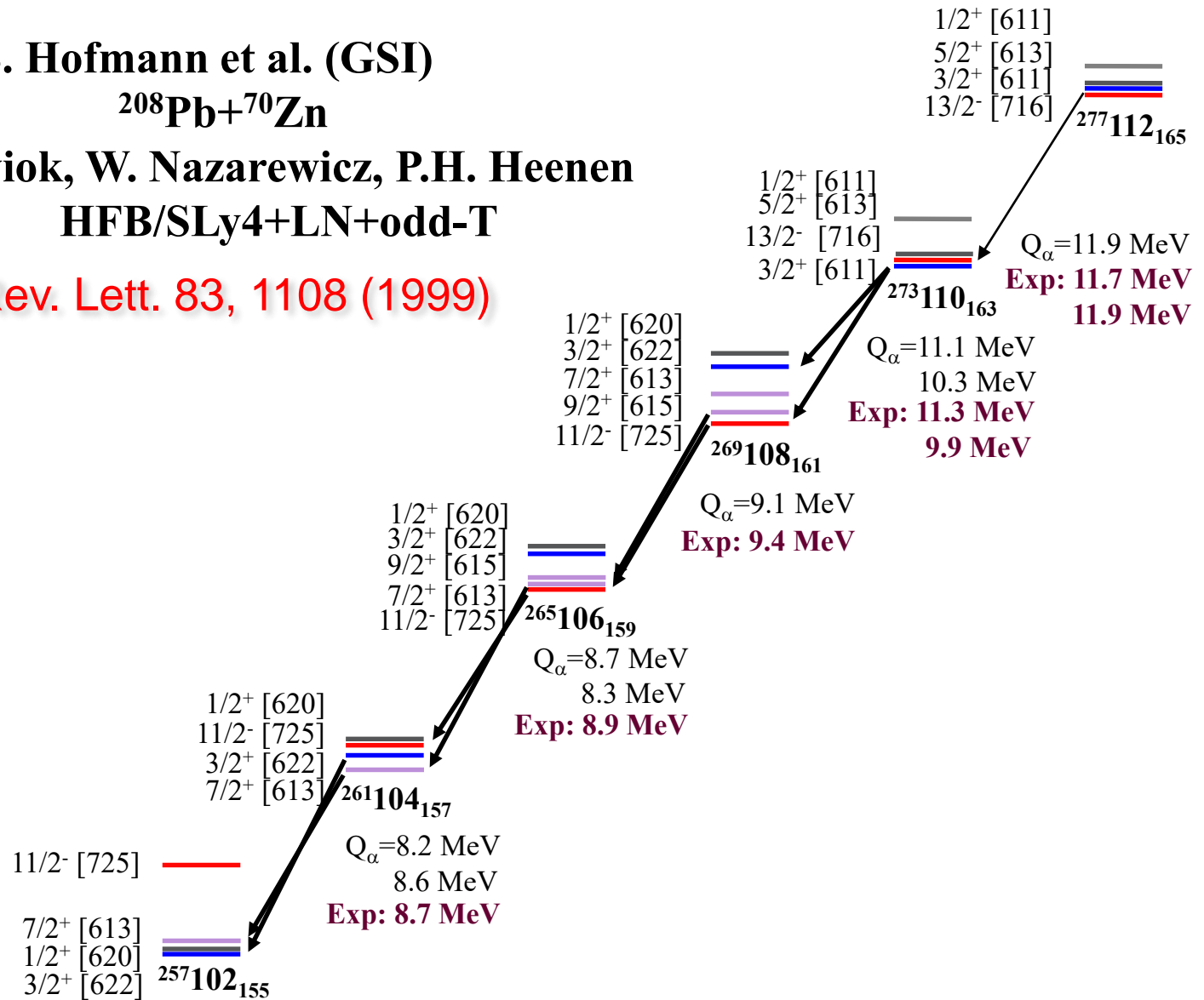
Experiment: S. Hofmann et al. (GSI)

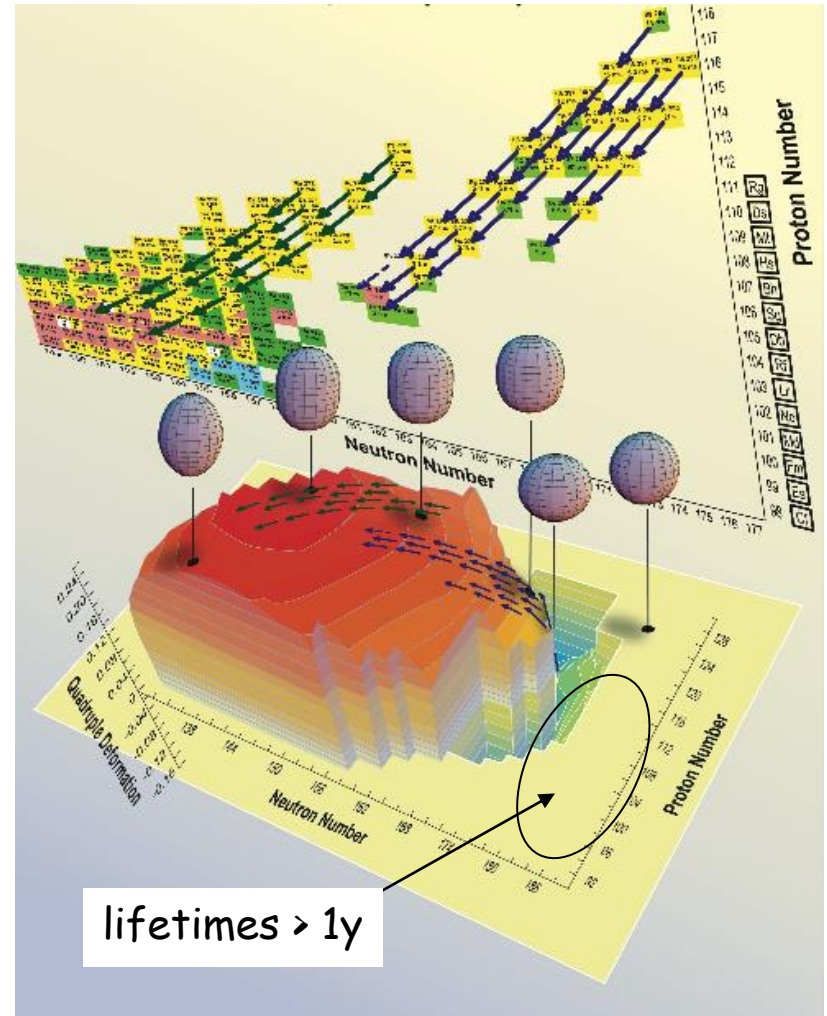
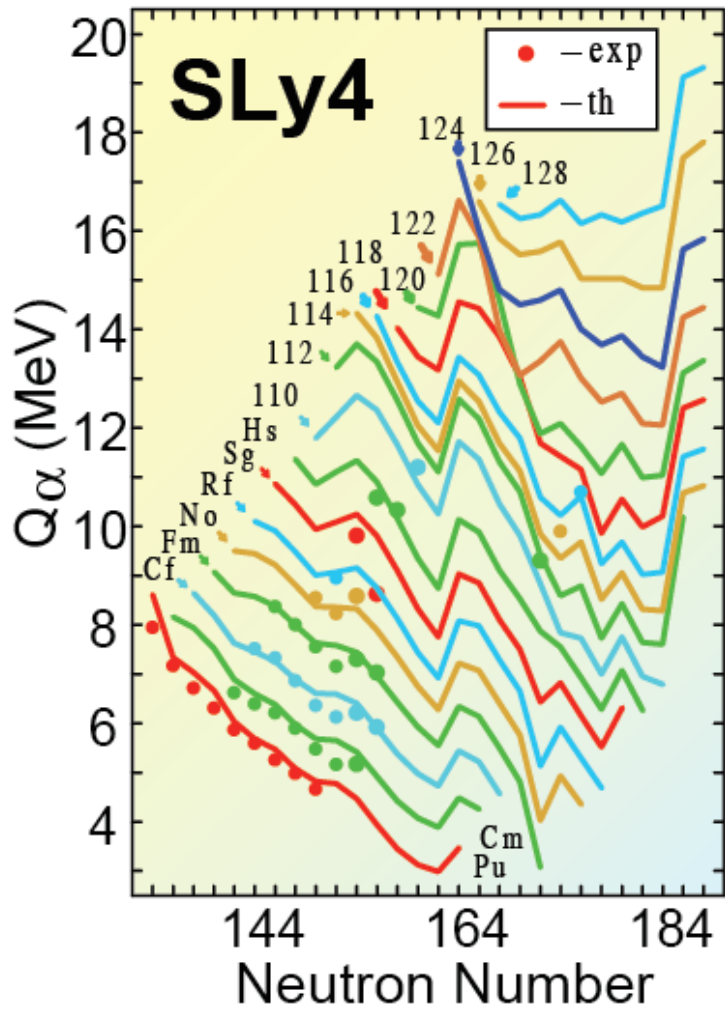


Theory: S. Cwiok, W. Nazarewicz, P.H. Heenen

HFB/SLy4+LN+odd-T

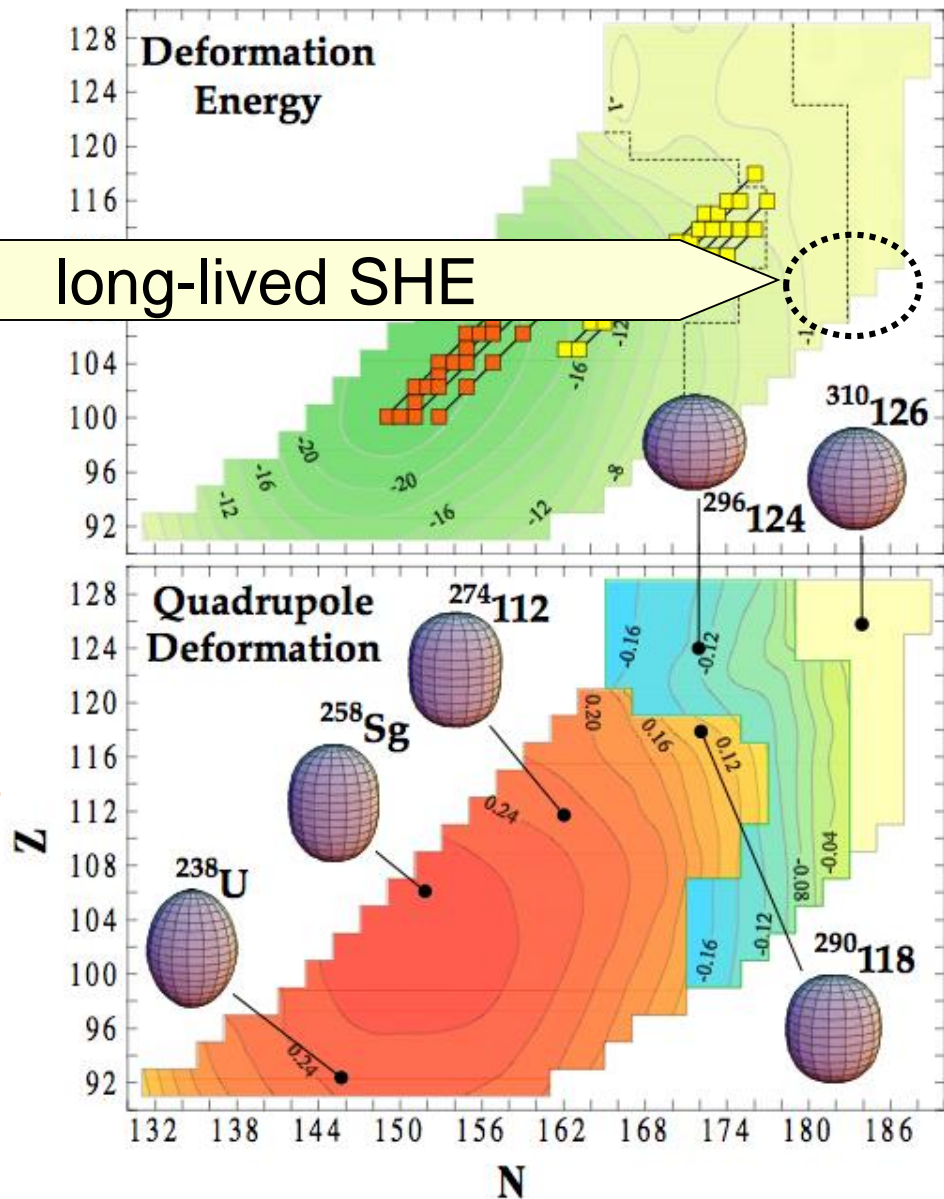
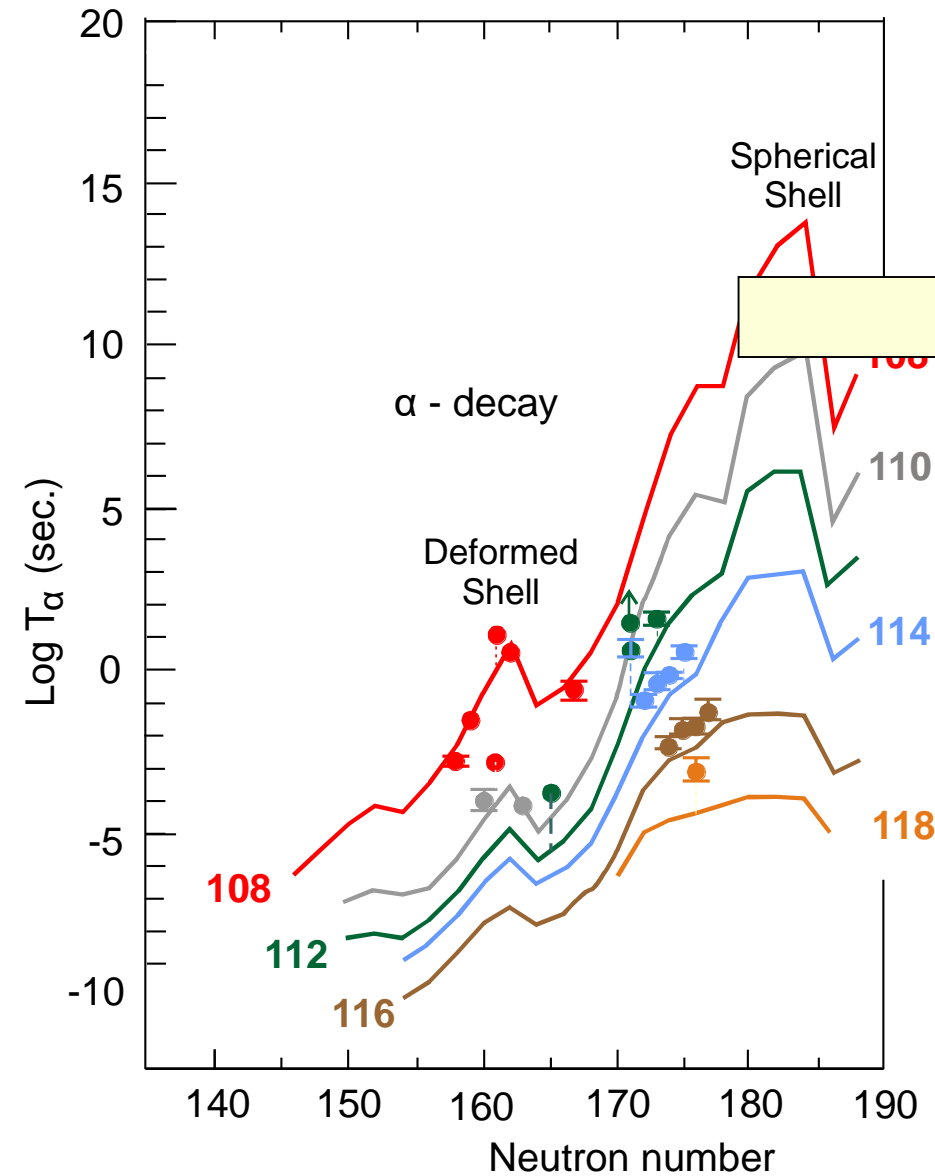
Phys. Rev. Lett. 83, 1108 (1999)



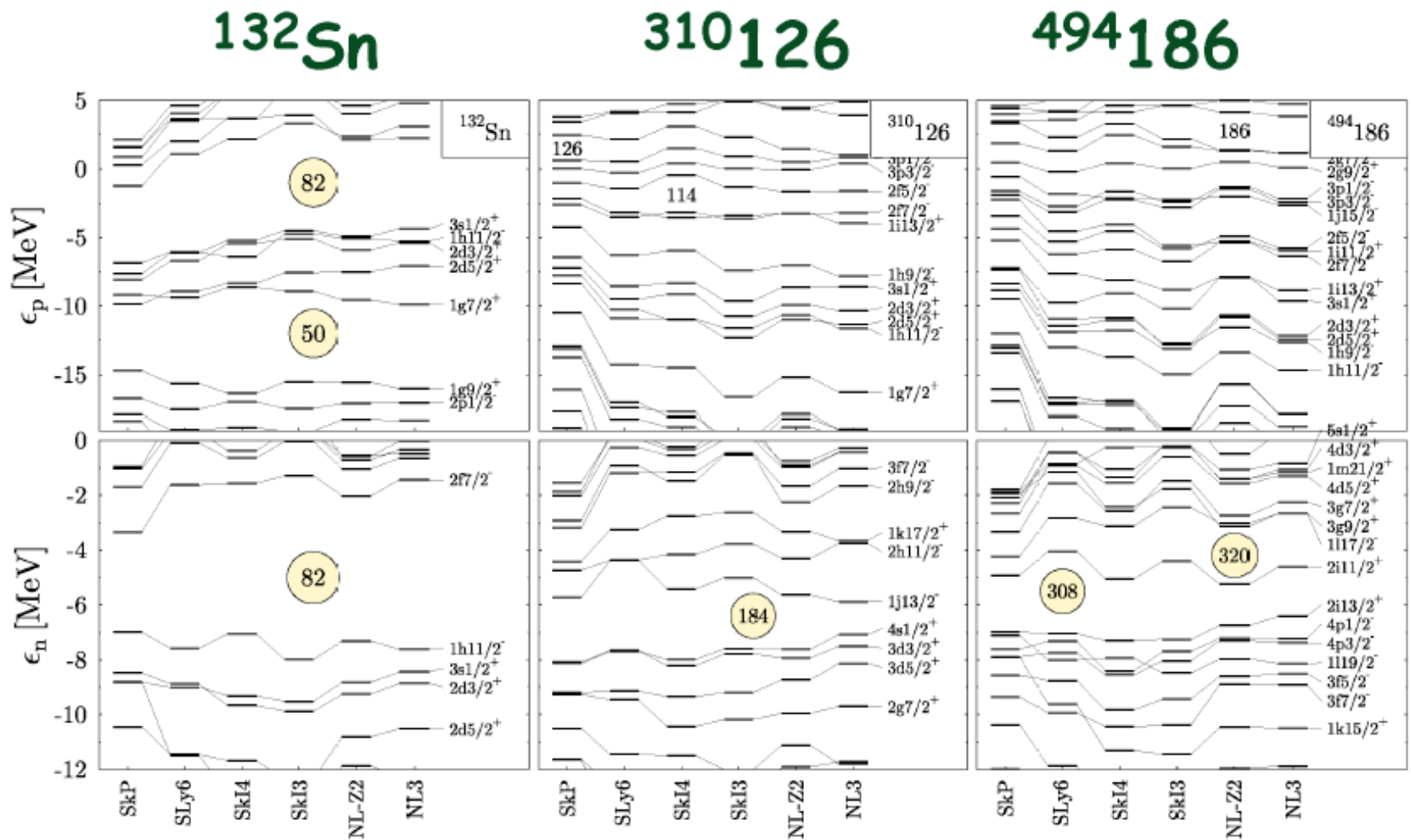


S. Cwiok, P.H. Heenen, W. Nazarewicz
Nature, 433, 705 (2005)

Superheavy Elements in Nuclear DFT



Shell structure in normal, superheavy, and hyperheavy nuclei



M. Bender, W. Nazarewicz, and P.-G. Reinhard, Phys. Lett. B515, 42 (2001)

Shell structure in normal, superheavy, and hyperheavy nuclei

