

INFLUENCE OF NEUTRON SHELLS ON SURFACE TENSION IN NUCLEI

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SURFACE TENSION AND RIGIDITY

Ager Bohr's formula
for the nuclear surface
tension

$$\sigma = \frac{C + 0.1376 \left(\frac{Z^2}{R_0} \right)}{4R_0^2}$$

Even-even nuclei rigidity

$$C = \frac{5E(2^+)}{2\beta^2}$$

<http://cdf.e.sinp.msu.ru/services/radchart/radmain>
Angeli, Marinova, At.Data
Nucl.Data Tables 99(2013)69

Raman, et al, At.Data
Nucl.Data Tables 78(2001)1

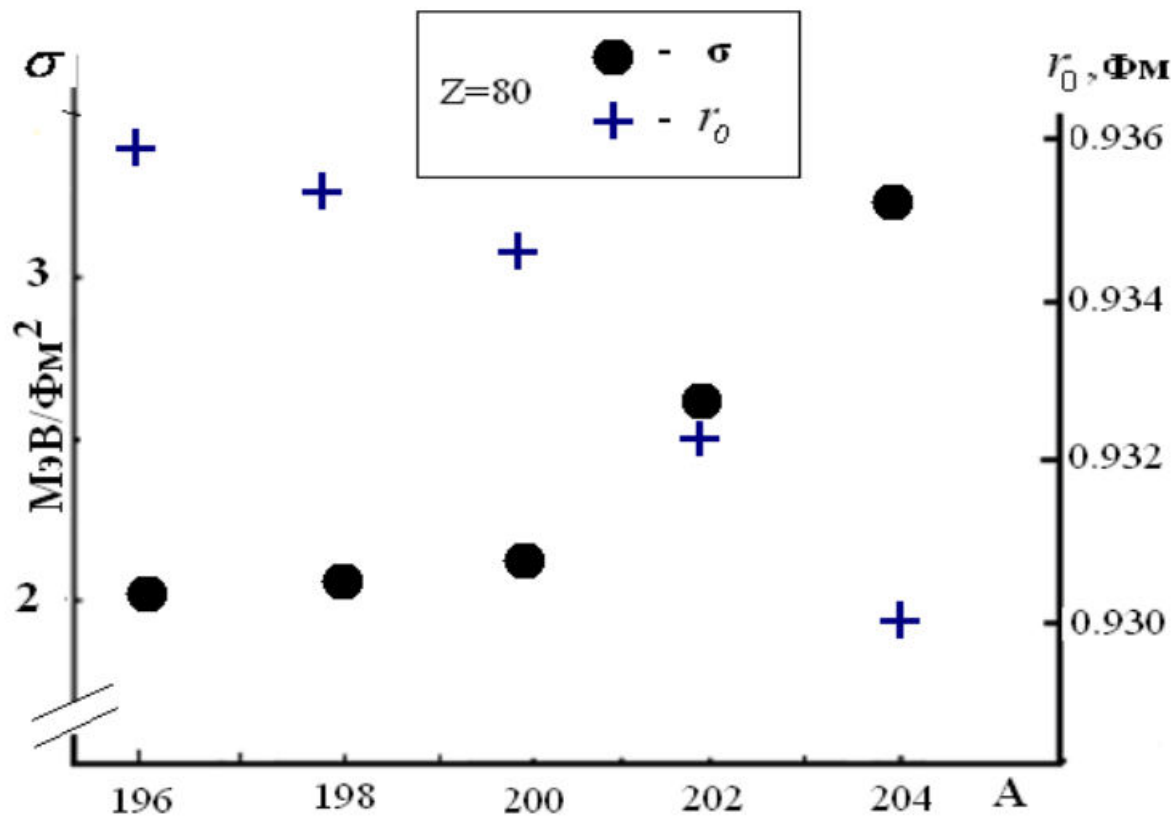
CALCULATED COEFFICIENTS ANALYSES

- The relation of the surface tension coefficients σ in atomic nuclei and rigidity C gave the opportunity to investigate the connection of these parameters with the nuclear shell structure
- High dependence of rigidity on nuclear shell structure
- Surface tension σ spreads over the large interval (two order of difference in the units MeV/Fm^2)
- Adding of a couple of neutrons could lead to a substantial jump in a surface tension value

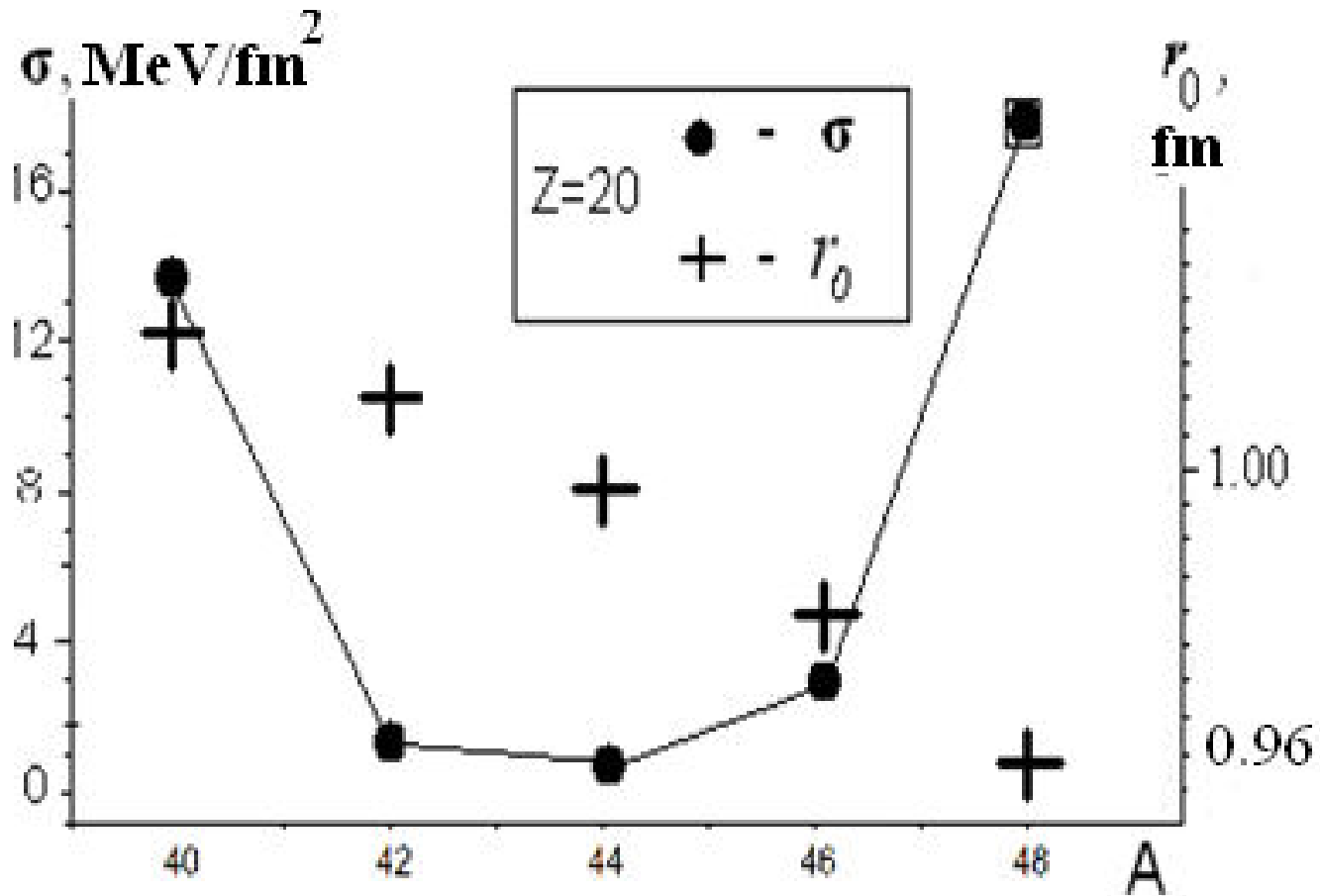
SURFACE TENSION COEFFICIENTS FOR $184 \leq A \leq 210$

A	184	186	188	190	192	194	196	198	200	202	204	204	206	208	210
Z	74	74	76	76	78	78	80	80	80	80	80	82	82	82	82
N	110	112	112	114	114	116	116	118	120	122	124	122	124	126	128
σ , MeV /Fm ²	1,3	1,3	1,4	1,4	1,5	1,6	1,8	2,1	2,2	2,7	3,3	11,3	17,5	28,7	33,9

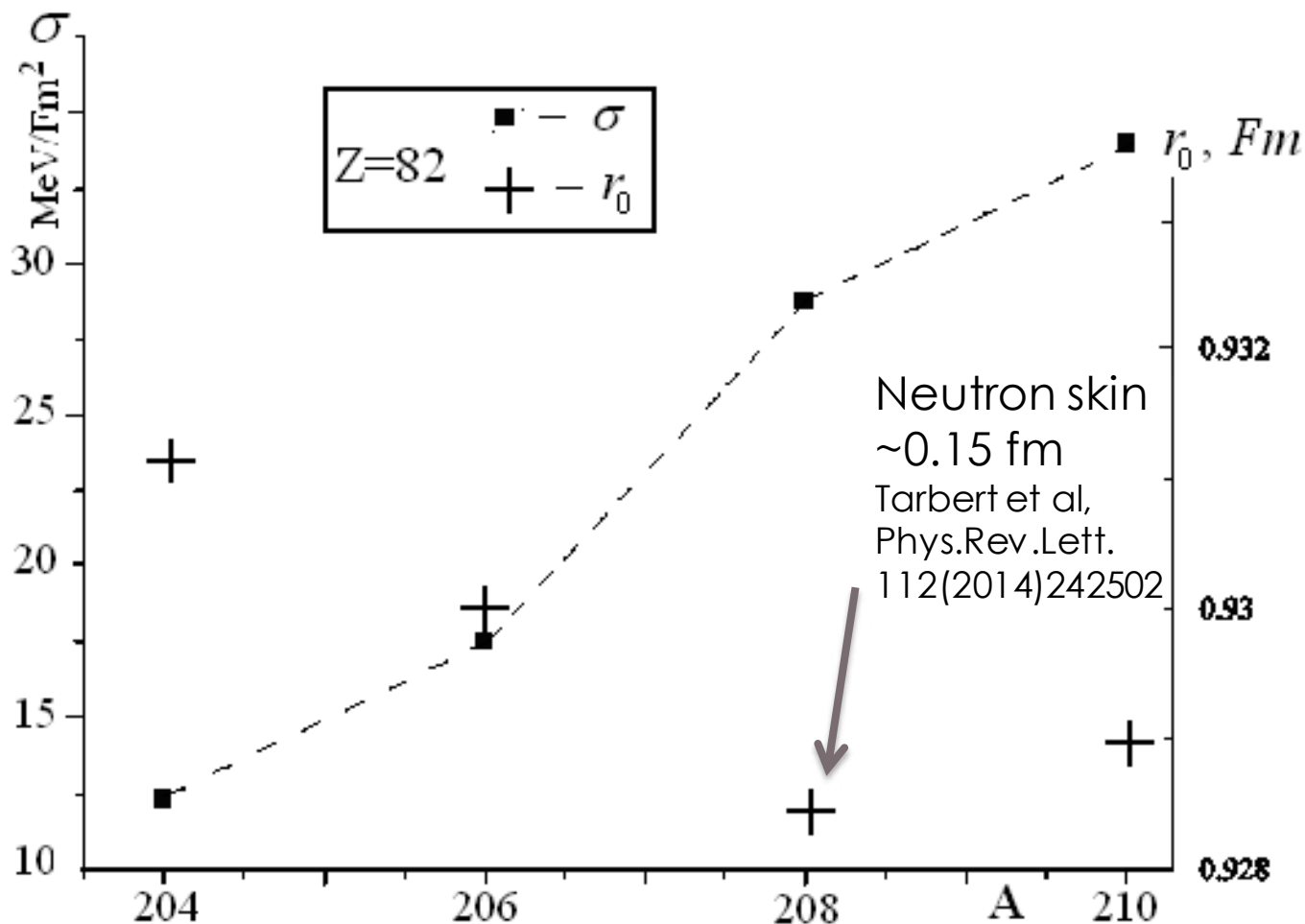
VALUES OF SURFACE TENSION AND CHARGE RADII FOR THE ISOTOPES OF HG



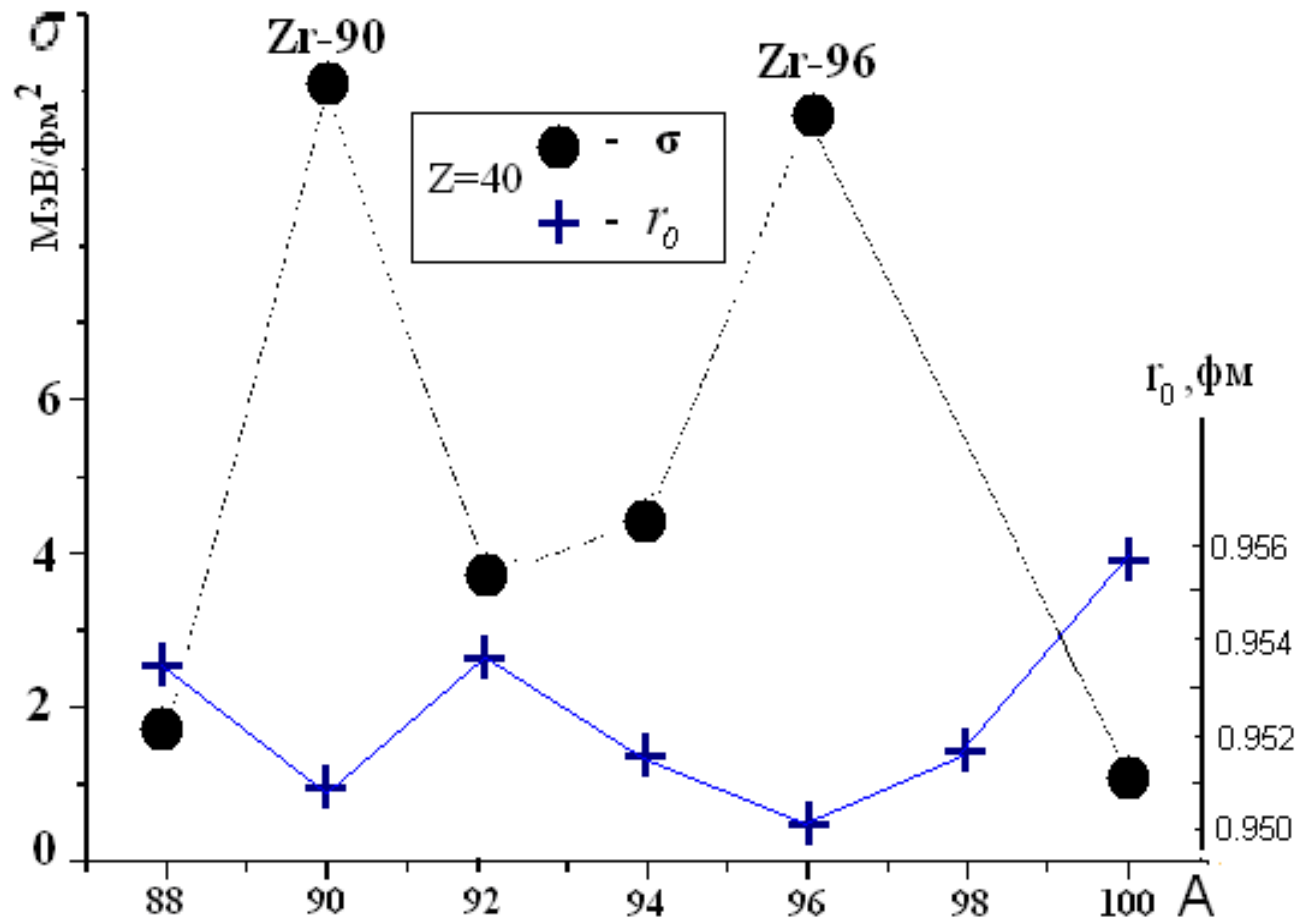
VALUES OF SURFACE TENSION AND CHARGE RADII FOR THE ISOTOPES OF CA



VALUES OF SURFACE TENSION AND CHARGE RADII FOR THE ISOTOPES OF PB



VALUES OF SURFACE TENSION AND CHARGE RADII FOR THE ISOTOPES OF ZR



CONCLUSIONS

- Nuclear surface tension and shell structure are related
- Surface tension has jumps especially in case of magic numbers
- High surface tension leads to minima for proton distribution radius at the same time neutron distribution radius is higher (neutron skin effect)
- Analysis gives that the most prospective isotopes in terms of the effect of neutron skin are ^{90}Zr and ^{96}Zr