

# STRUCTURE OF LEVELS AND ELECTROMAGNETIC TRANSITION RATES IN ODD-ODD NUCLEI CLOSE TO DOUBLY-MAGIC NEUTRON DEFICIENT $^{100}\text{Sn}$

Tuesday 21 September 2021 18:35 (5 minutes)

In our previous papers, we extensively studied odd-odd nuclei adjacent to doubly magical stable nuclide  $^{208}\text{Pb}$ , as well as to also doubly magical neutron excess  $^{132}\text{Sn}$ . To date, some experimental information has emerged also about the properties of such nuclei in the vicinity of an extremely neutron deficient and also doubly magical  $^{100}\text{Sn}$ . In our calculations of odd-odd nuclei close to  $^{100}\text{Sn}$ , we applied random phase approximation and multi-particle shell model, both based on the phenomenological nuclear potential [1] and effective two-body interaction [2], which parameters were defined by us before. The subject of our interest were  $^{98}_{49}\text{In}_{49}$ ,  $^{100}_{49}\text{In}_{51}$ ,  $^{98}_{47}\text{Ag}_{51}$  and  $^{94}_{45}\text{Rh}_{49}$ . In these nuclei we determined energy spectra and  $E2$ ,  $M1$  transition rates. Effective transition operators were also defined by us before [3], and they successfully described  $E2$  and  $M1$  transitions in nuclei close to  $^{208}\text{Pb}$  and  $^{132}\text{Sn}$ . In particular, the values of proton and neutron effective charges were  $e_p = 1.6|e|$  and  $e_n = 0.9|e|$ . In our case, the value of  $e_p \approx 1.6|e|$  was also obtained by us by using the experimental  $T_{1/2}$  values of the  $8_1^+ \rightarrow 6_1^+$  and  $6_1^+ \rightarrow 4_1^+$  transitions in  $^{98}\text{Cd}_{50}$  [4], as well as our RPA calculation for these cases. However, the energy of an analogous  $6_1^+ \rightarrow 4_1^+$  transition and its half-life in  $^{102}_{50}\text{Sn}_{52}$  are known with great uncertainty [4, 5] and thus the value of neutron effective charge in nuclei close to  $^{100}\text{Sn}$  is also very uncertain [5]:  $e_n = 2.3(+0.6 - 0.2)|e|$ . Such a large value of neutron effective charge is a subject of discussions. Here, we defined the values of  $e_p$  and  $e_n$  from the joint description of the  $4_1^+ \rightarrow 6_1^+$  (*gr.st.*) and  $2_1^+ \rightarrow 4_1^+$  (*gr.st.*) transitions in  $^{98}\text{Ag}$  and  $^{94}\text{Rh}$ . The result is  $e_p \approx 1.6$  and  $e_n \approx 2.8$ . Mention that the obtained by us value of  $e_n$  agrees with the experimental results [6, 7], considered together with theoretical calculations performed by us for the  $6_1^+ \rightarrow 4_1^+$  transition in  $^{102}\text{Sn}$  [2].

1. V. I. Isakov et al., Eur. Phys. J. A {bf14}, 29 (2002).
2. V. I. Isakov, Phys. At. Nucl. {bf76}, No 7, 828 (2013).
3. S. A. Artamonov, et al., Sov. J. Nucl. Phys. {bf36}, No 4, 486 (1982).
4. <https://www-nds.bnl.gov/ensdf/>
5. M. Lipoglavšek et al., Phys. Lett. B {bf440}, 246 (1998).
6. T. Faestermann, {em Spectroscopy of N ~ Z Nuclei:  $^{100}\text{Sn}$  and Neighbours}, <https://indico.ific.uv.es/event/349/contributions/6172/attachments/4036/4532/Faestermann.pdf>, 24 (2011).
7. M. Górska, {em Recent results in the region of  $^{100}\text{Sn}$ }, <https://indico.in2p3.fr/event/12970/contributions/12367/attachments/104936/104936> (2016).

**Primary author:** ISAKOV, Vadim (PNPI NRC KI St.-Petersburg)

**Presenter:** ISAKOV, Vadim (PNPI NRC KI St.-Petersburg)

**Session Classification:** Poster session (Experimental and theoretical studies of the properties of atomic nuclei)

**Track Classification:** Section 1. Experimental and theoretical studies of the properties of atomic nuclei.