Contribution ID: **33** Type: **Poster report**

ON THE NEUTRON DRIP-LINE OF Ca ISOTOPES

Wednesday, 14 October 2020 18:50 (20 minutes)

On the basis of the Hartree-Fock-Bogolyubov (HFB) method with various versions of Skyrme forces we investigated the position of the neutron drip-line (NDL) of Ca isotopes with allowance for axial deformation of nuclei. For calculations of the properties of the ground state of even-even isotopes of Ca, we used computer code HFBTHO v2.00d [1] and our software package as in [2]. Our calculations and those of various authors [3] have shown that the position of the NDL for different types of Skyrme forces differs significantly in the boundary value of the number of neutrons $N_{drip-line}$. We have shown that for the same type of Skyrme forces, the determination of the $N_{drip-line}$ is also ambiguous. We performed constrained HFB calculations of the total energy of Ca isotopes in the vicinity of the NDL depending on the quadrupole deformation parameter β_2 in the range of $-0.5 \leq \beta_2 \leq 0.5$. It is shown that for the isotopes ^{68}Ca (forces UNEDF1) and ^{66}Ca (forces SLy4) over the entire range of considered β_2, in the vicinity of the min curve E(β_2), the chemical potential of the nuclei is $\lambda_n < 0$. These isotopes can be considered as neutron-stable. For the isotopes ^{70}Ca (forces UNEDF1) and ^{68}Ca (forces SLy4) in the vicinity of the min curve E(β_2), the chemical potential of the nuclei is $\lambda_n > 0$. If we consider the condition $\lambda_n < 0$ as a condition for the stability of the nucleus with respect to the emission of one neutron, then the nucleus ^{70}Ca (for forces UNEDF1) and ^{68}Ca (for SLy4 forces) cannot be considered as neutron-stable. In [3], these nuclei are given as neutron-stable for which the separation energies of one neutron have positive values.

1. M.V.Stoitsov *et al.* // Comp. Phys. Com. 2013. V. 184. P. 1592.
2. V.N.Tarasov *et al.* // Phys. Atom. Nucl. 2012. V. 75. P. 17.
3. J.Erler *et al.* // Nature 2012. V. 486. P. 509; http://massexplorer.frib.msu.edu/.

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Session Classification: Poster session 1 (part 2)

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