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The Structure of Nuclear Unbound Isotopes 9He and 10He

There is a general interest in studies of the asymmetric nuclear matter.
Indeed the studies of nuclei near the limits of nuclear stability are
the richest source of information about the properties of nuclear interactions.
This studies are also important for applied astrophysical problems as
abundance of chemical elements and asymmetric nuclear matter in the neutron stars.

The studies of neutron-rich 10He isotope are perfectly fit this trend.
The unbound nuclear system of 10He have been studied for many times both in theory and experiment.
However, conventional interpretation of obtained experimental results still has not attained.
One can divide all obtained experimental results on two groups.
The first one is population of 10He in reactions with halo-nuclei.
In particular, the 10He was first time experimentally observed in 1994 in reaction
of proton knockout from 11Li [1].
The decay energy of 10He ground state about 1.2 was obtained from inclusive spectrum.
This value was reproduced in further experiments on beams of 11Li and 14Be aimed on 10He studies.
The second group is population of 10He in two-neutron transfer reaction.
In an experiment conducted in FLNR at JINR the t(8He,p)10He reaction was used to populate 10He [2].
The obtained spectrum shows significantly different behavior:
analysis of inclusive spectrum in combination with correlation studies provide the decay energy of 10He ground state about 2.1 MeV.

We propose an approach that explain behavior of all obtained experimental data thus reconcile contradiction in ones interpretation.
The difference in the 10He spectrum behavior can be explained by influence of initial state structure on the continuum spectrum population.

The properties of 10He continuum are strictly bound with properties of 9He structure.
Existing experimental data about 9He and the restrictions connected with the observed 10He spectrum are also going to be discussed in the talk.

[1] A.A. Korsheninnikov, et al., Phys. Lett. B326 (1994) 31.
[2] S.I. Sidorchuk, et al., Phys. Rev. Lett. 108 (2012) 202502.

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