# ON THE POSSIBILITY OF STUDYING CLUSTER STRUCTURE OF LIGHT NUCLEI BY PROTON QUASIFREE SCATTERING AT LOW ENERGIES

Konobeevsky E.S., Zuyev S., Kasparov A.
*Institute for Nuclear Research, Russian Academy of Sciences, Moscow, Russia*
E-mail: konobeev@inr.ru

Availability of radioactive nuclear beams led to the discovery of unusual structure at the periphery of the nucleus – a neutron or a proton halo. However, even for the most studied $^{6}$He halo nucleus the structure of its halo (dineutron or cigar-like configuration) is not completely determined.

In this work, we consider a possibility to study the structure of halo nuclei ($^{6}$He, $^{8}$He) using the reaction of quasifree scattering (QFS) of proton by the clusters composing these nuclei. As clusters of $^{6}$He and $^{8}$He we considered $^{6}$He, $^{4}$He, n and $^{2}$n. To determine the kinematical regions allowed for proton kinematical calculations were performed for reactions $^{6,8}$He + p→ p + C + S, where C and S are clusters constituting the halo nucleus: cluster C is involved in proton QFS, and cluster S is a spectator. By definition, the spectator does not undergo scattering and continues moving with the same total momentum as that which it had in the incident halo nucleus.

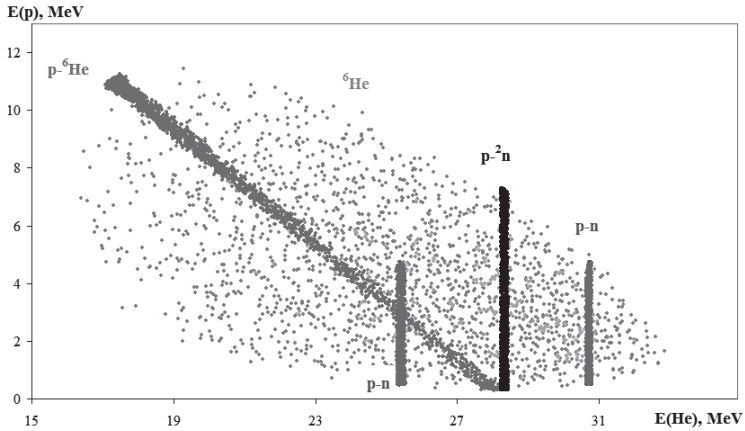


*Fig. 1. Two-dimensional plot $E_{He}$–$E_p$ for proton QFS by clusters of $^{8}$He (kor $^{6}$He). $E_{8He}$=40 MeV. Grey dots represent calculation for $^{8}$He+p→$^{6}$He+p+n+n breakup reaction.*

The simulation results for proton QFS by $^{6}$He, n and $^{2}$n clusters of $^{8}$He are presented in Fig. 1 as a two-dimensional plot $E_{He}$–$E_p$. One can see that events of quasifree proton scattering by different clusters occupy different regions in the two-dimensional Dalitz plot. Thus we can hope that experimental study of proton quasifree scattering by constituents of halo nuclei allows one to determine their cluster structure.