Contribution ID: **452** Type: **Oral**

Interference patterns in angular distributions observed for 10He decay products

Thursday, 18 April 2019 14:45 (15 minutes)

Representing extreme nuclear matter asymmetry 10He nucleus is attracted a lot of attention. Despite a long story of trying to research this unbound system, there are still many contradictions in obtained results. Partly it is connected with a difficult recognition of broad states in the continuum.

In recent experimental research, the spectrum of low-lying states in the 10He was populated in two neutron transfer reaction from tritium target (S.I. Sidorchuk et al., Phys. Rev. Lett. 108 (2012) 202502). It was investigated with full kinematics techniques allowing for correlation studies. Demonstrating prominent interference patterns, internal correlations helped establish spin/parity of states in the 10He spectrum. A proposed negative parity of the first excited state contradicts to theoretical expectations.

The theoretical approach in this work was simple enough and calls for more rigorous justification (L.V. Chulkov et al., Phys. Lett. B 720 (2013) 344). We testify our statements by Monte-Carlo simulating of the decay. Based on HH formalism these simulations allow for description all range of experimental data with the one set of parameters taking into account reaction mechanism, efficiency, alignment and interference of states. This unique technique for three-body decays studies was successfully applied in the analysis of 6Be, 17Ne, 45Fe and it has no analogs in the world.

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Session Classification: Nuclear Physics

Track Classification: Nuclear Physics