

Studying fine structure in exotic atoms

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Hadronic atoms offer two main advantages for nuclear and low energy particle physics: first - studies of level shifts and widths due to strong interactions allow us to test hadron-nucleon scattering amplitudes at or below the thresholds as both particles are bound. In this way one could test properties of exotic quasi-bound-states in the two body systems, second - the atomic decay modes of these systems are a method to study the structure of nuclear surfaces. For both of these aims the studies of atomic X-rays constitute an essential part of the research.

The content of this talk is devoted to two experimental lines of research. Studies of level shifts in light K-mesic atoms performed in INFN Frascati [1] and extension of these to study the K- proton quasi-bound state. The other line is a study of (hyper) fine structure in light anti-protonic atoms. Here, the purpose is to complete the partial wave analysis and establish expected quasi-bound states in antiproton-proton and antiproton-neutron systems. This knowledge, will serve PUMA experiment proposed to study neutron haloes in unstable nuclei [2].

[1] H. Bazzi et al: Phys. Lett B 704, 103(2011) , B 714,40(2012) Nucl.Phys. A 907,69(2013)

[2] A. Obertelli , PUMA proposal at CERN

Summary

Primary author: WYCECH, Slawomir

Presenter: WYCECH, Slawomir

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