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Hypernuclear Production by Coherent Antiproton-Nucleus Annihilation Reactions

Wednesday, 13 September 2017 15:00 (20 minutes)

Coherent reactions, when the hypernucleus is produced in a fixed quantum state, are especially sensitive to the reaction mechanism and to the properties of the hyperon-nucleus interaction. Exclusive hypernuclear production reactions by antiproton annihilation on a nuclear target populating single-Lambda states plab = 1.5...20 GeV/c are discussed in a Glauber model approach [1,2]. Initial and final state interactions are considered. Available elastic antiproton-nucleus data are well described. The elementary production amplitude of the underlying proton-antiproton to hyperon-antihyperon process includes ⊠-channel exchange by the pseudoscalar K, vector K*(860), and the yet to be confirmed scalar kappa(800) S=+/-1 mesons. The relativistic wave functions of the bound proton and Λ are calculated from the static Dirac equation with scalar and vector potentials describing properly the binding energy and r.m.s. nucleon radii of the initial nucleus and the phenomenological energy levels of the final hypernucleus. The inclusion of the kappa meson strongly influences the beam momentum dependence of the hypernucleus production cross sections in various quantum states [2]. This can be regarded as the first clear signal of the correlated pion-Kaon exchange in antiproton-nucleus collisions.

[1] A. Larionov, H. Lenske, Nucl.Phys. A957 (2017) 450.
[21] A. Larionov, H. Lenske, PLB (in print), arXiv:1703.02073

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