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Extraction of Baryonia from Atomic Data

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Exotic atom X-ray research offers atomic level shifts and widths for “lower levels” and widths for “upper levels”. Understanding of lower levels is usually difficult as due to larger nuclear–atomic overlap, many body phenomena are involved.

In the upper levels the orbital hadron just grazes the nucleus and the physics is reduced essentially to single hadron – nucleon collisions. Moreover these collisions involve sub-threshold energies and thus allow studies of quasi-bound states in this region.

With antiprotons the “upper level” data are quite numerous and involve level widths in light nuclei, shifts and widths in several heavy nuclei and specific annihilation channels. These data indicate some anomalies in nuclei of sizably different proton and neutron separation energies. These anomalies can be explained provided there exist nucleon–antinucleon 3P_1 quasi-bound state at about 8 MeV binding. Such states were predicted by Paris N-Nbar potential models [1], albeit at different energies.

Possibilities of similar studies in Kaonic atoms will be outlined.

[1] PHYSICAL REVIEW C 79, 054001 (2009)

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