

Elusive quark state studied by X-rays

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The $\Lambda(1405)$ state is a basic element used to affect K-mesic atoms and built K-mesic nuclear states. The common understanding is that this state is predominantly a quasi-bound state of anti- K meson and a proton. Scattering data in Kp channel and $\Sigma\pi$ channel allow to built interaction models. However, these models differ strongly if extrapolated to energies below the Kp threshold where $\Lambda(1405)$ is located.

Upper levels of K-mesic atoms offer studies of quasi-free K –nucleon interactions , below the threshold as both particles are bound. From level widths of such atoms w extract the absorptive subthreshold K-N amplitude which disagrees with all potential models. It indicates that $\Lambda(1405)$ has a 3-quark component. That is an old idea of simple quark models that was discarded as inconsistent with data. However, we extended the old formalism and show that such an interpretation is possible. It may dramatically change K- nuclear physics. As uncertainties are high, a new X-ray experiments are necessary. Suggestions will be presented.

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