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Traces of the hidden-charm S=-1 pentaquark in the Lambda_b –> J/psi eta Lambda decay

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The hidden charm pentaquark state $P_c(4450)$, observed recently by the LHCb collaboration in the $\Lambda_b \to J/\psi K^- p$ decay, may be of molecular nature, as advocated by some unitary approaches that also predict pentaquark partners in the strangeness S=-1 sector. In this work we argue that a hidden-charm strange pentaquark could also be seen in the decay of the Λ_b, but through the $J/\psi\eta\Lambda$ decay mode, by studying the invariant mass spectrum of $J/\psi\Lambda$ pairs.

In our model we assume a standard weak decay topology, then incorporate the hadronization process and final state interaction effects, and finally we find that the $J/\psi\eta\Lambda$ final state is populated with the strength similar to that of the $J/\psi K^- p$. We have studied the dependence of our results on reasonable changes in the parameters of the models involved in our description of the process, as well as on the unknown properties of the speculated hidden charm strange pentaquark. We have observed that, while there appear changes in the position of the peak and in the shapes of the distributions, a resonance signal in the $J/\psi\Lambda$ invariant mass spectrum is clearly seen in all the cases. This gives us confidence that such an experimental study could result into a successful proof of the existence of this new state.

Summary

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