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SEMINAR ZAVODA ZA TEORIJSKU FIZIKU

(Zajednički seminari Zavoda za teorijsku fiziku,
Zavoda za eksperimentalnu fiziku IRB-a i Fizičkog odsjeka PMF-a)

LHCb pentaquarks

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Abstract:

We interpret the newly discovered pentaquark $P_c(4450)$ as a bound state of charmonium $\psi(2S)$ and the nucleon. The binding potential is due to charmonium-nucleon interaction that in the heavy quark approximation is proportional to the product of the charmonium chromoelectric polarizability and the nucleon energy-momentum distribution. We use the large N_c expansion to estimate the quarkonium polarizability and calculate the nucleon properties in the framework of the mean-field picture of light baryons. Two almost degenerate states $J^P = (1/2)^-$ and $J^P = (3/2)^-$ are predicted at the position of the $P_c(4450)$ pentaquark. We find that the nucleon-$\psi(2S)$ bound state has a naturally narrow width in the range of tens of MeV. The unitary multiplet partners of the $P_c(4450)$ pentaquark and the generalization to $b\bar{b}$-nucleon pentaquark bound states are discussed.

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