Contribution ID : 34

Interpretation of the LHCb Pc States as Hadronic Molecules and Hints of a narrow Pc(4380)

Thursday, 17 December 2020 14:45 (25)

Three hidden-charm pentaquark P_c states, $P_c(4312)$, $P_c(4440)$, and $P_c(4457)$ were revealed in the $\Lambda_b^0 \rightarrow J/\psi p K^-$ process measured by LHCb using both run I and run II data. For the first time, such an analysis is performed employing a coupled-channel formalism with the scattering potential involving both one-pion exchange as well as short-range operators constrained by heavy quark spin symmetry. We find that the data can be well described in the hadronic molecular picture, which predicts seven $\Sigma_c^{(*)} \bar{D}^{(*)}$ molecular states in two spin multiplets. We also show that there is evidence for a narrow $\Sigma_c^* \bar{D}$ bound state in the data which we call $P_c(4380)$, different from the broad one reported by LHCb in 2015. With this state included, all predicted $\Sigma_c \bar{D}$, $\Sigma_c^* \bar{D}$, and $\Sigma_c \bar{D}^*$ hadronic molecules are seen in the data, while the missing three $\Sigma_c^* \bar{D}^*$ states are expected to be found in future runs of the LHC or in photoproduction experiments.

Primary author(s) : DU, Meng-Lin (HISKP, university of Bonn)

Co-author(s): Dr VADIM, Baru (HISKP/Kurchatov Institute/P.N. Lebedev Physical Institute); GUO, Feng-Kun (Institute of Theoretical Physics, CAS); Prof. MEIßNER, Ulf-G. (Univ. Bonn/ FZ Jülich); Prof. HANHART, Christoph (FZ Jülich); Prof. WANG, Qian (South China Normal University); Prof. OLLER, Jose (Universidad de Murcia)

Presenter(s): DU, Meng-Lin (HISKP, university of Bonn)

Session Classification : Session 5