Hidden-charm pentaquarks in the molecular picture: effective field theory and phenomenological considerations

During the last few years the LHCb collaboration has detected a series of hidden-charm pentaquarks, the most recent one being the $P_{\psi s}^{\Lambda}(4338)$, which has the quantum numbers of a Λ baryon. Most of these pentaquarks are close to a meson-baryon threshold and have been readily interpreted as bound (or molecular) states. Here we explore what are the consequences of the molecular hypothesis, particularly when constrained by heavy-quark spin symmetry [1,2,3,4]. We argue, for instance, that if the $P_{\psi s}^{\Lambda}(4338)$ is to be interpreted as a $\bar{D}\Xi_c$ bound state, this will imply the existence of a $\bar{D}_s\Lambda_c$ partner state with a mass close to 4250 MeV [5]. Finally, we confront predictions coming from effective field theory with phenomenological models, to find what are the converging points between these two approaches.

- [1] Ming-Zhu Liu, Fang-Zheng Peng, Mario Sánchez Sánchez, Manuel Pavon Valderrama, Phys.Rev.D 98 (2018) 11, 114030; arxiv:1811.03992 [hep-ph]
- [2] Ming-Zhu Liu, Ya-Wen Pan, Fang-Zheng Peng, Mario Sánchez Sánchez, Li-Sheng Geng, Atsushi Hosaka, Manuel Pavon Valderrama, Phys.Rev.Lett. 122 (2019) 24, 242001; arxiv:1903.11560 [hep-ph]
- [3] Fang-Zheng Peng, Mao-Jun Yan, Mario Sánchez Sánchez, Manuel Pavon Valderrama, Eur.Phys.J.C 81 (2021) 666; arxiv:2011.01915 [hep-ph]
- [4] Mao-Jun Yan, Fang-Zheng Peng, Mario Sánchez Sánchez, Manuel Pavon Valderrama, Eur.Phys.J.C 82 (2022) 6, 574; arxiv:2108.05306 [hep-ph]
- [5] Mao-Jun Yan, Fang-Zheng Peng, Mario Sánchez Sánchez, Manuel Pavon Valderrama, arxiv:2207.11144

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