Recent progress in charmonium physics: role of heavy meson loops

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In recent years a large number of new states in the charm sector were discovered above the first inelastic threshold that not at all match to the predictions of the quark model, which on the other hand was extremely successful below that threshold [1]. Since most of those states are located close to a two–hadron threshold, many authors proposed a molecular nature for them. In this talk we will collect the evidences and discuss how the picture can be tested further — see, e.g., Refs. [2]. In addition, if hadron loops induce non-perturbative effects above the inelastic threshold, one should also expect them to have some impact on the properties of standard charmonia. Following Refs. [3], in the last part of the talk an effective field theory is introduced that allows one to investigate this issue systematically.

[1] E. S. Swanson, Phys. Rept. **429** (2006) 243.

[2] F. K. Guo, C. Hanhart and U.-G. Meißner, Phys. Lett. B **665**, 26 (2008); Phys. Rev. Lett. **102**, 242004, (2009).

[3] F. K. Guo, C. Hanhart and U. G. Meissner, Phys. Rev. Lett. **103** (2009) 082003; F. K. Guo, C. Hanhart, G. Li, U. G. Meissner and Q. Zhao, arXiv:1002.2712 [hep-ph].

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