

Below there is information concerning hadron spectroscopy relevant to PANDA, coming from different collaborations in which spanish groups have been involved.

1 Vector-vector molecular states, or equivalently, dynamically generated states from the vector-vector interaction. Also vector-baryon molecules

The vector vector interaction is most efficiently considered by taking the hidden local gauge Lagrangians [1, 2, 3, 4, 5], which puts together the chiral Lagrangians for the interaction of pseudoscalar mesons with the interaction of vectors with pseudoscalars and between themselves. An update of the recent advancements in this field can be seen in a recent report of the lectures I delivered in "New Frontiers in QCD 2010 Workshop, Kyoto, February 2010" [7].

2 Charm and hidden charm mesons

Two thesis have been done here, by Daniel Gamermann and R. Molina. Daniel Gamermann has done much work concerning the interaction of charmed mesons generating many resonances, some of which have already been observed, and some others which are predictions. His relevant papers can be seen in [8, 9, 10, 11, 12].

Raquel Molina has also done work with charm and hidden charm resonances coming from the interaction of vector mesons in [13, 14, 15, 16].

3 Charmed baryons

The group of Barcelona is currently doing work on the topic. A very recent work is [17], and a recent report for Charm at FAIR is the talk of Laura Tolos [18].

4 Baryons with hidden charm

A very interesting prediction of baryons states with hidden charm has been done in [19], in collaboration with the chinese IHEP group, for states above 4 GeV.

5 Charm and hidden charm in the nuclear medium

A recent report on work on this field can be found in the lectures of Laura Tolos [20].

6 Bound states and resonances of three hadrons

This topic is of relevance, and contrary to scattering experiments, where one finds resonances which couple to the two body entrance channel, PANDA at FAIR has the chance to see such states in final three body channels. An excellent complement to scattering experiments. Alberto Martinez, for his Thesis has done much work on the topic and found that the low lying $1/2^+$ can be well described as molecules of two mesons and a baryon, the X(2175) can be explained as a $\phi K \bar{K}$ resonance and the Y(4260) as a $J/\psi K \bar{K}$ system. With the development of new few body techniques, this area is only beginning to emerge and looks very promising. New predictions will be made, and experiment can go on its own, with the certainty that many more states will appear from the analysis of three body final states. The relevant references for this area are: [21, 22, 23, 24, 25, 26, 27].

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