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Studying the Glueball Spectrum within Constituent Models

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Glueballs are elusive states. These unique particles, arising directly from the non-Abelian nature of the QCD gauge symmetry, were theoretically predicted in the early 1970s. Yet, their experimental observation remains a matter of debate within the community. The existing signals are difficult to interpret, partly due to the lack of theoretical consensus on their expected properties.

Various approaches have been employed to determine these properties, including calculations based on lattice QCD, Bethe-Salpeter equations, QCD sum rules, the bag model, and the Coulomb-gauge Hamiltonian. The present talk analyses the glueball spectrum from a different perspective, that of constituent models. In this framework, glueballs are treated as bound states of several constituent gluons. The focus is placed on the two-gluon sector, illustrating how a glueball mass spectrum can be obtained at relatively low numerical cost within this model. The issue of the constituent gluon mass is discussed in this context. The resulting masses are finally compared with those from lattice QCD and show notable agreement.

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