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Computation of correlation matrices for tetraquark candidates with $J^P = 0^+$ and flavor structure $q_1\bar{q}_2q_3\bar{q}_3$

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The conjecture that several recently observed mesons have a structure, which is not dominated by an ordinary quark antiquark pair, but by a four-quark structure, is being actively investigated both theoretical and experimentally. Such a state maybe characterised as molecular state or as a diquark-antidiquark pair. Lattice QCD provides a theoretically sound framework to study such states. In order to quantitatively investigate the internal structure of such mesons one needs the precise computation of correlation matrices with several different interpolating fields that include two- and four-quarks. In this talk we present our study of such correlation matrices paying particular attention to the technical aspects involved in the computation of diagrams that include closed quark loops and disconnected parts. We study tetraquark candidates with $J^P = 0^+$ and flavor structure $q_1\bar{q}_2q_3\bar{q}_3$ including e.g.\ the $a_0(980)$ meson, the D^*_{s0} meson and some of the the charged $c\bar{c}$ X states. Numerical results on the $a_0(980)$ meson are discussed in detail.

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