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Heavy tetraquark states and quarkonium hybrids

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Many of the XYZ resonances observed by the Belle, Babar, CLEO and BESIII collaborations in the past decade are difficult to interpret as conventional quark-antiquark mesons, motivating the consideration of scenarios such as multi-quark states, meson molecules, and hybrids. After a brief introduction to QCD sum-rule methods, we provide a brief but comprehensive review of the mass spectra of the quarkonium-like tetraquark states $qQ\bar{q}\bar{Q}$, doubly charmed/bottomed tetraquark states $QQ\bar{q}\bar{q}$ and the heavy quarkonium hybrid states $\bar{Q}GQ$ in the QCD sum rules approach. Possible interpretations of the XYZ resonances are briefly discussed.

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