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## Shapes and sizes of diquarks in lattice QCD

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The idea of diquarks as effective degrees of freedom in QCD has been a successful concept in explaining observed hadron spectra. Recently they have also played an important role in studying doubly heavy tetraquarks in phenomenology and on the lattice. The first member of this family of hadrons is the  $T_{CC}$ , newly discovered at LHCb.

Despite their importance, the colored nature of diquarks has been an obstacle in lattice studies. We address this issue by studying diquarks on the lattice in the background of a heavy static quark, i.e. in a gauge-invariant formalism with quark masses down to almost physical pion masses in full QCD. We determine mass differences between diquark channels as well as diquark-quark mass differences. In particular we consider diquarks with “good” scalar,  $\bar{3}_F, \bar{3}_C, J^P = 0^+$ , quantum numbers. Attractive quark-quark spatial correlations are found only in this channel and we observe that the “good” diquark shape is spherical. From the spatial correlations in the “good” diquark channel we extract a diquark size of  $\sim 0.6$  fm.

Our results provide quantitative support for modelling the low-lying baryon spectrum using good light diquark effective degrees of freedom.

### In-person participation

Yes

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