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Doubly heavy exotics

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Recent discoveries by Belle and BESIII of charged exotic quarkonium-like resonances provide fresh impetus for study of heavy exotic hadrons. In the limit N_c –> infinity, M_Q –> infinity, the (Qbar Q qbar q') tetraquarks (TQ-s) are expected to be narrow and slightly below or above the (Qbar q') and (Q qbar) two-meson threshold. The isoscalar TQ-s manifest themselves by decay to (Qbar Q) pi pi, and the ~30 MeV heavier charged isotriplet TQ-s by decays into (Qbar Q) pi. The new data strongly suggest that the real world with N_c=3, Q=c,b and q,q' = u,d is qualitatively described by the above limit. We discuss the relevant theoretical estimates and suggest new signatures for TQ-s in light of the recent discoveries. We also consider "baryon-like" states (Q Q' qbar qbar'), which if found will be direct evidence not just for near-threshold binding of two heavy mesons, but for genuine tetraquarks with novel color networks. We stress the importance of experimental search for doubly-heavy baryons in this context.

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