## Phenomenology 2019 Symposium



Contribution ID: 771

Type: parallel talk

## Double Heavy Baryons and Corrections to Heavy Quark-Diquark Symmetry

Tuesday 7 May 2019 17:45 (15 minutes)

Doubly heavy baryons and singly heavy antimesons are related by heavy quark-diquark (HQDQ) symmetry because in the  $m_Q \rightarrow \infty$  limit the light degrees of freedom in both hadrons are expected to be in identical configurations. Hyperfine splittings of the ground states in both systems are nonvanishing at  $O(1/m_Q)$  in the heavy quark mass expansion and HQDQ symmetry relates the hyperfine splittings in the two sectors. It was expected that corrections to this prediction would scale as  $O(1/m_Q^2)$ . In this paper, working within the framework of Non-Relativistic QCD (NRQCD), we point out the existence of an operator that couples four heavy quark fields to the chromomagnetic field with a coefficient that is enhanced by factor from Couloumb exchange. This operator gives corrections to doubly heavy baryon hyperfine splittings that scale as  $1/m_Q^2 \times \alpha_S/r$ , where r is the separation between the heavy quarks in the diquark. This corrections can be calculated analytically in the the extreme heavy quark limit in which the potential between the quarks in the diquark is Coulombic. In this limit the correction is  $O(\alpha_s^2/m_Q)$  and comes with a small coefficient. For values of  $\alpha_s$  relevant to doubly charm and doubly bottom systems the correction to the hyperfine splittings in doubly heavy baryons is only a few percent or smaller.

## Summary

Authors: MOHAPATRA, Abhishek (Duke University); MEHEN, Thomas (Duke University)
Presenter: MOHAPATRA, Abhishek (The Ohio State University)
Session Classification: Flavor II