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Analysis of heavy baryon lifetimes

Monday, 17 July 2023 14:40 (20 minutes)

We study the inclusive decay widths of the singly heavy baryon using the improved bag model in which the unwanted center-of-mass motion is removed. We discuss the running of the baryon matrix elements and compare the results with the non-relativistic quark model (NRQM). We find that while the numerical values of two-quark operator elements are compatible with the literature, those of the four-quark ones deviate largely. In particular,the heavy quark expansion holds well in the bag model for four-quark operator matrix elements but badly broken in the NRQM. We find an excellent agreement between theory and experiment for the bottom-baryon lifeimes. For charmed baryons, the calculated decay widths confirm that the established new hierarchy of $\tau(\Xi_c^+) > \tau(\Omega_c^0) > \tau(\Lambda_c^+) > \tau(\Xi_c^0)$
originates from dimension-7 four-quark operators. We recommend to measure some semileptonic inclusive branching fractions in the forth-coming experiments to discern different approaches.

Consent

I consent to recording/broadcasting my presentation.

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