



Contribution ID: 23

Type: not specified

η_c production at the LHC challenges nonrelativistic-QCD factorization

Tuesday 30 August 2016 17:50 (20 minutes)

We analyze the first measurement of η_c production, performed by the LHCb Collaboration, in the nonrelativistic-QCD (NRQCD) factorization framework at next-to-leading order (NLO) in the strong-coupling constant α_s and the relative velocity v of the bound quarks including the feeddown from h_c mesons. Converting the long-distance matrix elements (LDMs) extracted by various groups from J/ψ yield and polarization data to the η_c case using heavy-quark spin symmetry, we find that the resulting NLO NRQCD predictions greatly overshoot the LHCb data, while the color-singlet model provides an excellent description

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Session Classification: Section C

Track Classification: Section C: Heavy Quarks