ESTIMATES OF THE WEAK ANNIHILATION CONTRIBUTIONS TO THE DECAYS $B \to \rho + \gamma$ and $B \to \omega + \gamma$

A. Ali, V. M. Braun

The dominant long-distance contributions to the exclusive radiative decays $B \to \rho(\omega)+\gamma$ involve photon emission from the light quarks at large distances, which cannot be treated perturbatively. We point out that this emission can be described in a theoretically consistent way as the magnetic excitation of quarks in the QCD vacuum and estimate the corresponding parity-conserving and parity-violating amplitudes using the light-cone QCD sum rule approach. These are then combined with the corresponding short-distance contribution from the magnetic moment operator in the same approach, derived earlier, to estimate the decay rates $\Gamma(B \to \rho(\omega) + \gamma)$. The implications of this result for the determination of the Cabibbo-Kobayashi-Maskawa (CKM) matrix elements in radiative B decays are worked out.

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POWER CORRECTIONS AND RENORMALONS IN DRELL–YAN PRODUCTION

M. Beneke, V. M. Braun

The resummed Drell-Yan cross section in the double-logarithmic approximation suffers from infrared renormalons. Their presence was interpreted as an indication for non-perturbative corrections of order $\Lambda_{QCD}/(Q(1-z))$. We find that, once soft gluon emission is accurately taken into account, the leading renormalon divergence is cancelled by higher-order perturbative contributions in the exponent of the resummed cross section. From this evidence, 'higher twist' corrections to the hard cross section in Drell-Yan production should intervene only at order $\Lambda^2_{QCD}/((Q^2(1-z)^2)$ in the entire perturbative domain $Q(1-z) > \Lambda_{QCD}$. We compare this result with hadronic event shape variables, comment on the potential universality of non-perturbative corrections to resummed cross sections, and on possible implications for phenomenology.

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