

Interpretation of Angular Distributions of Z-boson Production

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High precision data of dilepton angular distributions in γ^*/Z production were reported recently by the CMS Collaboration covering a broad range of the dilepton transverse momentum, q_T , up to ~ 300 GeV. Pronounced q_T dependencies of the λ and ν parameters, characterizing the $\cos^2\theta$ and $\cos 2\varphi$ angular distributions, were found. Violation of the Lam-Tung relation was also clearly observed. We show that the q_T dependence of λ allows a determination of the relative contributions of the $q\bar{q}$ annihilation versus the qG Compton process. The violation of the Lam-Tung relation is attributed to the presence of a non-zero component of the $q - \bar{q}$ axis in the direction normal to the “hadron plane” formed by the colliding hadrons. The observed q_T dependencies of λ and ν from the CMS and the earlier CDF data can be well described using this approach.

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