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Drell-Yan lepton angular dependencies at the LHC

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The angular distributions of Drell-Yan charged lepton pairs in the vicinity of the Z-boson mass peak probe the underlying QCD dynamics of Z-boson production. This talk presents measurements from ATLAS and CMS collaborations on the set of angular coefficients A0-A7 describing these distributions using pp collisions at $\sqrt{s}=8$ TeV at the LHC. The measurements are compared to the QCD predictions at leading order, next-to-leading order, and next-to-next-to-leading order in perturbation theory. Drell-Yan charged lepton pairs in addition allow the transverse momentum of Z/ γ^* bosons, $p_T(\ell\ell)$ to be measured. The latter requires a precise understanding of the p_T calibration and resolution of the final-state leptons. To minimize the impact of systematic uncertainties, the ϕ observable derived from the angles subtended by the leptons is introduced. Its resolution is significantly better than that of $p_T(\ell\ell)$ and therefore it can be used as an alternative probe of $p_T(\ell\ell)$. Finally, the angular distributions of charged leptons and in particular the angular variable $\cos\theta^*$ between the outgoing lepton and the incoming quark in the Collins-Soper frame is useful for the measurement of the forward-backward asymmetry AFB in the production of Drell-Yan lepton pairs. In turn, measurements of AFB are used to extract the effective weak mixing angle. In this talk, measurements from ATLAS, CMS and LHCb experiments on ϕ , $\cos\theta^*$ and AFB are presented at $\sqrt{s} = 7,8$ and 13 TeV.

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