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Born-projected leptons in Drell–Yan final state analysis

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In the study of the Drell-Yan process with LO decay into leptons, the cross-section allows for an angular decomposition in terms of spherical harmonics in the Collins-Soper frame. This decomposition is particularly useful for fitting the experimental data to obtain measurements for each individual angular coefficient. These coefficients can then be used to extract physical observables, one of these is proportional to the forward-backward asymmetry, A_{FB} , which is the observable used in experiments to determine the effective weak-mixing angle, $\sin^2 \theta_{\text{eff}}^\ell$. However, this decomposition is not necessarily valid beyond LO. I will discuss how one can study more complicated final states (such as QED final-state radiation) by defining Born-projected leptons, allowing us to preserve the angular decomposition in terms of suitable generalised Collins-Soper angles. This is crucial for properly fitting the experimental data when the desired precision is comparable with higher-order QED contributions, and in particular would allow to extract the FB asymmetry from the angular coefficient beyond LO.

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