

Bottom quark forward-backward asymmetry at the future electron-positron collider FCC-ee

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The Standard Model prediction for the Z -boson pole b -quark forward-backward asymmetry is calculated to be $(A_{FB}^{0,b})_{th} = 0.1030 \pm 0.0002$. From the experimental point of view, A_{FB}^b as measured by the large electron-positron (LEP) collider at the Z -pole is $A_{FB}^{0,b} = 0.0992 \pm 0.0016$, which remains today the electroweak precision observable with the largest discrepancy with respect to its SM prediction. All the A_{FB}^b measurements performed at LEP suffered from both the dominant statistical and different sources of systematic uncertainties. In this feasibility study, we show that the proposed high-luminosity electron-positron collider FCC-ee, collecting orders of magnitude more data at the Z -pole than LEP, will significantly reduce statistical uncertainties on $A_{FB}^{0,b}$. We also have studied and discussed to what extent the newly developed packages and tools, the QCD developments in the last years, and the new official FCCAnalysis framework could improve our understanding of the different sources of systematic uncertainties.

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