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Electroweak Physics at FCC-ee

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The Future Circular Collider with electron-positron beams (FCC-ee) should provide improvements of the electroweak precision measurement concerning Z, W, H and their masses by a large factor over the present status. The unparalleled experimental precision would open, via Electroweak loop corrections, a broad discovery potential for new, at least weakly interacting particles up to high energy scales.
The Z boson mass and width, as well as the Z ⟶ bb partial width, and the forward-backward asymmetries for leptons and quarks can be measured with high precision with the run at the Z pole, where the instantaneous luminosity is expected to be five to six orders of magnitude larger than LEP. As a result, a precise determination of the effective weak mixing angle, as well as of the running electromagnetic coupling αQED(mZ2) can be extracted directly from the data.
At centre-of-mass energies around 160 GeV, corresponding to the WW production threshold, the W boson mass and width can be determined precisely with high-statistics cross section measurements at several energy points. The key breakthrough for this exceptional performance is the continuous beam energy determination by resonant depolarization of the beams. Considerable improvements of the strong coupling constant determination down to a precision of Δαs(mZ)⊠±0.0001 will be possible with the measurements of the hadronic widths of the Z and W bosons.

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