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Quark & Lepton flavour physics opportunities at FCC-ee

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The Future Circular Collider (FCC) is a post-LHC project aiming at direct and indirect searches for physics beyond the SM in a new 91 km tunnel at CERN. The abundant production of beauty and charm hadrons in the 8×10^{12} Z boson decays expected in e+e- collisions at FCC-ee offers outstanding opportunities in flavour physics with b and c hadron samples that exceed those available at Belle II by a factor of 20, and are complementary to the LHC heavy-flavour programme. A wide range of measurements will be possible in heavy-flavour spectroscopy, rare decays of heavy-flavoured particles and CP-violation studies, which will benefit from the low-background experimental environment, the high Lorentz boost, and the availability of the full spectrum of hadron species. The tau pairs production in the Tera-Z phase will be 3 times larger than at Belle II, and thanks to more favorable experimental conditions (better tau - hadrons separation, better tau hemispheres separation, higher momentum tracks) it will be possible to significantly improve the determinations of the tau-lepton properties – lifetime, leptonic and hadronic widths, and mass – allowing for important tests of lepton universality. Furthermore, it will be possible to extend the searches for Lepton-Flavour-Violating tau decays, and, via the measurement of the tau polarisation, FCC-ee can access a precise determination of the neutral-current couplings of electrons and taus. These measurements present strong experimental challenges to exploit as far as possible statistical uncertainties $O(10^{-5})$, raising strict detector requirements. This contribution will present an overview of the broad potential of the FCC-ee flavour physics program and also some preliminary results from recent analyses.

Collaboration / Activity

FCC-ee

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