

## FCC-ee - also a tau factory

*Friday 1 October 2021 14:15 (20 minutes)*

The proposed FCC-ee collider provides optimal conditions for ultimate statistics studies of the four heaviest particles of the Standard Model, the Z, W and Higgs bosons and the top quark. With the phenomenal sample of  $5 \times 10^{12}$  Z decays in the very clean  $e^+e^-$  environment it also provides optimal conditions for precision studies of heavy flavour, among that studies of the tau lepton. Possibilities are opened of much improved determinations of  $\tau$ -lepton properties and, via the measurement of the  $\tau$  polarisation, of the neutral-current couplings of electrons and  $\tau$ s. Improved measurements of  $\tau$ -lepton properties –lifetime, leptonic branching fractions, and mass – allow important tests of lepton universality. The experimental challenge is to match as far as possible statistical uncertainties at the  $10^{-5}$  level. This applies in particular to the lifetime measurement, and to the branching fraction and polarisation measurements, where the cross-channel contamination is of particular concern. These issues raise strict requirements, in particular, on the accuracy of the construction and alignment of the vertex detector and of the precise calorimetric separation and measurement of photons and  $\pi$ 0s in the collimated  $\tau$  decay topologies.

The talk will review the status of the FCC-ee project and summarise the opportunities for ultimate precision tau-lepton measurements.

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