



Contribution ID: 119

Type: ORAL

Tau Physics at FCCee

Thursday 10 October 2024 14:35 (14 minutes)

The data sample of $6 \cdot 10^{12}$ Z boson decays expected to be produced at the FCC-ee offers unprecedented opportunities for the precise measurement of physics observables. One of the areas in which large improvements are foreseen is the determinations of tau lepton properties (lifetime, leptonic/hadronic widths, mass), allowing for key tests of lepton universality. These measurements will benefit from a low-background environment, initial-state energy-momentum constraints and high Lorentz boost. They present strong challenges to match the $\sim 10^{-5}$ stat uncertainties, raising strict detector requirements and novel experimental methods to limit systematic effects. In this presentation we will explore the measurement of the tau polarisation at the FCCee, focusing on some of the main experimental inputs and systematics with full simulation studies to emphasize the capabilities of FCCee for tau identification. The performance of different tau lepton reconstruction approaches in some of the leading decay modes ($\tau^\pm \rightarrow \pi^\pm \nu$, $\tau^\pm \rightarrow \pi^\pm \pi^0 (\rho) \nu$, $\tau^\pm \rightarrow \pi^\pm \pi^\mp \pi^\pm (a_1) \nu$) will also be discussed.

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Session Classification: Parallel - WG1-HTE

Track Classification: WG1: WG1-HTE - Physics Potential: Higgs, top and electroweak