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Prospects for B_c^+ and $B^+ \to \tau^+ \nu_{\tau}$ at FCC-ee

The e+e- collisions at the Z-pole energy at the Future Circular Collider (FCC) present trillions of B-hadrons of all species in a clean experimental environment. The purely leptonic $B_c^+ \rightarrow \tau^+ \nu_{\tau}$ and $B^+ \rightarrow \tau^+ \nu_{\tau}$ decays provide excellent probes of the $b \rightarrow q\tau\nu$ transition, complementary to the semileptonic decay modes. The prospects of precise measurements of the $B_c^+/B^+ \rightarrow \tau^+ \nu_{\tau}$ decays, focused on the subsequent $\tau^+ \rightarrow \pi^+ \pi^+ \pi^- \bar{\nu_{\tau}}$, are explored for the Tera-Z phase of FCC. The range of the expected signal precision is evaluated in different scenarios of non-ideal background modelling. The corresponding phenomenological impacts are discussed in both the Standard Model context, for measurements of CKM matrix elements, as well as New Physics cases, for interpretations in the generic Two-Higgs-doublet model and leptoquark models.

Collaboration / Activity

Future Circular Collider

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