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Impact of NLO QCD on Key Physics Processes at Future Higgs Factories

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The majority of Monte-Carlo (MC) simulation campaigns for future Higgs factories has so far been based on the leading-order (LO) matrix elements provided by Whizard 1.95, followed by parton shower and hadronization in Pythia6, using the tune of the OPAL experiment at LEP.

In this contribution, we test the next-to-leading-order (NLO) mode of Whizard.

NLO events of $e^+e^- \rightarrow q\bar{q}$ and $e^+e^- \rightarrow \mu^+\mu^-b\bar{b}$ are generated by POWHEG matching, with parton shower and hadronization provided by Pythia8.

The NLO effect on hadron multiplicities and event shape variables of jets will be discussed and compared with MadGraph5 at hadron-level.

After passing the events through the full detector simulation of the International Large

Detector concept as an example for a ParticleFlow-optimised detector, the jet energy

resolution and typical kinematic quantities are compared between NLO and LO at reconstruction level.

A first assessment of which physics prospects of future e^+e^- should be studied with NLO MC in the future will be given.

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