



Contribution ID: 101

Type: Oral

Evaluating Detector and Physics Limitations on Center-of-Mass Energy Determination in e^+e^- Colliders Using Dileptons.

Thursday, 18 May 2023 14:15 (15 minutes)

Methods for measuring the absolute center-of-mass energy using dileptons from e^+e^- collision events are further developed with an emphasis on detector and physics limitations. We discuss three main types of estimator, the lepton momentum-based and angles-based center-of-mass energy estimators discussed in arXiv:2209.03281, and a new estimator for the electron and positron collision beam energies. In this work we focus on the underlying limitations from beam energy spread, detector resolution, and the modeling of ISR and FSR. We study the consequent implications for the potential of these methods at center-of-mass energies ranging from 90-GeV to 1-TeV for a number of potential accelerator realizations in the context of measurements of masses of the Z, W, H, top quark, and new particles.

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Session Classification: Physics and Detectors: Track 2

Track Classification: Physics and Detectors: Track 2: Analysis and Reconstruction