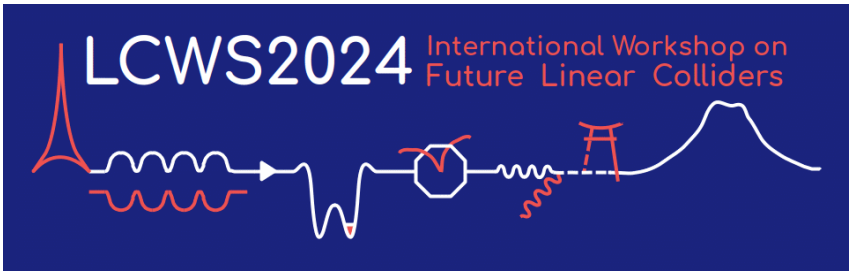

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A New Method for Measuring the Higgs Mass at ILC

Monday 8 July 2024 17:40 (20 minutes)

The Higgs mass as one of the fundamental parameters in the Standard Model has been already measured pretty well by the data collected so far at the LHC. However in some cases of looking for small deviations from the SM, current precision or projection of the Higgs mass measurement at the LHC or HL-LHC may not be good enough. One prominent example is for the SM prediction of the Higgs partial decay width to WW*or ZZ*, in which the Higgs mass uncertainty becomes one of the leading sources of parametric theory error. It is expected that at future e+e- colliders we can improve the Higgs mass precision significantly by the well-known "recoil mass method", at least statistically. This research proposes a new method which may complement to the recoil mass method in terms of systematic errors. The new method employs the signal channel of Higgs decaying to a pair of fermions, in particular tau leptons, and makes use of transverse momentum conservations alone instead of the 4-momentum conservation in the recoil mass method. The key experimental observables will be just the momentum directions of tau leptons without any input from energy measurement, and the momentum directions can possibly be measured by reconstructing the decaying vertex of the tau leptons. This new method can in principle be applied at the LHC as well. We will explore this method by performing realistic detector simulation and physics analysis at the ILC.

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