**Minutes for CEPC**

**Snowmass Progress Meeting**

Time: 10:00 — 12:00 24/12/2021

Participants: 29

**Talk1 Higgs CP measurement with EFT model in lepton collider, by Qiyu Sha**

The aim is to find the CP-odd Higgs in the Higgs CP mixing model. In the 6-dimention EFT model, the differential cross section can be simplified with reasonable assumptions. And the three angular distributions to be studied can be represented by an optimal variable ω combining the 3-dimension phase space information. The signals used is μμH with H to bb/cc/gg, the cut flow can selection efficiencies are shown. The optimal variable and μμ recoil mass are fitted to get the p distribution, which can be fitted using the maximum-likelihood fit. The result shows the parameters accuracy in EFT model are less than 10-4, which is much better than HL-LHC.

**Comments:**

 1. Only ZZ to μμqq events are used in this analysis

 2. The assumptions are made to the variables mostly contributing to the CP even terms, but it still need careful validation.

 3. The fit to recoil mass seems problematic, need further check

**Talk 2 Bs->φvv analysis, by Lingfeng Li**

The B anomalies is a tool to verify the SM mechanism and to explore new physics. The CEPC TeraZ provides large signal statistics and clean background. By looking at the BR difference between BSM and SM, we can find constrains to new physics models. The φ’s are first reconstructed using the kaon pairs, and their information are used to select the signal events. the flavor tagging and missing energy are also used in the event selection. The BDTG is applied and the final signal strength is 1.82%. The dependence of the sensitivity on the kaon pid performance is investigated. The φ longitudinal polarization fraction can be fitted to 0.53 ± 0.04 ± 0.008 using the distribution of angle between Bs and kaon in the φ frame. Combined it with the sensitivity, a tight constrain region could be obtained.

**Talk 3 Prospect for CP-violation phase φs study in the Bs->J/ψφ channel, by Mingrui Zhao**

The estimation of CP violation phase precision is made. The χ2 for vertex are used to reject the backgrounds. The dependence of the observables on the time resolution and flavor tagging power are investigated. In the previous estimation, the φs resolution is slightly better than the LHCb(HL-LHC). However, the updates show the φs resolution is worse than the LHCb(HL-LHC). It can be improved with a better flavor tagging.

**Comments:**

 1. The vertex fitting χ2 is calculated from the reconstructed samples, it means the vertex resolution is already taken into account.

**Talk 4 Measurement of B0(s) → ηη at CEPC**

The η are reconstructed using the di-photon final states. Since the average number of π0 is significantly larger than that of η, the photons entering into the π0 mass window are first exclude to reduce the combinatorial background related to π0. The reconstruction efficiency, purity, and the pair distributions are investigated and information are applied in the event selection. The accuracies at different B mass resolution are estimated at MC truth level.

**Comment:**

 1. The importance of of this channel need theoretical inputs

 2. The LHCb or other experiments might have discussed the potential of this channel.

**Talk 5 Deeply Learned Preselection of Dijet Higgs Decays at Future Lepton Colliders, by Wenxing Zhang**

Three deep learning tools (BDT, FCNN, CNN) are used in the preselection analysis to improve the cut-based result, and their performances are compared using the signal strength. The variables used in the preselection are missing mass, transverse/longitudinal momentum, charge particle number, y\_i,j values, and the di-jet mass. The result shows the FCNN provide the best improvement (for s-tagging events, the signal strength improve from 200 to 50), and the CNN result is the worst, even worse than cut-based result.

**Comments:**

 1. The CNN need large amount data for training, in this analysis it is not the case