Reply to the comments for the draft v1.

("Physics potential for the HZZ decay at the CEPC")

# [ Comments from Yaquan ]

L10: Since BDT has some additional improvement, why not use that number in abstract and mention that BDT is applied.?

A: Update the final number from the BDT analysis (9.48% to 8.80%) and

it is now mentioned in the abstract.

L260: It is worthwhile to mention BDT results in summary because it is most important update after CDR.

A: BDT result is included in the summary.

L59: should be from the "combination of the two measurements.

A: yes, it is corrected.

Table2: what fraction of event it is smaller?

A: it was trying to indicate that number of event is less than 1.

It is updated to be 0 after checking that the remaining 2-fermion event is 0.

Table3: better to have a distribution plot of BDT outputs for different processes.

A: BDT distribution plots are added in the draft. (Fig.2 in the updated version)

L203: describe what variables are used in BDT

A: Description of input variables to the BDT is added in the draft.

# [ Comments from Manqi ]

[1] I noticed that the Higgs Background is pretty significant after the event selection. Is the leading background mainly H->bb (i.e. in Z(mumu)H(qqvv) )? If so, we shall try to use some b-tagging information to Veto it.

A: Yes, (Z->)H(->bb) is a main background in Z(->)H(ZZ->qq) and

Z(->qq)H(ZZ->). Since 4-fermion backgrounds as well as other Higgs background have certain contribution, a very rough estimation,

assuming the b-tagging for veto, has been tried. From this comparison,

the improvement might be limited even though we utilize the b-tagging.

[2] In addition, it would be nice to quantify the cross talks between different signal channels, to see if there exist any chance to mis-identify one signal decay modes into another.

Since the signal sample (i.e., Z(->)H(ZZ->qq/qq) ) has been chosen

from "e2e2h\_zz" MC samples, using MC truth information, therefore,

misidentifying the other signals as the signal under consideration would not

happen.

On the other hands, the other signals are left in the ZH background category.

To quantify that number, we have made a table which lists number of events after all of cuts applied. (numbers are taken from the cut-based analysis).

Current analysis treats all of six signal categories as independent,

but if there are further suggestions, such as, better to try to remove this cross talks

in the background, that's would be helpful.