

# Hadronic branching ratios of the Higgs: $H \rightarrow bb/cc/gg$

## Short description.

Measurement of Higgs coupling to heavy quarks (Higgs decay to gluons is mediated by heavy quark loops.)

These studies were previously done focused on  $\sqrt{s}=250$  GeV with ZH and Zll.  
For this study at 500 GeV, the study should at least be done with  $\nu\nu$ -H (WW-fusion and ZH) which is a clean experimental benchmark.  
(For physics the ZH channel with  $Zq\bar{q}$  would also be worth studying as it is likely the most powerful for physics and at 500 GeV benefits from the relatively unambiguous jet pairing).

## Main observables.

$BR(H \rightarrow b\bar{b}, c\bar{c}, gg)/BR$  from  $(\sigma BR)/(\sigma BR)$  and / measurements.

## Control variables.

b-tag, c-tag, JER,  $M_H$

## People.

Masakazu Kurata, Ryo Yonamine

## Referees.

Hiroaki Ono, Frank Simon

## Git repository.

[https://github.com/ILDAnaSoft/ILDbench\\_Hbbccgg](https://github.com/ILDAnaSoft/ILDbench_Hbbccgg)

## IDR analysis note on Overleaf

<https://overleaf.com/read/bkhrbnxscjkm>

Current version of analysis note 2020-01-09 V7



## Candidate plots for IDR

Update plots and code at 2020-01-09



IDRplot1.eps



IDRplot1.C



IDRplot1.pdf



IDRplot2.C



IDRplot2.eps



IDRplot2.pdf



IDRplot5.eps



IDRplot5.C



IDRplot5.pdf



IDRplot4.eps



IDRplot4.C



IDRplot4.pdf



IDRplot3.eps



IDRplot3.C



IDRplot3.pdf



IDRplot6.C



IDRplot6.eps



IDRplot6.pdf

### Source of the plots

Updated 2020-01-09



makeIDRplot.cc



vars\_histograms\_l\_m08p03.root



vars\_histograms\_s\_m08p03.root

## References.

H. Ono, A. Miyamoto, "Evaluation of measurement accuracies of the Higgs boson branching fractions in the International Linear Collider", <https://arxiv.org/abs/1207.0300>

H. Ono, "Higgs branching ratio study for DBD detector benchmarking in ILD", [http://inspirehep.net/record/1475550/files/1238328\\_203-223.pdf](http://inspirehep.net/record/1475550/files/1238328_203-223.pdf)

M. Kurata, presentaion at Benchmarking Days, <https://agenda.linearcollider.org/event/8011/contributions/42069/>