



Brief report on Status of CLIC Higgs Paper

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for the editorial team

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(will be inserted by the editor)

Higgs Physics at the CLIC e^+e^- Linear Collider*

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Status



- ★ **Things are progressing:** 😊
 - **enthusiastic agreement from editor that paper should be submitted to EPJC**
 - **paper structure decided** 😊
 - **a very early draft exists** 😊
 - **sections are being filled as analyses are completed**
 - **now need to fill in gaps**
 - **+ editing, more editing, ...**



Structure



- ★ 1) Introduction
- ★ 2) Simulation and Reconstruction tools
- ★ 3) Overview of Higgs Production at CLIC
- ★ 4) Higgsstrahlung at 350 GeV
- ★ 5) WW Fusion – all energies: 350, 1.4, 3.0
- ★ 6) ZZ Fusion – 1.4 TeV
- ★ 7) Top Yukawa Coupling
- ★ 8) Higgs Self-Coupling
- ★ 9) Higgs Mass
- ★ 10) Combined Fits
- ★ 11) Summary and Conclusions



Status



- ★ 1) Introduction
- ★ 2) Simulation and Reconstruction tools
- ★ 3) Overview of Higgs Production at CLIC
- ★ 4) Higgsstrahlung at 350 GeV (some gaps)
- ★ 5) WW Fusion (some content)
- ★ 6) ZZ Fusion (introductory text)
- ★ 7) Top Yukawa Coupling
- ★ 8) Higgs Self-Coupling (1.4 TeV to be finalised)
- ★ 9) Higgs Mass
- ★ 10) Combined Fits (need all final numbers)
- ★ 11) Summary and Conclusions



Structure



- ★ 1) Introduction
- ★ 2) Simulation and Reconstruction tools
- ★ 3) Overview of Higgs Production at CLIC
- ★ 3) Overview of Higgs Production at CLIC
 - ★ 3.1: Motivation for 350 GeV
 - ★ 3.2: Impact of Beam Polarisation
 - ★ 3.3: Overview of measurements at 350 GeV
 - 3.3.1: Extraction of couplings
 - ★ 3.4: Overview of measurements at > 1 TeV
- ★ 9) Higgs Mass
- ★ 10) Combined Fits
- ★ 11) Summary and Conclusions



★ 1) Introduction

★ 4) Higgsstrahlung at 350 GeV

★ 4.1: Recoil mass

- 4.1.1: $Z \rightarrow \mu\mu, ee$
- 4.1.2: $Z \rightarrow qq$
- 4.1.3: $Z \rightarrow \text{invis}$
- 4.1.4: ZH cross section

★ 4.2: Branching ratios

- 4.2.1: $H \rightarrow bb, cc, gg$
- 4.2.2: $H \rightarrow \tau\tau, bb, cc, gg$
- 4.2.3: $H \rightarrow WW^*$
- 4.2.4: $H \rightarrow ZZ^*$

★ 11) Summary and conclusions



★ 5) WW Fusion

★ 5.1: Higgs to fermions

- 5.1.1: $H \rightarrow bb, cc, gg$
- 5.1.2: $H \rightarrow \tau\tau$

★ 5.2: Higgs to WW and ZZ

- 5.2.1: $H \rightarrow WW^*$ at 350 GeV
- 5.2.2: $H \rightarrow WW^*$
- 5.2.3: $H \rightarrow ZZ^*$

★ 5.3: Rare Higgs Decays

- 5.3.1: $H \rightarrow \gamma\gamma$
- 5.3.2: $H \rightarrow Z\gamma$
- 5.3.3: $H \rightarrow \mu\mu$



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- ★ 6) ZZ Fusion
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**Monolithic
sections**



Structure



- ★ 1) Introduction
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- ★ 4) Higgsstrahlung at 350 GeV
- ★ 5) WW Fusion
- ★ 6) ZZ Fusion
- ★ 7) Top Yukawa Coupling
- ★ 8) Higgs Self-Coupling
- ★ 9) Higgs Mass
- ★ 10) **Combined Fits** } Some thoughts required on BSM sensitivity?
- ★ 11) Summary and Conclusions



What next?



★ Timescales

- desire to bring to conclusion asap
- lots of progress, but still a lot to do...

★ Highest priorities

- finish remaining analyses – lots of progress presented at this meetings
- fill in the missing sections (analyses + ...)
- edit into a consistent style