APC FCC news

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Contributions to mid-term review report

- Measurement of ee->ZH inclusive x-section and Higgs mass with ee->Z(ll)H at 240 GeV [Ang, Greg]
- Measurement of H(bb/cc/gg/ss) branching ratios with ee->ZH at 240 GeV (Z->ll/nunu/qqbar) [Giovanni]

Higgs mass and model-independent cross section at FCC-ee in the muon and electron final states

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This note outlines the prospects of Higgs mass and model-independent cross-section measurements at the FCC-ee using the recoil mass method at the ZH threshold of $\sqrt{s} = 240$ GeV. A baseline analysis with statistical interpretation in the muon and electron channels is presented and discussed within the targeted experimental conditions such as detector configurations and machine parameters.

Measurement of Higgs boson hadronic decays with $Z(\rightarrow \text{leptons})H$ events at FCC-ee at $\sqrt{s} = 240$ GeV

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Abstract

The sensitivity of the measurement of the Higgs boson branching branching ratios to $b\bar{b}$, $c\bar{c}$, $s\bar{s}$ and gg final states with a modified version of the IDEA detector concept at the Future Circular Collider is studied using simulated event samples of the main signal and background processes. The study assumes an integrated luminosity of 5 ab^{-1} of e^+e^- collisions with a centre-of-mass energy $\sqrt{s} = 240$ GeV. The signal consists of $e^+e^- \rightarrow ZH$ Higgs-strahlung events followed by one of the four Higgs boson decays under study. The study considers Z boson decays to pairs of leptons, either charged (e^+e^-, $\mu^+\mu^-$) or neutral ($\nu\bar{\nu}$).

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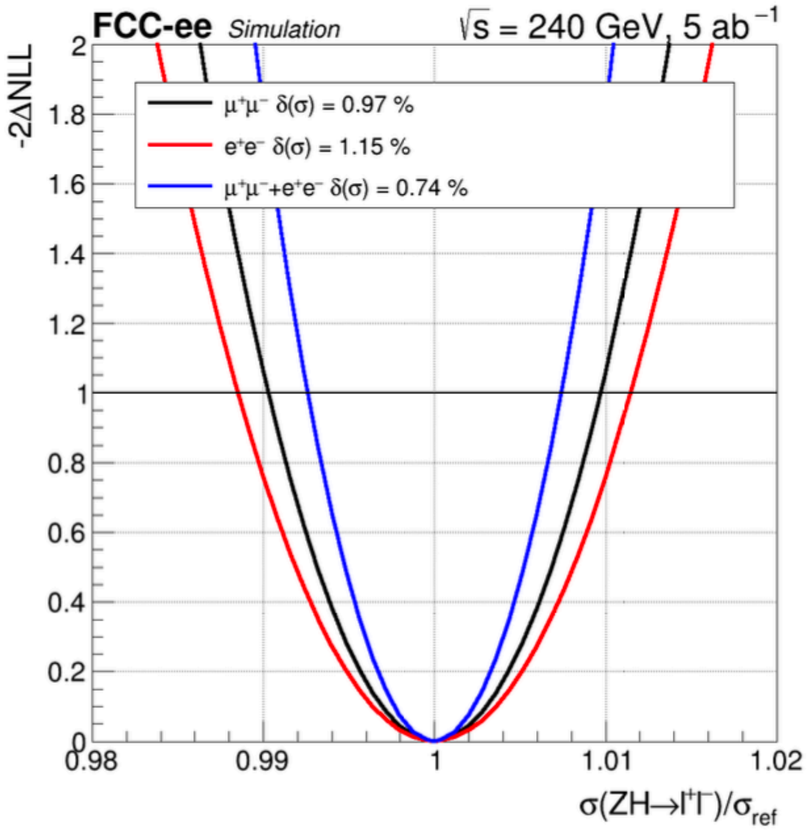

Table 4: Expected statistical uncertainties on the signal strength in the $\ell\ell H$ production mode assuming an integrated luminosity $L = 5$ ab^{-1} of ee collisions at $\sqrt{s} = 240$ GeV, for three different configurations of the POIs.

Signal strength	Uncertainty (%)			
	5 POIs	4 POIs	4 POIs	3 POIs
$b\bar{b}$	0.81	0.81	0.81	0.81
$c\bar{c}$	4.93	4.93	4.93	4.93
gg	2.73	2.72	2.68	2.67
other	2.19	2.19	-	-
$s\bar{s}$	410	-	410	-

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Relative error on mu_bb: 0.81%
Relative error on mu_cc: 4.97%
Relative error on mu_gg: 2.70%
Relative error on mu_ss: 377.93%
Relative error on mu_WW: 2.00%
Relative error on mu_ZZ: 20.19%
Relative error on mu_tautau: 3.32%
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Table 7: Expected statistical uncertainties on the signal strength in the $\nu\bar{\nu}H$ production mode assuming an integrated luminosity $L = 5$ ab^{-1} of ee collisions at $\sqrt{s} = 240$ GeV, for different configurations of the POIs.

Signal strength	Uncertainty (%)			
	5 POIs	4 POIs	4 POIs	3 POIs
$b\bar{b}$	0.37	0.37	0.37	0.37
$c\bar{c}$	2.50	2.50	2.50	2.50
gg	1.25	1.24	1.25	1.24
$s\bar{s}$	160	160	-	-
other	1.46	-	1.46	-

Proposals for contribution to DRDs

- DRD3 - solid state sensors (Marco, Giovanni)
  - CMOS 65 nm MAPS (mainly for FCC-ee) [0.6 FTE phys+IT] - Joint proposal submitted with IPHC et al - discussion ongoing about IT resources at APC
  - Radiation damage (mainly towards FCC-hh) [0.4 FTE phys]

- DRD6 - calorimetry (Gregorio, Giovanni)
  - R&D activities on liquid-noble calorimeters (simulation and digitisation / performance studies / analysis and support of test measurements) [0.8 FTE physicists]

Other

- **Participations to future workshops FCC/ECFA**
  - FCC week in London: Greg
  - ECFA WG3 WS on tracking at CERN: Giovanni
  - ECFA plenary in Paestum: Greg + Giovanni

- **Internships**, that could lead to presentations at the jamboree:
  - Matthieu Gailliard (M2, ongoing) on optimisation of ZH xsection measurement with Z(ee), and reduction of systematic uncertainties
  - Robin Signoret (M1, ongoing) and Justin Albinet (L3, starting in 2 weeks) on H(bb/cc/gg/ss) branching ratios (optimisation of selection criteria)