CP-mixing measurement using $t\bar{t}H$

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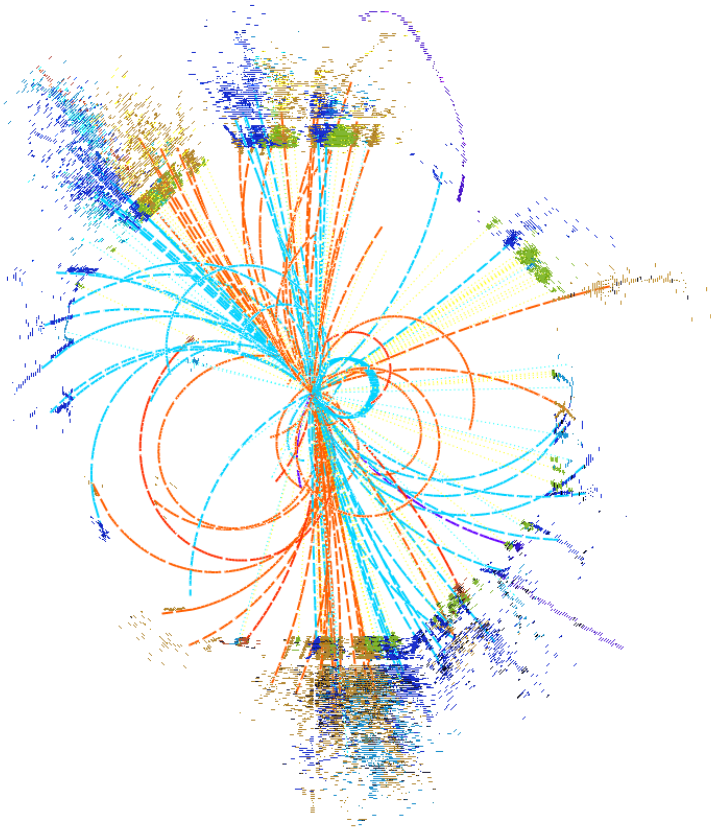
CLICdp
WG analysis
meeting



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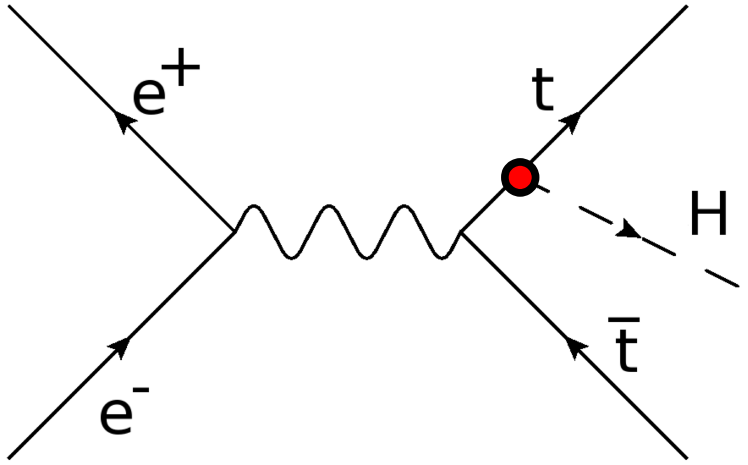
CERN, Geneva

Introduction

Higgs coupling to the top quark:

$$-ig_{ttH}(a + i\,b\,\gamma_5)$$

e.g. arXiv:1103.5404



Standard Model: a = 1, b = 0
Pure pseudo-scalar coupling: a = 0, b ≠ 1

Easiest option: use total cross section $\sigma(t\bar{t}H)$ → see next slides

In the following: $a = \cos\Phi$, $b = \sin\Phi$, $\cos^2\Phi + \sin^2\Phi = 1$

Better: use differential distributions → analyses by Yixuan and Tom

$t\bar{t}H$ cross section at CLIC

$\sin^2\Phi$:	$\sigma(t\bar{t}H)$ [fb]:
0.0	1.63
0.05	1.57
0.1	1.51
0.2	1.40
0.3	1.28
0.4	1.17
0.5	1.05
0.6	0.93
0.7	0.82
0.8	0.71
0.9	0.59
1.0	0.46

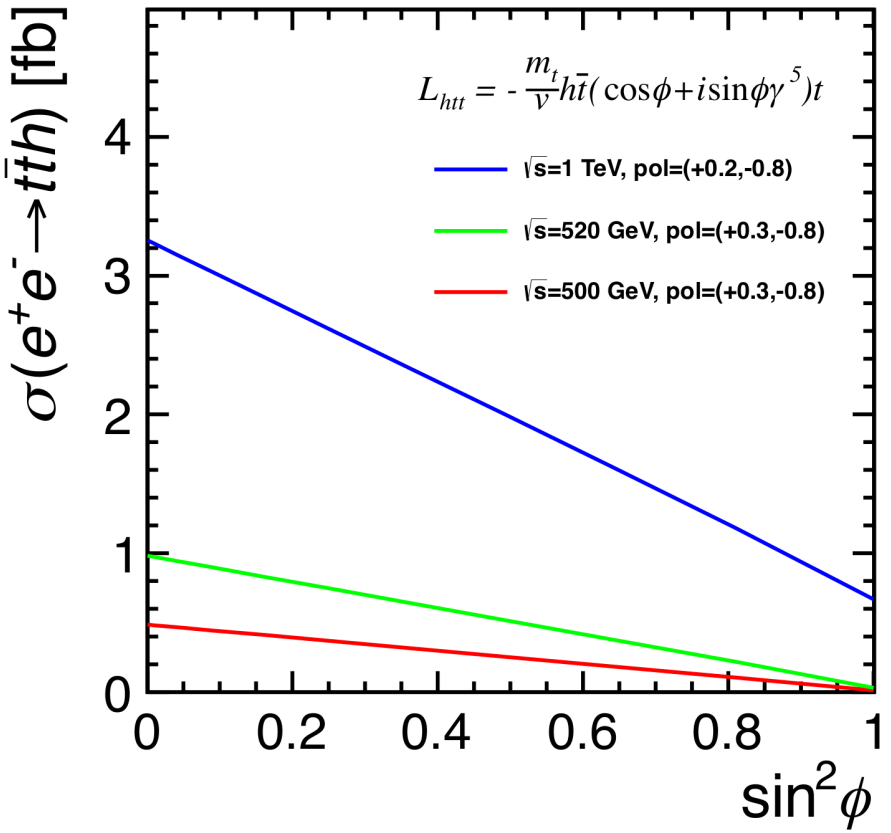
Physsim calculation:
- $\sqrt{s}$ = 1.4 TeV
- ISR
- CLIC luminosity spectrum
- M_H = 125 GeV
- M_t = 174 GeV

For analysis of differential distributions:

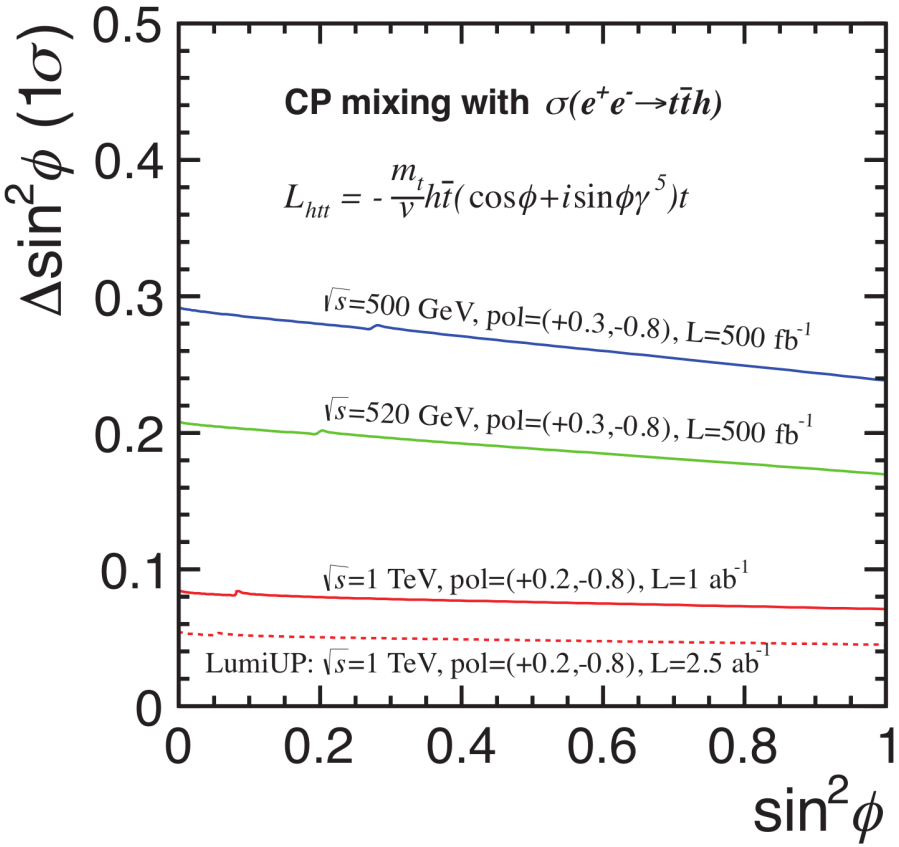
- Producing $t\bar{t}H$ signal samples for the fully hadronic and semi-leptonic channels assuming these $\sin^2\Phi$ values

- 2D templates potentially later

For comparison: ILC projections



→ consistent with CLIC numbers



arXiv:1310.0763