

Update for Combination Measurement of CEPC

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2016-06-27

Data from each subchannel

Signal		abbr.	Who takes charge	Update date
Z	H			
ee	bb	eebb	ZhenXing	2015.11 (root) 2016.3,4 (slcio file)
	cc	eecc		
	gg	eegg		
$\mu\mu$	bb	mmbb		
	cc	mmcc		
	gg	mmgg		
qq	bb	qqbb	Bai Yu	2015.11 (root) 2016.4 (slcio file)
	cc	qqcc		
	gg	qqgg		
ll	$\gamma\gamma$	llaa	Wang Feng	2015.11 No new data any more
vv		nnaa		
qq		qqaa		
vv	ZZ	vvzz	Yuqian	2016
$\mu\mu$	$\tau\tau$	mmtt	Yu Dan	2016.6 undergoing (root)
vv	WW (lvqq)	vvWW	Libo, (Xianke?)	2016.6 (slcio file) undergoing

Considering their busy schedule,
It seems there could not have a complete version of histograms in months.

So my current plan is wait and complete my analysis code, and update the data whenever available.

All the histograms are created from slcio files, by themselves and their own code, so things like nuisance parameters naming are totally different.

Fit μ uncertainty

- This week only τ updated and Dan told me the events are not scaled yet;
- So no plots or fit results update.

Variables in analysis

- Only use H Invmass, No any nuisance parameters yet;
 - For using any other variables(Like recoil mass, four momentum, MCTruth information), or nuisance parameters, should store first when analyzing slcio file.
- I have got some of their analysis code and now reading.
 - Few system uncertainties are parametric
 - Now trying to build my own filter, and export my own root file with interested variables.
- Now wait for their update

Fit μ Uncertainty

- In Jin's code, each subchannel's POI are recorded as:
 - BB :uncertainty_common, mu, mu_bb, mu_JJ
 - CC :uncertainty_common, mu, mu_cc, mu_JJ
 - GG :uncertainty_common, mu, mu_gg, mu_JJ
 - ZZ :uncertainty_common, mu, mu_zz
 - AA :uncertainty_common, mu, mu_aa
 - Common error are about NP(Current 0 or 0.5%), then
 - Fit global μ : Set poi of bb,cc,gg,zz,aa,JJ constant;
 - Fit br μ : Set poi of global μ , JJ constant.
 - This signal strength is proportional to the square of CrossX.
 - Not get Br or CrossX directly; their product;
- In Nicolas's code, the classification are different (more complicated)
 - Especially in NP; now small issue, maybe serious later;
 - Workspace need rebuild;
 - Trying to edit code to use one workspace?

Coupling Fits

$$\kappa_f = \frac{g(hff)}{g(hff; SM)}, \quad \kappa_V = \frac{g(hVV)}{g(hVV; SM)}$$

- In CEPC, Higgs coupling parameters can be reduced into:
- 7, $\kappa_b, \kappa_C, \kappa_T = \kappa_\mu, \kappa_Z, \kappa_W, \kappa_\gamma, \kappa_g$. recommended by the LHC Higgs cross section group
- 10 $\kappa_b, \kappa_C, \kappa_T, \kappa_\mu, \kappa_Z, \kappa_W, \kappa_\gamma, \kappa_g, BR_{inv}, \Gamma_h$.
- After setting (doubting its accuracy.....),
 - now the fit can output these fit parameters
 - changing from ATLAS usage to CEPC.
- But Fit failed when only using H_InvMass
- Need more inputs?
 - like measured CrossX (From Recoil Mass?)
- Continue to debug the code, and trying to get more inputs into fit.

cision in rare processes such as Higgs to di-photon couplings. Note that a large portion of the systematics intrinsic to a hadron collider would be cancelled by taking ratios of measured cross sections. For example, combining the ratio of the rates of $pp \rightarrow h \rightarrow \gamma\gamma$

Further Plan

- Debugging
- Waiting new data, and trying to find new inputs for fit;
- Get CrossX from subchannels with recoil mass?
- Reviewing pre-CDR, their analysis code, Nicolas's code
- Gfitter package, Gang advised me to view