Weekly report

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VBF Higgs CP

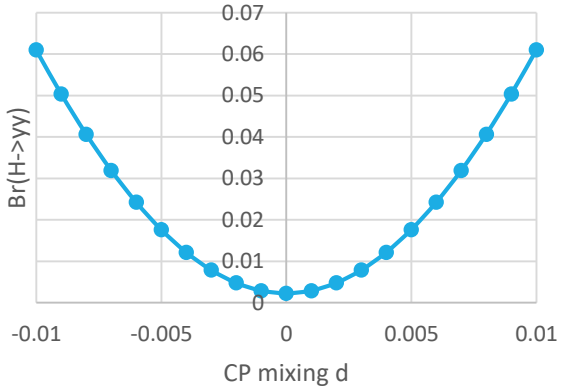
$Br(H \to \gamma\gamma)$ in EFT:

$$\mathrm{Br}(H \to \gamma\gamma) = \frac{\Gamma(H \to \gamma\gamma)_{\mathrm{SM}} + \delta\Gamma(H \to \gamma\gamma)}{\Gamma(H)_{\mathrm{SM}} + \delta\Gamma(H \to \gamma\gamma) + \delta\Gamma(H \to \gamma Z) + \delta\Gamma(H \to Z^*Z) + \delta\Gamma(H \to W^*W)}$$
$$= \frac{0.227\% \times 4.088\mathrm{MeV} + 155.425\mathrm{MeV}\ \tilde{g}^2_{HAA}}{4.088\mathrm{MeV} + 155.425\mathrm{MeV}\ \tilde{g}^2_{HAA} + 7.95702\mathrm{MeV}\ \tilde{g}^2_{HAZ} + 0.000654803\mathrm{MeV}\ \tilde{g}^2_{HZZ} + 0.00362573\mathrm{MeV}\ \tilde{g}^2_{HWW}}. \quad (29)$$

$$\tilde{g}_{HAA} = \tilde{g}_{HZZ} = \frac{1}{2}\tilde{g}_{HWW} = \frac{g}{2m_W}\tilde{d} \quad \text{and} \quad \tilde{g}_{HAZ} = 0\,.$$

$m_W = 80.385GeV, \mathrm{g} = 0.652$

$$Br(H \to \gamma\gamma) \approx \frac{0.227\% \times 4.088MeV + 155.425 \times \left(4.055\tilde{d}\right)^2}{4.088MeV + 155.440 \times \left(4.055\tilde{d}\right)^2}$$



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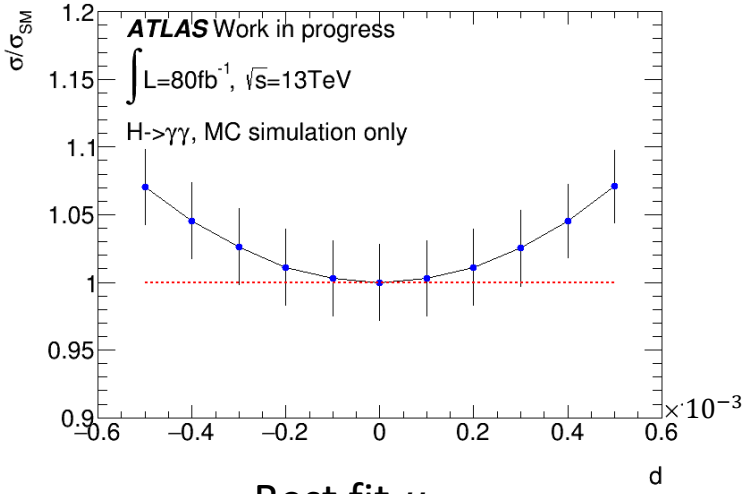
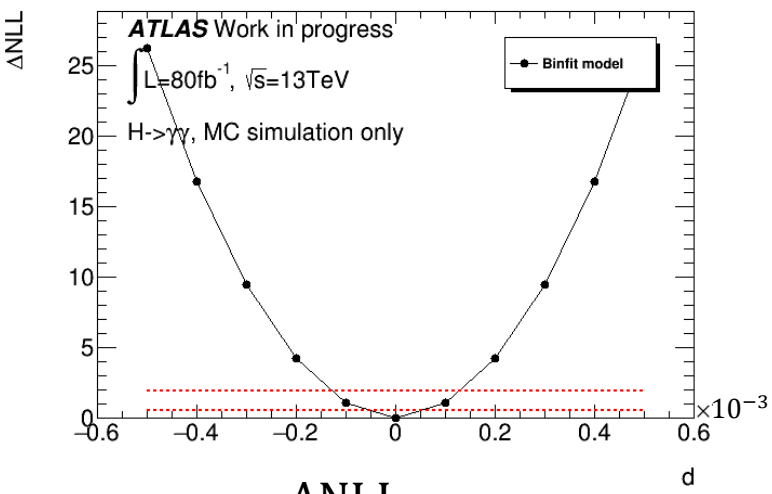


Best fit μ



ΔNLL

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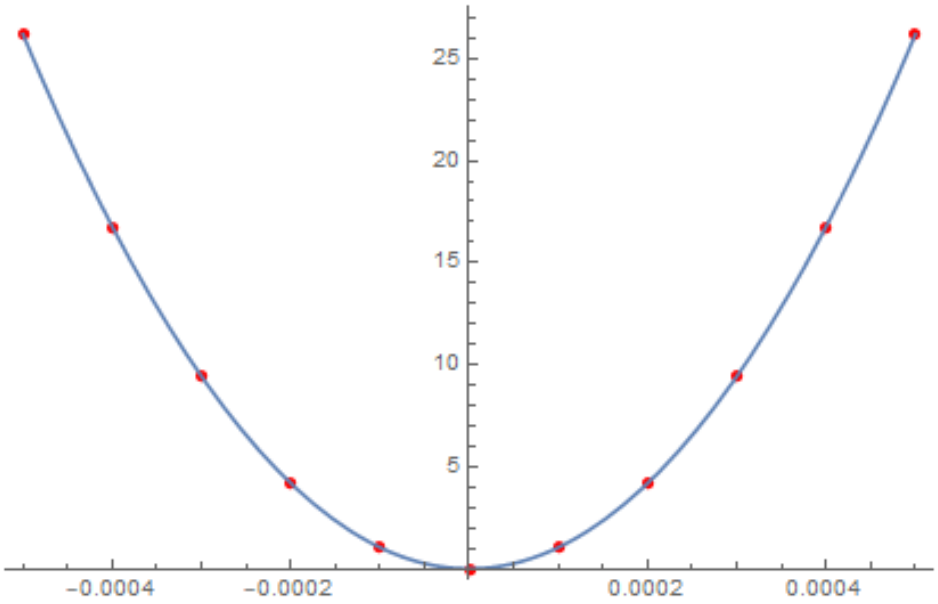
Fit ΔNLL curve with $1+x^2$



$\Delta NLL = 0.00197 + 1.047 * 10^8 \, x^2$

68% CL (ΔNLL=0.5): [-0.000069, 0.000069]
95% CL (ΔNLL=1.96): [-0.00014, 0.00014]

H->tautau result in 36fb-1:
Exp: [-0.035, 0.035] @ 68% CL
[-0.21, 0.15] @ 95% CL.
Obs: [-0.090, 0.035] @68% CL.

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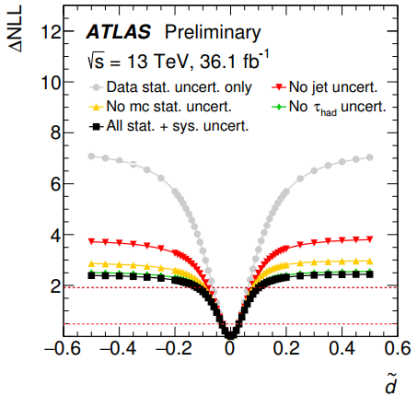
Next step:

- Check inclusive category in OO. (Check contribution from OO)
- Consider systematic uncertainty. (I suppose in this level sys. error would be dominant)
- Consider MVA categories.
- Asked a report tomorrow.



Others:

- HGTD: the conveners suggested to use more MC, to further decrease stat. error. Now we are aiming at LHCC @ June.
- QT: trying in debug. Can I ask the technical supervisor?