Plans : Matrix Element Approach for ZZH

$$e^+e^- \to ZH \to \mu^+\mu^- H \text{ at } 250 \text{ GeV}$$

$$\chi^2 = -2\log\Delta\mathcal{L} = -2\log(\mathcal{L}(\vec{a}_V) - \mathcal{L}_{SM})$$

likelihood function $\mathcal{L}(\vec{a}_V) = \mathcal{L}_{\text{shape}}(\vec{a}_V) \cdot \mathcal{L}_{\text{norm}}(\vec{a}_V)$

$$= \prod_{i=1}^{\text{events}} P_{\text{shape}}(\vec{p}_i^{\,\mu}; \vec{a}_V) \cdot P_{\text{norm}}(\vec{a}_V)$$

anomalous parameters

momenta: μ, μ, h

Probability function for testing ZZH couplings

Integration over phase space for four momenta

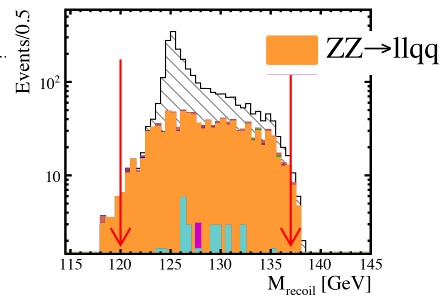
$$P_{\text{shape}}(\vec{p}^{\,\mu}; \vec{a}_V) = \frac{1}{\sigma(\vec{a}_V)} \int d\bar{\Phi}\, |\mathcal{M}(\bar{\vec{p}}^{\,\mu}; \vec{a}_V)|^2\, T(\vec{p}^{\,\mu} \to \bar{\vec{p}}^{\,\mu})$$

Normalization

Matrix Element
(Softwares by Junping, Keisuke)

Transfer function (detector resolution)

$T(\vec{p}^{\,\mu}; \bar{\vec{p}}^{\,\mu}) = \delta(\vec{p}^{\,\mu} - \bar{\vec{p}}^{\,\mu})$ The transfer is delta : (at least good assumption for μμ)



Background contributions (irreducible ZZ)

$$P_{\text{shape}}(\vec{p}^{\,\mu}; \vec{a}_V) = \frac{\int d\bar{\Phi}\, |\mathcal{M}_{Zh}(\bar{\vec{p}}^{\,\mu}; \vec{a}_V)|^2\, T(\vec{p}^{\,\mu}; \bar{\vec{p}}^{\,\mu}) + \int d\bar{\Phi}\, |\mathcal{M}_{ZZ}(\bar{\vec{p}}^{\,\mu})|^2\, T(\vec{p}^{\,\mu}; \bar{\vec{p}}^{\,\mu})}{\sigma_{Zh}(\vec{a}_V) + \sigma_{ZZ}}$$

→ reports from next meetings