



Feasibility Study of Measuring the Higgs Self-coupling Using the Muon Collider

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- Signal: $\mu^- + \mu^+ \rightarrow \nu_\mu + \bar{\nu}_\mu + H + H$ ($0.0008201 \pm 2.2e - 6$ pb)
- Background:
 - $\mu^- + \mu^+ \rightarrow \nu_\mu + \bar{\nu}_\mu + b + \bar{b} + Z$ (0.03168 ± 0.00027 pb)
 - $\mu^- + \mu^+ \rightarrow \nu_\mu + \bar{\nu}_\mu + b + \bar{b} + H$ ($0.003743 \pm 2.7e - 5$ pb)
 - $\mu^- + \mu^+ \rightarrow \nu_\mu + \bar{\nu}_\mu + b + \bar{b} + b + \bar{b}$ ($0.0009227 \pm 7.02e - 6$ pb)

10k for each



Weight calculation

Should produce

$$(\sigma_{HH} + \sigma_{H+bb} + \sigma_{Z+bb} + \sigma_{QCD}) \times L \text{ events}$$

Therefore, scale by

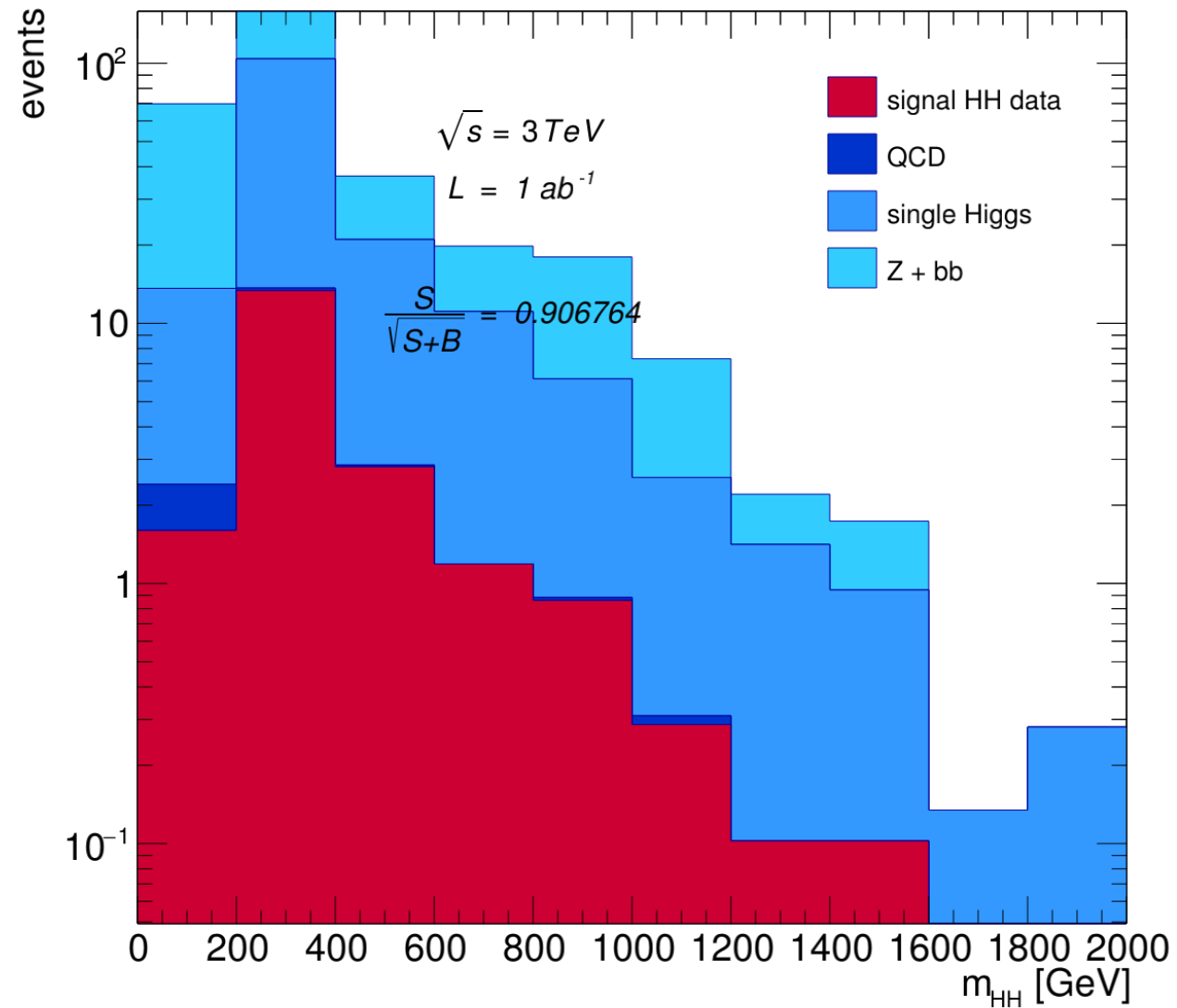
$$\frac{(\sigma_{HH} + \sigma_{H+bb} + \sigma_{Z+bb} + \sigma_{QCD}) \times 1e+6 \text{ pb}^{-1}}{40k}$$

Where each channel scale by

$$\frac{\sigma}{\sigma_{HH} + \sigma_{H+bb} + \sigma_{Z+bb} + \sigma_{QCD}} \frac{(\sigma_{HH} + \sigma_{H+bb} + \sigma_{Z+bb} + \sigma_{QCD}) \times 1e+6 \text{ pb}^{-1}}{40k} = 25 \sigma$$



Muon Collider Simulation (Delphes)





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