

1. Cross section comparison – Higgs vs Z:

$$\sigma(e+e- \rightarrow ZH) = 200 \text{ fb}$$

$$\sigma(e+e- \rightarrow Z) = 41 \text{ nb} = 200,000 \text{ times larger than } \sigma(e+e- \rightarrow ZH)$$

Therefore, **for the same $\int L$, 1 Higgs \leftrightarrow 10^5 Z's**

2. Luminosity and number of Z's:

- CEPC for Higgs: ($L = 2 \times 10^{34}$)

$$\int L = 500 \text{ fb}^{-1} \text{ per year for 2 IPs}$$

$$= 5 \text{ ab}^{-1} \text{ in 10 years}$$

$$\rightarrow 10^6 \text{ Higgs}$$

- **CEPC for Z: ($L = 1 \times 10^{34}$)**

$$\int L = 250 \text{ fb}^{-1} \text{ per year for 2 IPs}$$

$$\rightarrow 5 \times 10^{10} \text{ Z's in 5 years}$$

- **FCC-ee for Z: ($L = 2 \times 10^{36}$)**

$$\int L = 40\text{-}80 \text{ ab}^{-1} \text{ per year for 2 IPs}$$

$$\rightarrow 10^{13} \text{ Z's in 5 years}$$

- LEP2 for Z: ($L = 1 \times 10^{32}$)

$$\int L \rightarrow 4.5 \times 10^6 \text{ Z's for each of the four IPs}$$

Purpose of the meeting:

Physics reach of 10^{11} vs 10^{13} Z's