

The Higgs Boson and the Search for Charm Quark Decay Modes

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The Higgs Boson

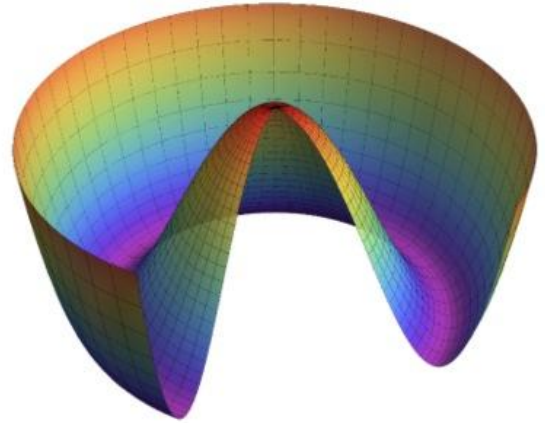
- Why do we need the Higgs Boson?
 - Gauge Invariance
 - Mass Term in the weak interaction

$$\vec{A} \rightarrow \vec{A} - \vec{\nabla} f(\vec{r}, t)$$

$$\phi \rightarrow \phi + \frac{1}{c} \frac{\partial f(\vec{r}, t)}{\partial t}$$

$$\psi(\vec{r}, t) \rightarrow e^{-i \frac{e}{\hbar c} f(\vec{r}, t)} \psi(\vec{r}, t)$$

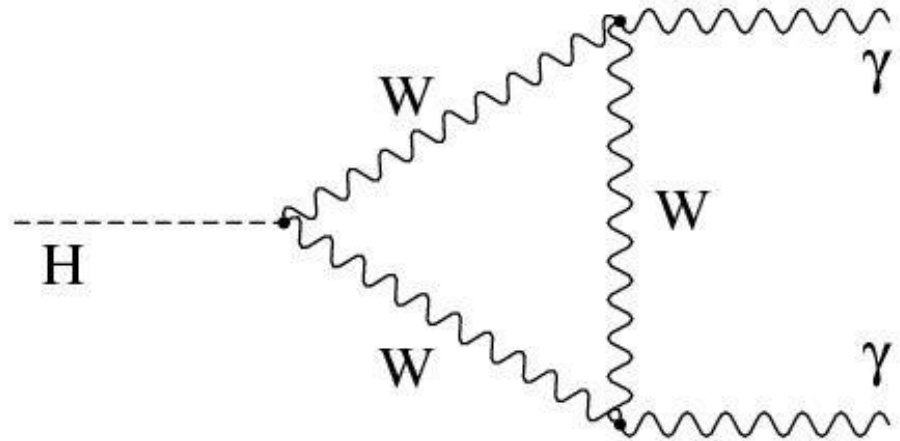
Sombrero



$$\mathcal{L}'_{\text{Higgs}}(\phi) = (\partial_\sigma \phi)^\dagger (\partial^\sigma \phi) + \mu^2 \phi^\dagger \phi - \lambda (\phi^\dagger \phi)^2$$

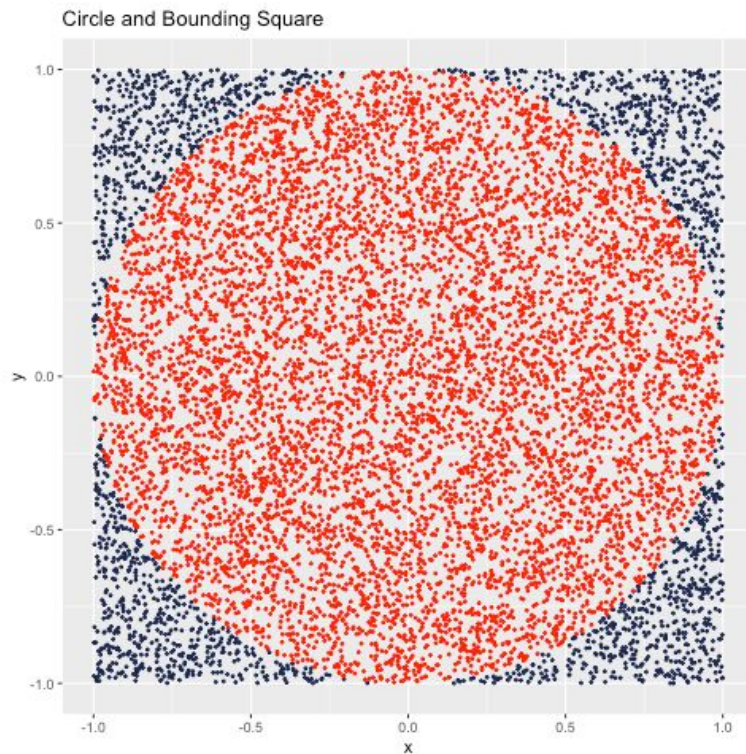
Simulating Decay Modes

- Branching ratios



The Monte Carlo Method

- Define input domain
- Randomly generate inputs
- Compute the output
- Aggregate results



Questions?
