

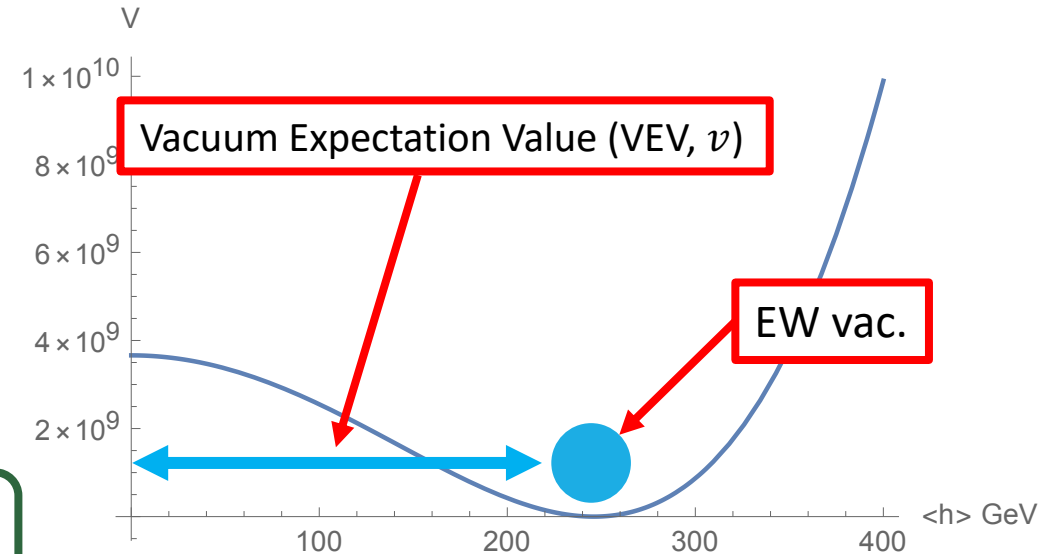
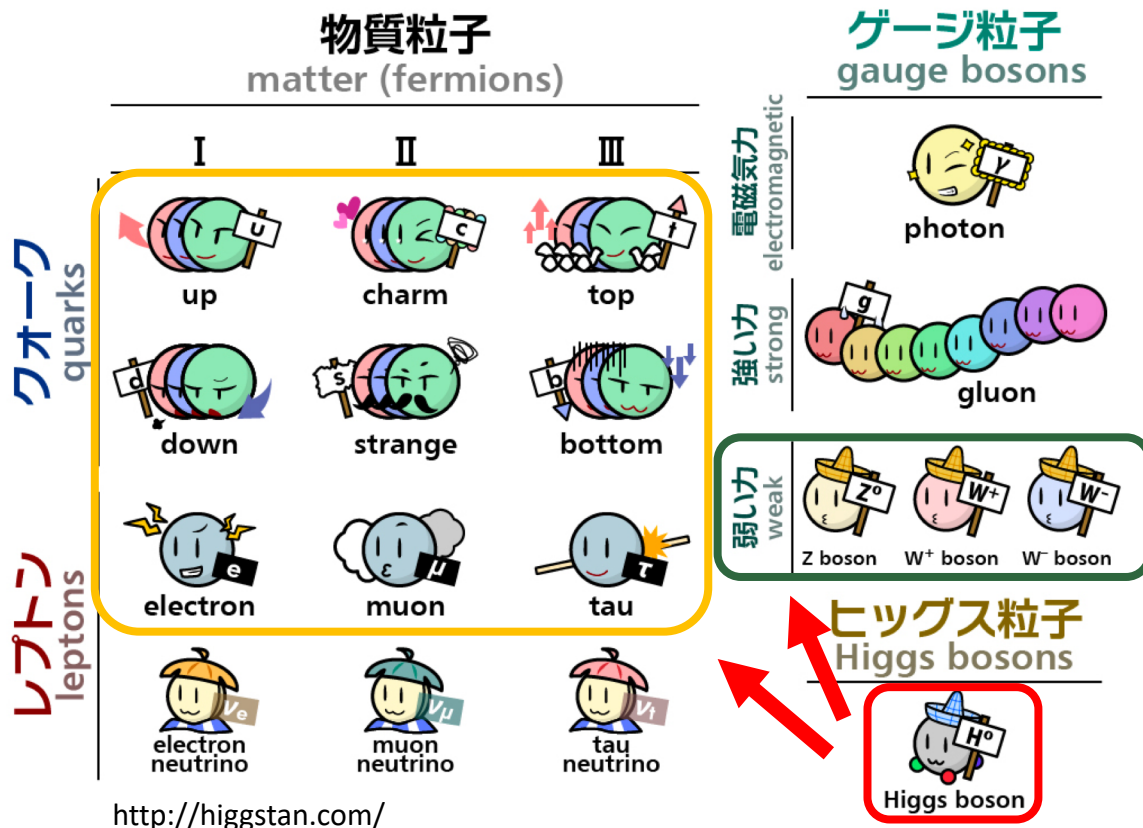
GPPU

Fujitani Yoshio
Particle theory and cosmology group

Contents

- About my research
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Higgs and Vacuum in particle physics



Higgs has non-zero VEV

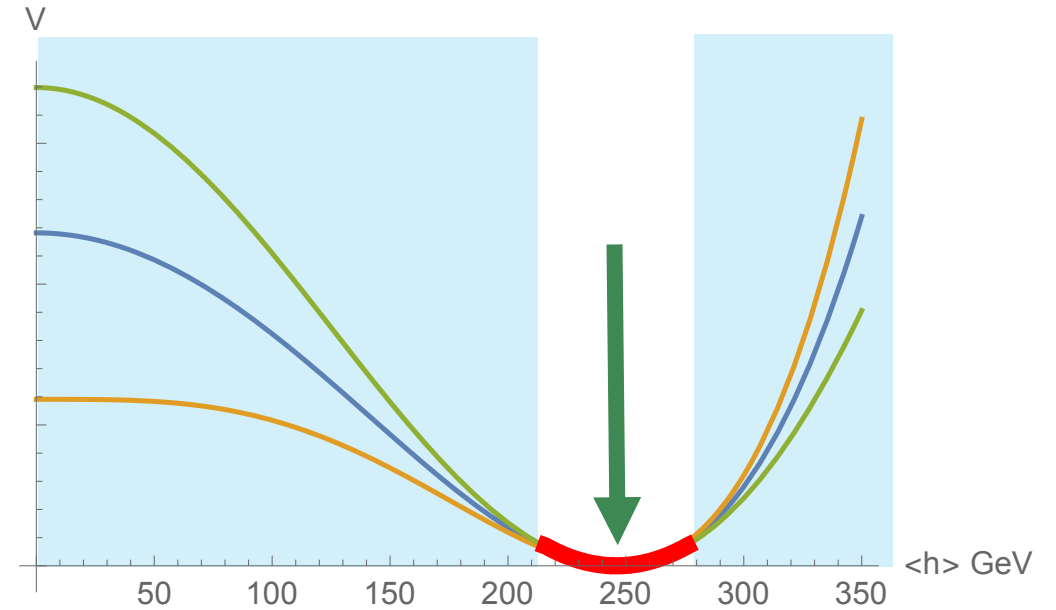
- Vac. breaks EW sym.
- Fermions and W, Z have mass

Vacuum structure of the Higgs

$$V = 0 \times h + \frac{1}{2} m_h^2 h^2 + \frac{1}{6} \lambda_{hhh} v h^3 + \dots$$

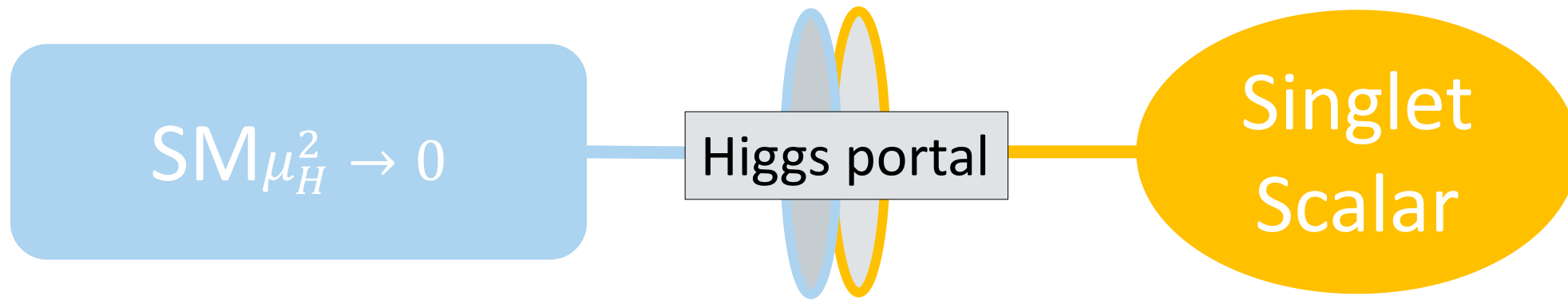
$\frac{dV}{dh}$ $\frac{d^2V}{dh^2}$ $\frac{d^3V}{dh^3}$

observed unknown

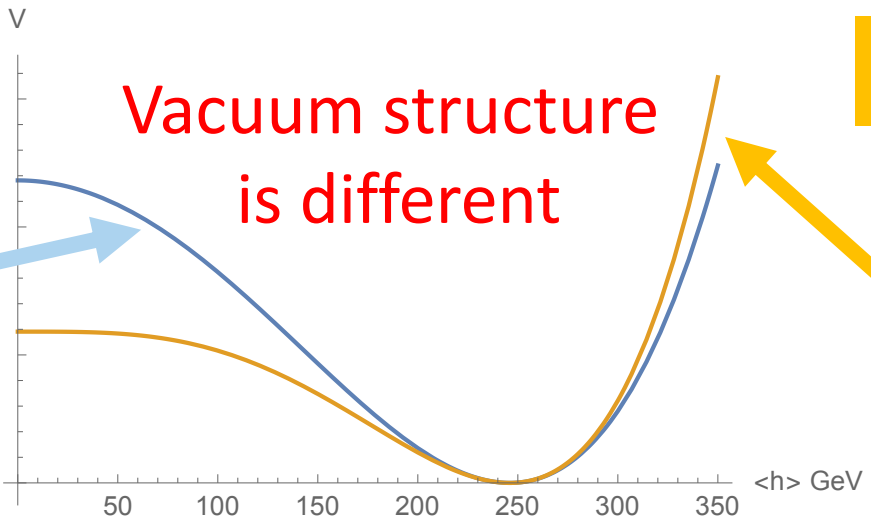


We only know near Vac. -> Global shape of pot. is **unknown**

Classically Scale Invariant (CSI) model

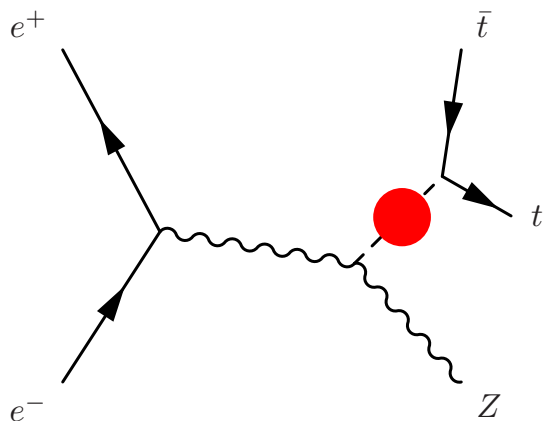
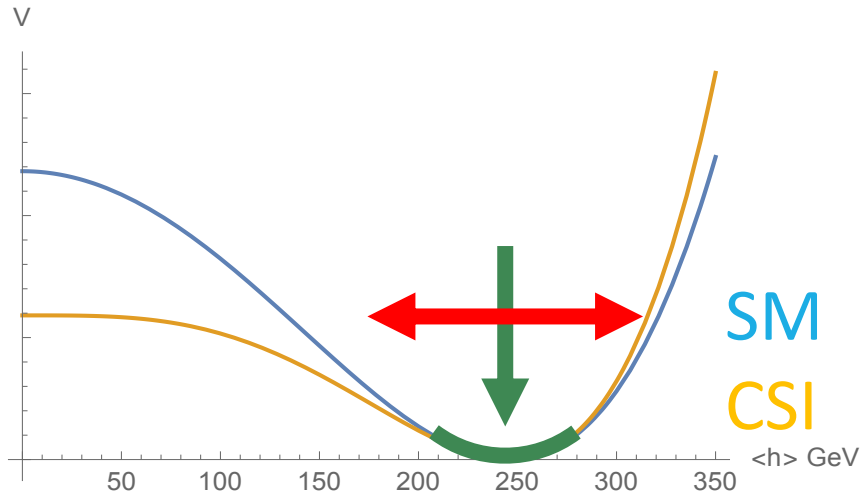


SM
Tree level Sym. Breaking
Polynomial-pot.



CSI Foot et.al.,2007 Endo,Sumino 2015
Radiative Sym. Breaking
Logarithmic-pot.
Large deviation of λ_{hhh}
High predictability

The way to test CSI model



VEV and Higgs mass
->same

New Physics effects

-> Self-interaction

Done

-> off-shell Higgs propagation

Work in progress

The research work in 2017

- Publication
 - Probing Higgs self-coupling of a classically scale invariant model in $e^+e^- \rightarrow Zh h$: Evaluation at physical point
 - > Published in Physics Letter B (PLB779)
- Meetings
 - New Higgs Working Group 21st ,22nd (talk)
 - Workshop on BSM and the Early Universe (poster)
 - KEK-PH2018 (poster)
- Research trip
 - H.Yokoya (KIAS/ Korea) July 3rd -12th

The work in progress

- Physics
 - Off-shell Higgs propagating process in CSI model
 - $e^+e^- \rightarrow Zt\bar{t}$
 - Which observable is better to see?
- Plan of research in oversea
 - Remain 80 days
- GPPU seminar