

THESIS INFORMATION

Thesis title: **Higgs boson decays $h \rightarrow Z\gamma$ and $h \rightarrow \mu\tau$ in 3-3-1 models**

1. PhD student information.

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Education Schedule: 2016 - 2020.

Speciality: Theoretical Physics and Mathematical Physics.

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2. Supervisor Information.

- Full name: Nguyen Thanh Phong.

- Institution: College of Sciences, Can Tho University.

- Academic Title: Assoc Prof: 2014, PhD: 2010

- Major: Theoretical Physics.

- Full name: Le Tho Hue.

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- PhD: 2013.

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3. Training institution: Ha Noi Pedagogical University 2.

- We have produced the general analytic formulas expressing one-loop contributions to the amplitude and the branching ratio of the Higgs boson decay $h \rightarrow Z\gamma$, including all contributions that had been ignored in the previous studies. The unitary gauge was used. The analytic results are expressed in terms of the Passarino-Veltman functions, following notations in the LoopTools library. We have found that these contributions may be large and should be taken into account for fitting with upcoming experimental data.

- Our results would be useful for further studies of loop-induced decays of neutral and charged Higgs bosons $H \rightarrow Z\gamma, W\gamma$, which have not been yet mentioned in many well-known beyond the standard models (BSM). In this thesis, our results were applied to discuss on the decay of standard model-like Higgs boson in the SM and BSM, including the 331 β 0 model, the Higgs Triplet model, and the left-right symmetric model.
- The thesis has built analytical formulas of one loop contributions needed to calculate the branching ratios (Br) of the SM-like Higgs boson decays $h_1^0 \rightarrow \mu\tau$ and $\mu \rightarrow e\gamma$ in the 3-3-1 model with inverse seesaw neutrino (331ISS). The divergent cancellation in the total decay amplitudes $h_1^0 \rightarrow e_a e_b$ was pointed out.
- From the numerical investigation, we have indicated that $\text{Br}(h_1^0 \rightarrow \mu\tau)$ predicted by the 331ISS model can reach large values of $\mathcal{O}(10^{-5})$. They are even very close to 10^{-4} , for example, in the special case with $k = 5.5$ and $z \simeq 600$ GeV, which is close to the perturbative limit of the lepton Yukawa couplings. These numerical results could be measured by the upcoming experiments.

Supervisor

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