

Preface

This is the proceedings of the first Toyama International Workshop on “ Higgs as a Probe of New Physics 2013 (HPNP2013) ”, which was held in the period 13.-16. February 2013 at the University of Toyama.

It was one of the most exciting events of particle physics for the last decades that the Higgs boson was discovered at the LHC experiment in July 2012. The existence of all the particles in the standard model for particle physics has been confirmed finally. Even more, the mass generation mechanism for particles, the spontaneous symmetry breaking of electroweak gauge symmetry, has been experimentally confirmed by the detection of the couplings of the Higgs boson with the weak gauge bosons. The discovery of the Higgs boson had indeed opened the door to a new stage of particle physics; i.e., the exploration of a new paradigm of new physics beyond the standard model.

Although the Higgs boson was confirmed its existence, nothing remains to be understood about the essence of the Higgs boson and the structure of the Higgs sector. They are strongly connected to the physics behind the Higgs sector or the physics beyond the standard model. In addition, we already know that there are phenomena which cannot be explained in the standard model, such as dark matter, neutrino oscillation and baryon asymmetry of the universe. In order to understand these phenomena we need to go beyond the standard model. If such new physics appears at TeV scales, it should have a strong connection with the Higgs physics.

The international workshop HPNP2013 was planned to dedicate to thoroughly discuss how we can approach to the new physics beyond the standard model via the exploration of the essence and the structure of the Higgs sector. Excellent invited speakers, such as Prof. Abdelhak Djouadi, Prof. Howard E. Haber, Prof. Maria Krawczyk, and Prof. Yutaka Hosotani gave nice review talks about the Higgs physics and topics related to the Higgs physics. These review talks were followed by many interesting contributed talks by qualified experts as well as by poster presentations mainly by young postdocs and graduate students. Most of them are contained in this proceedings.

In HPNP2013, we had a nice excursion during the workshop, as which we visited Kamioka Observatory of ICRR, the University of Tokyo, which was located just 30 km south from the University of Toyama. In addition, as the associated Public Lecture, Prof. Mihoko Nojiri and Prof. Satoru Yamashita gave lectures to the general public for the topic “ Particle Physics and Cosmology ”, which were very successful because of their exciting and fascinating presentations.

We organizers were extremely happy to hold such a great international workshop in Toyama, and to see that the workshop could be an extraordinary successful one. We would like to acknowledge Prof. Shunro Endo (President of University of Toyama), Prof. Masaaki Shimizu (Dean of Science Faculty, U. of Toyama), Toyama Prefecture and Toyama City for their financial supports, which were crucial for the success of the workshop. Finally, we would like to thank all the participants for their nice presentations, critical questions, and active discussions during the workshop.

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on behalf of Organizing Committee of HPNP2013