Focus Week on Quantum Gravity and Holography

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Our focus week "Focus Week on Quantum Gravity and Holography" was held at Kavli IPMU on April 2-6, 2018.

The search for the quantum theory of gravity has been one of the most important subjects in theoretical physics for decades. While superstring theory is widely believed to be a promising candidate, the focus of the community for quite some time has been the application of string theory and holography to other areas (such as quark-gluon plasma, condensed matter, and mathematics), and less so to quantum gravity per se. The situation has rapidly been changing over the past few years; many researchers are coming back to the field, armed with new ideas (e.g., relationship between quantum information and quantum gravity, Sachdev-Ye-Kitaev model, ER=EPR proposal, and supergravity on de Sitter space), or new techniques which can solve old and difficult problems (e.g., holographic entanglement entropy, new techniques based on integrability, conformal bootstrap, and lattice super Yang-Mills simulation).

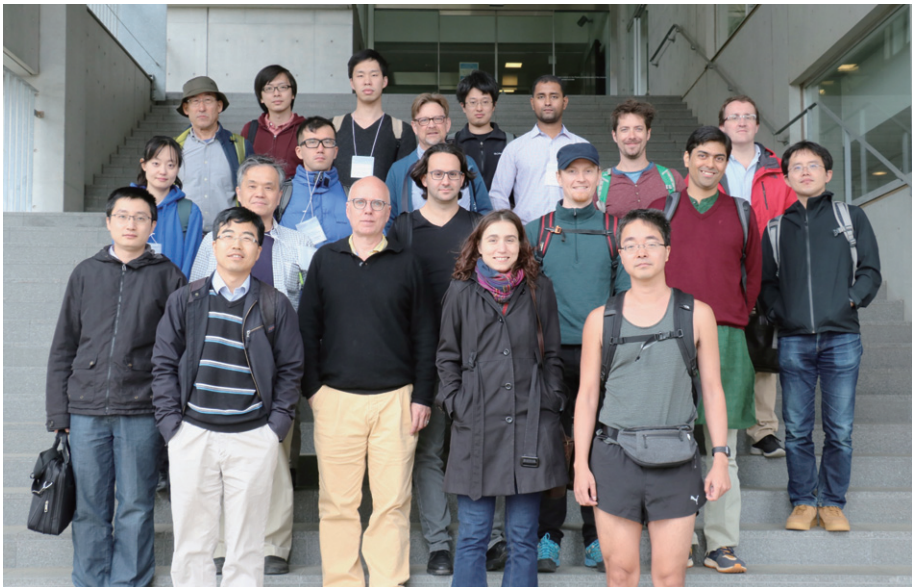
In order to strengthen this trend, it was desirable and timely to bring together top researchers working in various different directions, encourage the deepening of mutual understanding, and discuss next directions. This was the motivation for our focus week.

We had the fortune of having an international organizing committee, including Tatsuo Azeyanagi, Valentina Forini, Masanori Hanada, Bert Vercnocke, Nico Wintergerst, and myself.

We had plenary talks by Monica Guica, Yuta Hamada, Song He, Simeon Hellerman, Petr Horava, Jared Kaplan, Ami Katz, Yasunori Nomura, Hirosi Ooguri, Xiaoliang Qi, Suvrat Raju, Bo Sundborg, and Nico Wintergerst. We also had invited contributed talks, selected from among the applicants, by Yuhma Asano, Kanato Goto, Goro Ishiki, Anosh Joseph, Rene Meyer, Max Riegler, Takahiro Uetoko, Masataka Watanabe, and Yun-Long Zhang.

As an experiment, we organized this focus week as a hybrid: we had a relaxed schedule for the first three days with a lot of time for discussions, while we had a more intense conference-style format in the last two days.

I myself very much enjoyed attending this focus week, talking with experts and getting ideas for possible future projects. I also obtained positive feedback about the focus week from many participants. I do hope our focus week, while limited in scope, provided an inspiration for future fascinating activities in the field of quantum gravity and holography.



Joint Kavli IPMU - ICEPP Workshop on New Directions for LHC: Run 2 and Beyond

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On June 18, 2018, we held the joint workshop of the Kavli IPMU and the International Center for Elementary Particle Physics (ICEPP) "New Directions for LHC: Run 2 and Beyond" at Kavli IPMU. Kavli IPMU and ICEPP had never hosted such a workshop together and this is the first joint workshop.

The Large Hadron Collider (LHC) is now the most important experiment for elementary particle physics. So far, the LHC has discovered the Higgs particles and is now studying its mass and property in detail. On the other hand, signatures of new physics beyond the standard model are yet to be found. In this workshop, the latest results of the LHC were reported and we discussed the future direction of particle physics in light of the LHC results.

First, Karl Jakobs, a spokesperson of the ATLAS experiment, gave a review on the latest LHC results on the Higgs particle measurements and search for new physics. He also discussed the prospects of the future high luminosity LHC. Subsequent speakers and the contents of their talks were as follows. S. Shirai gave a talk on the status of the supersymmetric models after the discovery of the Higgs particle, and emphasized the importance of searching for long-lived particles at the LHC. Mihoko Nojiri reported her recent research on the precise estimation of mono jet signals with colored particle productions, which play important roles for searching new physics. Takahiro Terada talked about a semi-analytic method to estimate the primordial gravitational wave spectrum in cosmology. Michihisa Takeuchi discussed the signatures of the Higgs pair production and dark matter in the supersymmetric models at the future LHC. Finally, Junping Tian gave a nice review on the prospect of precise measurement of the Higgs particle at the proposed International Linear Collider (ILC).

In the panel discussion, we discussed the future direction of the high luminosity LHC and synergy with other experiments such as ILC, SuperKEKB, and Hyper-Kamiokande. Especially, we intensively discussed precise measurements of the Higgs particle and top quark in the future experiments.

Unfortunately, a strong earthquake hit Osaka that morning and talks by Shinya Kanemura and Yuji Omura were canceled.

This workshop has brought together theoretical and experimental physicists. We enjoyed a stimulating discussion among participants. I hope the second Kavli IPMU-ICEPP joint workshop will be held in the near future.