MERIT overseas program report

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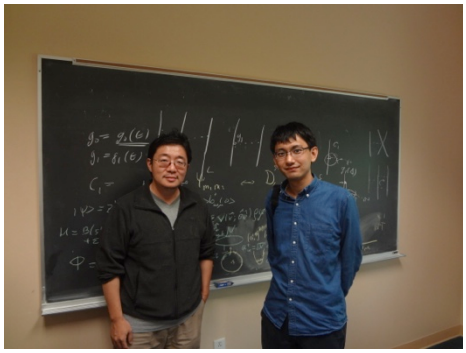
the Oshikawa group

- Kavli Institute for Theoretical Physics Prof. Cenke Xu
- Sep. 25-Oct. 30, 2016

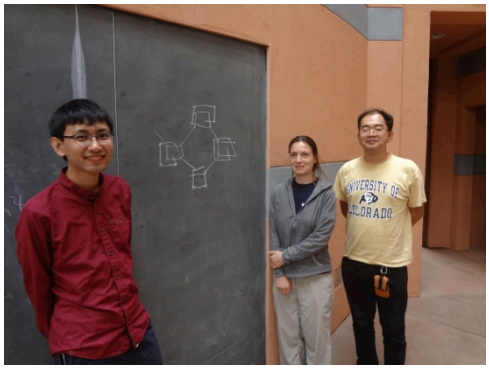
Kavli Institute for Theoretical Physics (KITP) is located inside the campus of University of California, Santa Barbara (UCSB). The research here is mostly related to theoretical physics. KITP organizes various long-term workshops for a whole year. Especially, it hosts important international workshops on modern condensed matter physics every year, and is a global center for the research on topological matter and quantum entanglement. There are severe competitions just to attend this workshop, so I was very lucky to be able to participate in the long-term workshop called “Symmetry, Topology, and Quantum Phases of Matter: From Tensor Networks to Physical Realizations,” thanks to the support from the MERIT program.

I was able to attend the first part of the workshop from Sep. 26 to Oct. 28, 2016 and most lectures were recorded and uploaded in the website [1]. Specifically, I was hosted by Prof. Cenke Xu in KITP, UCSB and was working mostly with Dr. Maria Hermanns. Santa Barbara was warm, dry and very confortable where we can concentrate on the research and lectures.



Prof. Cenke Xu (left) and me (right)

In addition to the long-term workshop, there was an associated



Dr. Maria Hermanns (center), me (left), and Prof. Oshikawa (right)

international conference: “Topological Quantum Matter” for a week. I have also participated in it and given a poster presentation. The conference was so exciting including the presentation by a Nobel laureate in physics. Prof. Duncan Haldane. Especially, I was impressed by the recent developments in new topological phases of matter produced by nonsymmorphic crystalline symmetries. I also had an opportunity to discuss with Dr. Itamar Kimchi and Mr. Hoi Chun Po especially on this nonsymmorphic symmetry.

My actual research project in KITP was mostly done with Dr. Maria Hermanns (University of Cologne) and Dr. Yin-Chen He (Harvard University). We have extended my previous research on the realization of quantum spin liquids in metal-organic framework (MOF) [2]. In particular, we studied (10,3)-a, or (10,3)-d structures newly implemented in three-dimensional Kitaev MOFs, and kagome/hyperkagome lattice quantum spin liquids with Dzyaloshinskii-Moriya interactions, and it was possible to obtain new insights into its topological phase and quantum entanglement. We have just started the research in this opportunity and it is still not on stage completed as a thesis. This overseas training would be very helpful for my future carrier selection.

With Dr. Yin-Chen He (left)

Finally, I would like to thank Prof. Xu, Prof. Oshikawa, Dr. Hermanns, Dr. He, Ms. Tsuji, Ms. Asano, the MERIT program, and all the other people who helped my overseas training.

[1] http://online.kitp.ucsb.edu/online/topoquant16/
[2] MGY, H. Fujita and M. Oshikawa, arXiv:1605.04471 [cond-mat.str-el].