

MERIT Overseas Dispatch Report

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I had stayed in Heidelberg, Germany for about three months from 17th February to 15th May. I visited Institute for Theoretical Physics, which is one of institutes in Ruprecht-Karls-Universität-Heidelberg. Prof. Jan M. Pawłowski kindly accepted my request of stay. Before leaving Japan, I exchanged email with him and consulted about research direction during the stay.

My research subject is functional renormalization group approach to hadron physics. The research group which I visited have been widely applying the same technique from cosmology to condensed matter physics. I expected to study technical details of the method. First of all, I introduced my research interest to my host. Then I tried to reproduce the result of the research article which my host suggested reading. In this article, the authors extend the Yukawa coupling, which represents the three point vertex between quarks and a meson, to meson-field-dependent one. Then they systematically investigate the effect of the coupling between quarks and multi-mesons on chiral phase transition. I could reproduce the result of the article during the stay. I understood chiral phase transition within the local potential approximation. As a future work, I am planning to investigate the interplay between chiral phase transition and color super conductivity transition, and the effect of axial anomaly on QCD phase diagram. The result which I could reproduce during the stay is important to tackle them.

I had also an opportunity to discuss the paper with its author. I discussed

the technical details of numerical calculation which is necessary for analysis by functional renormalization group approach. Besides the research, I interacted with the group members through attending the lunch meeting and the group meeting.

Heidelberg is well known as a tourist city. I enjoyed the sightseeing on holidays (Pic.1, 2). The beautiful cityscape was very impressive for me. It was also a good experience to lead a daily life abroad.

Finally I would like to thank people who helped me for this overseas dispatch.



Pic. 1 : Schloss Heidelberg and Alte Brücke



Pic. 2 : the view from Philosophenweg