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Computational Science Alliance Overseas Dispatch Report

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This time, with the support of Computational Science Alliance Overseas Dispatch Program I was able to participate in the American Physical Society (APS) March Meeting 2019. Annual APS March Meeting is one of the biggest meetings in the society of physics and this time it was held in Boston Convention and Exhibition Center (USA, Massachusetts) from 4th March 2019 to 8th March 2019. More than 11000 attendees arrived in order to visit and participate in APS March Meeting this year. APS March Meeting provides a bunch of programs for participants, including poster sessions, oral presentations, exhibition of novel experimental tools from an enormous number of famous companies, and also shops where one can buy recent scientific journals. In this report, I will briefly describe my experience during this overseas dispatch.

During my trip, I wanted to present my recent results about an exotic quantum state, called chiral spin liquid (CSL), obtained by massively parallel and large scale numerical simulation. So far, I was studying quantum spin liquid (QSL) realized in the Kitaev model, using method which is combination of Majorana fermion representation quantum Monte Carlo and Green's functions based Kernel Polynomial method. In my previous study I have already showed that we can observe finite temperature phase transition from paramagnet to QSL in a three-dimensional (3D) extension of the Kitaev model to a Hyperoctagon lattice. Recently, using the same method, we investigated finite temperature phase transition in the Kitaev model extended to another lattice, the so called Hypernonagon lattice, which realizes 3D CSL. In contrast to the two-dimensional CSL, 3D CSL is not so comprehensively studied. With such a background, simulating systems with about 2600 quantum spins we obtained that system shows first order finite temperature phase transition between paramagnet and CSL which is caused by a spontaneous time-reversal symmetry breaking. Also, we obtained ground state phase diagram with a variety of CSLs. All of our results are consistent with previous studies, which however, in contrast to our study calculated only low energy effective Kitaev model on this lattice. Our results include significant breakthrough in understanding of 3D CSL and it could be extremely interesting for an audience, familiar with Kitaev model physics, QSLs and CSLs.

Unfortunately I was not able to present my results to a target audience. Here I am going to explain why. Actually, this trip is especially notable because of an

enormous number of troubles. Troubles began already before the trip. First of all there were problems with VISA. Application process took much longer than expected and for that reason I needed to change my plane reservation. This trouble was solved but it was not the last problem on my way to present my results. My flight was delayed because of a snow in Boston and I could not depart from Detroit on time. Finally, I was able to depart from Detroit nearly a day later than the original plan, and of course, I was already late for my presentation. Fortunately, after explanation of the circumstances, I got an opportunity to change schedule of my presentation and present my results two days later. At the same time, unfortunately I could not present my results in a related to my research field session which significantly changed priorities of my talk. However, I believe that I got an excellent opportunity to present my results to an audience which is absolutely not familiar to my research field, and understand what people are interested in and what they do not know. I believe such an experience will improve my future presentations significantly.

Through this overseas dispatch I have an opportunity to get a lot of experience. For example, presenting results to an audience not familiar with my research, or solving travel problems, which are actually not so rare as far as I know. I believe I have a lot experience to share with people who may get into similar situation. Finally I want to thank Computational Science Alliance and especially Overseas Dispatch Program for this excellent opportunity.