（別紙様式５）

変革を駆動する先端物理・数学プログラム（FoPM）

国外連携機関長期研修　報告書

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Overview

I visited Florida State University (FSU) during the first two weeks of my stay, followed by one week at the University of Florida (UF), in order to engage in both planned and spontaneous discussions with researchers in the respective groups. These two institutions are located in northern Florida, approximately three hours apart by car. As there are Japanese faculty members I am acquainted with at both universities, it was both valuable and convenient for me to visit each of them. Both institutions host a broad and active research community, providing a stimulating environment for academic exchange.

Overall, the visit offered valuable perspectives on both my research topics of interest and diverse research environments, and will serve as a strong foundation for my future academic development.

Research activities

During my stay at FSU, I had several discussions with Prof. Takemichi Okui, primarily focusing on his work on the so-called monopole semiton/unitarity puzzle, a topic I have long been interested in. This puzzle, known for decades, concerns the apparent absence of certain final states in monopole–fermion scattering. In recent years, multiple groups have proposed independent resolutions; some of these appear to be related, while others seem inconsistent. Having followed this topic for several years, I greatly appreciated the opportunity to discuss it directly with Prof. Okui. The discussions were highly inspiring: while a general consensus is gradually emerging within the community, important open questions remain, offering promising directions for future work. He also shared a hidden paper that can be a hint for such open questions, which spurred me to give more thought to the topic.

At UF, I had the opportunity to discuss with Prof. Yohei Ema, whose research spans a wide range of topics in particle physics. In particular, I was interested in his recent work on scattering amplitudes and cosmological correlators. He provided valuable insights not only into these areas but also into broader directions for future research. These discussions were extremely illuminating, and I learned a great deal. We also identified several potential research ideas, one of which we have decided to pursue further. In addition, UF hosts many young faculty members as well as emeritus professors who remain highly active. Informal discussions with them were also very fruitful and intellectually stimulating.

By immersing myself in a different research environment, I was reminded of the importance of maintaining curiosity and being open to new ideas, as well as not hesitating to ask questions, even at the risk of being off the mark. This attitude was clearly reflected in the groups I visited.

Life in Tallahassee

FSU is located in Tallahassee, the capital of Florida. Despite its status, it is a relatively small city with a population of approximately 200,000. A car is essentially necessary, as public transportation is limited. Due to my lack of familiarity with the area, I booked a hotel relatively far from campus because it was the most affordable option. Initially, I thought that a 50-minute bus commute might be manageable; however, it proved to be much more challenging than expected. Buses run only once per hour, the last service is around 7 p.m., and occasionally buses do not arrive at all, requiring long waits. On one occasion, I had to walk back to the hotel after missing a

bus (despite arriving early at the stop), but this was also inconvenient as sidewalks are sometimes incomplete. Overall, I would strongly recommend staying near campus.

For lunch, I typically went to a campus cafeteria with members of the group, and occasionally they took me to restaurants further away by car. For dinner, I often cooked at the hotel, which was equipped with a kitchen. I also had opportunities to dine out with postdocs and Prof. Okui. Florida offers many excellent South and Central American restaurants, and I was able to try a variety of new dishes, which was a particularly enjoyable experience.

On weekends, postdocs or Prof. Okui kindly showed me around the area. We visited beautiful parks with ponds and natural springs, where we once played disc golf. We also took a short boat ride, during which we saw wildlife such as alligators and manatees, both characteristic of Florida. In addition, we visited the beach and had a very enjoyable time.

Life in Gainesville

UF is located in Gainesville, which is somewhat smaller than Tallahassee. Despite this, I found it significantly more convenient for daily life. UF has one of the largest campuses in the United States, and the city appears to be well designed for students. Public transportation is much more accessible: buses run frequently and even late into the evening.

Except for the first day, I stayed at the Reitz Union Hotel, located on campus and only a five-minute walk from the Physics Building. The hotel has several restaurants, which I frequently used for meals. For lunch, I often purchased a sandwich or burger and brought it back to the office to eat with members of the group, which provided additional opportunities for informal interaction

