2018/10/05

Internship at NASA/GSFC

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Duration of the stay：2018/07/18～09/07
Name & country of the institution　：NASA/Goddard Space Flight Center

I went internship to NASA Goddard Space Flight Center located at Maryland, United States of America from 2018/07/18 to 09/07. The main purpose of this internship was to learn the calibration method for the ARASE HEP instrument. Dr. Shri Kanecal(Fig 1), who is the leader of Energetic Particle Laboratory(672) at NASA/GSFC and host of this internship, taught me about developing the particle detector for the radiation belt and simulation. In the internship, I aimed to learn two things which follow.

1. Developing Geant4 simulation techniques for particle detector calibration
2. Inter-calibration with ARASE and Van Allen Probes using electron observation data

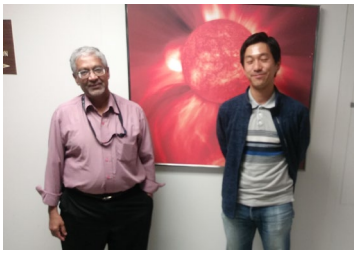

Fig 1. Dr.Shri Kanecal and Me

For those two goals, my achievement point might be considered 3/5. The reason is below.

1. In the internship, I developed and calculate the G-factors of the new particle detector, named CeREs(Fig 2). This research gives me confirmation of my simulation for G-factor is rigid and accurate. Also through this, I can get the reference of calculation, and help the CeREs project. I planned the background particle estimation using Geant4 simulation as a next subject. But I could not accomplish because of lack of time and misunderstanding of his team's works.

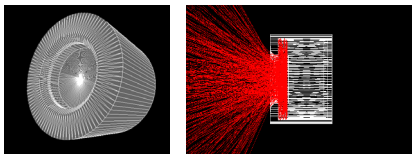

Fig 2. Simulation example of CeREs detector

2. Before heading to internship, I was started to compare ARASE/HEP and Van Allen Probes/MagEIS data. This analysis is to understand the high energy electron behavior at the magnetic storm event. I compared data points out that it would be better compare the data at storm quiet period for the calibration aspect.

From These reasons, my research purpose at the internship is not fully accomplished. But I will do the rest of things to accomplish and get the result.

In spite of these insufficient result of achievements, I had experienced very precious things at the internship.

I. Attended the planetary CubeSat symposium: As a member of LGS program, I am very interested in small satellites for the space explorer. When I stay at GSFC, the symposium was held on 16 Aug. Dr. Yamaoka also took part in this event and explain about chubusat. I was very impressed by the roadmap of NASA planetary explore plan. It helped me to have a more broad perspective in this field.

II. Meet with senior researchers: While I stay there, I have met a lot of researchers. They concern and advice for me And teaches career path for being the researcher. One of the most affordable programs which seniors suggest for me is NPP program. If I want a post-doc position at NASA, it will be the best program for me. Also, I've met the Korean researchers at 21 building where I stayed. Compared with the astrophysics field, I feel that the heliospheric department have a lot of Korean researchers and take an active role in the GSFC. It

would be a good situation for me that there is same nationality colleague in the same field. I think it could stimulate and exchange opinions each other and develop the community.

III. Experienced the front line of space exploration: The parker solar probe launched at 18 Aug. Although I am not directly related the satellite, I could feel the atmosphere and tension of the moment. Also, I visited many developing facilities like environment test or assembly building. The most impressed visit was James Webb Space Telescope developing site. I could see the collaborations and efforts to success for a lot of missions.

Also, I have experienced the life at oversea and felt lots of things.

·In the GSFC

I was surprised that the researchers at the GSFC frequently talk to each other about not only research things but normal life things also. This talking seems somewhat useless. But, it can help understand the co-worker's character and sometimes it related to the new idea of research. The interesting thing is they do their work on time, even if they spend much time talking to each other.

When I arrived at the institute, I met summer intern student. Every summer, NASA hire intern students and educate what they do. Through this, students can learn specific things at the laboratory and think about their career path. Researchers also very enthusiastic about this program. I think this system is very valuable to both student and the institute. Students can experience the state of art technology, and the institute can advertise what they do. At the end of the summer internship, they present the results of their works. I was surprised that the intern was hired not only from the labs but also from the normal office. NASA is a huge government organization. To control and run this agency, a lot of human resources needed. And I don't know well about other office work like human resources or finance office. I could learn what they go through the presentation.

·Host family

I planned to stay at the hotel and Airbnb house before heading to the US. But senior researcher suggested me to stay at retired scientist's house. While I stay at the house, I could experience the American lifestyle. We talked a lot of things especially politics and culture. Also, this conversation helped me to communicate through English. If I stayed just in the hotel, I could have not learned about those things.

Fig 3. With the host family

·Life at the Greenbelt

Greenbelt is the name of the city where GSFC located. It is the historic city from the 1930's. The community is well organized and the people are friendly. Through the internship period, I experienced two local events. The one is 'National night out' and the other is 'Labor day festival'. I could experience the culture of America through the events. At the Greenbelt, I met one senior scientist who worked at HyARC (former Institute of ISEE). Suprising thing is, he worked at South Korea as a weather forecaster officer and classmate of a former director of KMA. I felt how the world is small and serendipity.

At the end of the report, I want to express thanks to ISEE and LGS office for giving to me this precious experience. Also, Dr. Yamaoka gave me help and advice, while I stay at GSFC.

＜Supervisor's name＞

Kanya Kusano, Yoshizumi Miyoshi