

(For JSPS Fellow)

Form B-2
(FY2018)

Date (日付)

15/11/2018

(Date/Month/Year: 日/月/年)

Activity Report -Science Dialogue Program-

(サイエンス・ダイアログ事業 実施報告書)

- Fellow's name (講師氏名): Johannes Daniel Reim (ID No. P17706)
- Participating school (学校名): Mizusawa Highschool
- Date (実施日時): 13/11/2018 (Date/Month/Year: 日/月/年)
- Lecture title (講演題目): Physics – a short story, Spotlight on Skyrmions
- Name and title of your accompanying person (講義補助者 職・氏名)
Ryo Murasaki, Master Student
- Lecture format (講演形式):
 ◆Lecture time (講演時間) 90 min (分), Q&A time (質疑応答時間) 5 min (分)
 ◆Lecture style (ex.: used projector, conducted experiments)
 (講演方法 (例: プロジェクター使用による講演、実験・実習の有無など))
Projector, double slit/grid experiment, illustrative material

- Lecture summary (講演概要): Please summary your lecture 200-500 words.

In my research I study lattices of topological entities called skyrmions using neutron scattering. Since this is a very specific research topic, at first I laid out the different fields belonging the physics and highlighted a few recent research topics. In this introduction the background was provided for magnetism including its impact in our daily life, phase transitions, and topology. The latter was exemplified by a Mobius strip. Furthermore, I emphasized the interplay between theoretical and experimental studies. Then I introduced a simplified version of the atomic model crystal structure and symmetries. I prepared models for molecules and crystals, as well as actual crystals a various colors and symmetries. The concept of scattering was introduced by starting with the known light and x-ray radiation. Whereas the dual slit experiment was performed to provide an illustrative analogue to the scattering mechanism. After discussing the magnetic properties of certain materials, neutron scattering was presented as a method to study magnetic structures. In order to resolve the discrepancy of a particle being used like radiation the particle-wave duality was established. The introduction was concluded discussing neutron sources and instrumentation.

Motivating my own research the unique properties of skyrmions and the resulting possibilities for application in spintronics was highlighted. Starting from the previous research of the compound, which showed contradicting results, I presented our experimental observations, data analysis

and conclusion, specifically how we explained the previous contradictions.

- Overall advice or comments to future participants in the program (今後の講師へのアドバイス):
Consult your students about the level of knowledge to be expected from the students. Plan interactive experiments to get the students involved.

- Other noteworthy information (その他特筆すべき事項):

- Impressions and comments from the accompanying person (講義補助者の方から、本事業に対する意見・感想等がありましたら、お願いいたします。)

I felt that Dr. Reim did his best job and the lecture was awesome, and the opportunity was invaluable for high school students. In the following, I state my opinion. If an active intervention by the accompanying person was explicitly allowed by JSPS, I (the accompanying person) might be able to assist the lecturer more actively and effectively. Since general Japanese students are somewhat "shy", I could encourage and stimulate the students to make more actively questions. (Of course, Dr. Reim did his best job. What I mean is that an additional assistant like the accompanying person may be an additional help.) In my opinion, unlike the seminar held on the university, such an assistant person is helpful for high school students. (For this reason, paying some wages to the accompanying person may be good, since that also means some actions are expected from the accompanying person. I was somewhat confused my position, since no wage means no active actions are allowed/expected.)