

(For JSPS Fellow)

Form B-5

Date (日付)

2日 7月 28年 (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): Stefano Ansoldi (ID No. L15710)
- Participating school (学校名): 福井県立若狭高等学校 (Fukui Prefectural Wakasa High School)
- Date (実施日時): 24日 6月 28年 (Date/Month/Year: 日/月/年)
- Lecture title (講演題目): (in English) Einstein's relativity and beyond
(in Japanese)
- Lecture summary (講演概要): Please summary your lecture 200-500 words.

The lecture has been divided in two main parts.

During the first part we discussed fundamental research, both, in general and, more specifically, in physics. Motivations behind fundamental research have been outlined, with particular emphasis on the importance of fundamental research for long-term progress in our understanding of the universe, and in the development of new technology. We then discussed current aspects of fundamental research, especially the importance of small/large international collaborations. We finally provided a qualitative introduction to our research interests in fundamental physics, especially in connection with gravity: aspects in cosmology (the formation of baby-universes), and in current attempts to modify Einstein's general relativity have been outlined.

To provide a concrete example of what research in fundamental physics means, in the second part of the lecture we discussed the basic ideas at the heart of special relativity.

This second part of the lecture has been more interactive, in the sense that at some points students were asked to think about the concepts that were discussed, and to provide tentative solutions to some of the problems that have to be solved for a consistent formulation of special relativity. We started from a discussion of basic ideas in classical physics, in particular the concept of inertial systems, of Galilei transformations, and of the principle of relativity. We then emphasized how, in classical physics, the above concepts result in an apparent contradiction between the relativity principle and a well established experimental fact, i.e. the properties of light propagation *in vacuo*. To address this difficulty, we presented a re-thinking of the concept of

simultaneity, according to Einstein operational definition. In this way it was possible to show how Einstein proposal for a change in the understanding of a fundamental concept (simultaneity, i.e. time) based on experimental evidence, allowed to modify the transformation laws between inertial system, by replacing Galilei transformations with Lorentz transformations. It was then shown that this solves the apparent contradiction between the relativity principle and the law of propagation of light *in vacuo* that appeared at the beginning. We finally discussed some of the reasons why Einstein proposal is more effective than the pre-relativistic one for the development of modern physics.

- Language used (使用言語): English___

- Lecture format (講演形式):

◆Lecture time (講演時間) 80 min (分), Q&A time (質疑応答時間) 25 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 + blackboard_____

◆Interpretation(ex.: assistance by accompanied person, provided Japanese explanation by yourself) (通訳 (例: 同行者によるサポート、講師本人による日本語説明))

Assistance by accompanying person_____

◆Name and title of accompanied person (同行者 職・氏名)

Dr. Yuki Sakakihara_____

◆Other note worthy information (その他特筆すべき事項):

/_____

- Impressions and opinions from accompanied person (同行者の方から、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 am very glad that I had such a meaningful experience in Wakasa High School. I appreciate your help and support in the organization of the dialogue. I think that, in some sense, there may sometimes be difficulties to let high school students understand a lecture given in English. It may be convenient if the teachers in a high school can let the speaker know in advance as many details as possible about how the lecture will take place. For example, a form with some detailed questions could be given to the school; the school could fill it up, and send it to the speaker in advance. This might help the speaker to prepare for the lecture.