

(For JSPS Fellow)

Form B-5

Date (日付)

20/10/2015 (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): CHITRA SHUKLA (ID No. P15015 )- Participating school (学校名): Ichikawa High School, Ichikawa-city, Chiba Pref., Japan- Date (実施日時): 13/10/2015 (Date/Month/Year: 日/月/年)- Lecture title (講演題目): (in English) Quantum Communication(in Japanese)

- Lecture summary (講演概要): Please summary your lecture 200-500 words.
- The lecture was started with the introduction of Indian National symbols with the importance of its old culture and some great Indian personalities in the area of Physics, Chemistry, Mathematics and others as well. Subsequently, for the better understanding of lecture-title to the students, the lecture was begun with the basic understanding about "What is Quantum?" and "What is Communication?". So, the lecture was all about quantum communication using light referred to as optical quantum communication, which conveys the lesson to the students that how light can be used to communicate the message/information from one place to another place. Interestingly, the concept of light-quantum was included as introduction to quantum mechanics to shed light on the quantum mechanical resources such as qubits, entangled states, etc. Some optical components (with their important properties) such as lasers, beam-splitter, optical fibers etc., which are used in optical quantum communication has been showed to the students in the slides. Then, the relevant experiments of diffraction grating have been performed with the students during the lecture in order to verify the diffraction law. Further, 1 min movie has been shown to the students to let them understand how screen (of solid/liquid/gas) plays a crucial role to see the diffraction pattern. Specifically, by seeing the movie, they understood that a liquid screen can be used to see the interesting diffraction pattern using laser lights of different colors. Similarly, gas (foams) as a screen can also be used for the same purpose and that is what they use on DJ floor in their daily life. An experiment of total internal reflection has been performed to show how light travels inside the optical fibers, which provides students a clear understanding of communication through optical fibers. In the rest of the lecture, classical and quantum teleportation were explained together with the idea of unconditional security of quantum key distribution (QKD) with the suitable examples through the pictures and animations to let the students have the clear idea of how quantum world is advantageous over the classical world. Subsequently, some existing application available in the market has been shown using photographs. Finally, the lecture was ended with two cartoon pictures: 1. To justify the students that why should they listen this talk even if they do not work in quantum communication, and 2. To

give the students a glimpse that if a scalable quantum computer is built then they may have an unconditionally secure quantum bank and people would be leaving the RSA based classical bank because its no more secure.

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- Language used (使用言語): English

- Lecture format (講演形式): pptx

◆Lecture time (講演時間) 110 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 and Board with marker is used for the explanation, experiments of Diffraction grating to verify diffraction Law, experiment of Total Internal Reflection to show how light travels inside an optical fibers, a movie of 1 min to show liquid can be used as a screen to see interesting diffraction patterns using laser light.

◆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))

There was no accompanying person with me but Mr. TETSUO HOSOYA

Director of SSH, Chief of Science Department of Ichikawa High School has helped the students to understand (by translating from English to Japanese) some difficult points during the whole lecture. I am really very much thankful to him for his kind help, his explanations in Japanese were really helpful to establish the mutual understanding between the students and me about the lecture.

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

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

1. I would highly appreciate and recommend to have a person like Mr. TETSUO HOSOYA during the future lectures of Science Dialogue because it is very much helpful for the students and the lecturer as well in the sense that he (person) already knows what students have already learned and what not. 2. Students have enjoyed the experiments more and the movie and pictures during the lecture. I understand that visual experiments etc. are easy for the understanding of the students rather than more Physics in words.

- 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。):