

(For JSPS Fellow)

Form B-2
(FY2018)

Date (日付)
03/10/2018 (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) : Marco Tulio Coelho Quintino
(ID No. P-16769)

- Participating school (学校名) : Suwa-Seiryō High School.

- Date (実施日時) :
(Date/Month/Year: 日/月/年) 21/09/2018

- Lecture title (講演題目) : What do you mean by random?
Randomness, Quantum Mechanics, and Non-locality

- Name and title of your accompanying person (講義補助者職・氏名)
Shojun Nakayama, PhD in Physics

- Lecture format (講演形式) :

◆Lecture time (講演時間) 45 min (分), Q&A time (質疑応答時間) 60 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))

Used projector, conducted a game with the students

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

We have started the lecture by playing a cooperative game called correlation/anti-correlation game (相関・反相関ゲーム, or 同じ・同じじゃないゲーム), which involves probability (確率) and randomness (ランダム性). The students formed teams of two members to play against the referee (the teacher) which decides his choices by flipping tossing (コイントス). When the students won, both get a special price. This game is based in an important concept in modern physics, called Bell inequality (ベルの不等式), and will motivate a discussion on genuine randomness (真のランダム性), determinism, and local realism (局所実在論). After this discussion, we discussed about quantum mechanics (量子力学) and its intrinsic random (内在的ランダム) nature. We then finished the lecture discussing the ideas behind quantum entanglement (量子もつれ) and how it can be applied to cryptography (暗号手法).

- Overall advice or comments to future participants in the program (今後の講師へのアドバイス) :

Some students may be shy and may not interact or ask questions in the beginning. It is important to stimulate and interact with the students from the very beginning, maybe even before the lecture starts. For me, it was very useful to have a game and then talk to them about which strategies they have used to play this game and why.

- 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。)

学生が積極的に質問をしてくれて講義のし甲斐がありました。また高校生に伝えることで自分の量子情報の基礎に対する理解も見つめなおすよい機会になりました。またこのような機会があればぜひ参加したいと思います。