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SD4699
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（学校用）

様式 A-1
(FY2025)

2025 年　11 月　20 日

サイエンス・ダイアログ　実施報告書

1. 学校名：お茶の水女子大学附属高等学校

2. 講師氏名：Therese Sara KARMSTRAND

3. 講義補助者氏名：

4. 実施日時：　2025 年　11 月　20 日 （木）　　15：30～ 16：30

5. 参加生徒：　　1 年生　11 人、　　2 年生　1 人、　　年生　　人 （合計　12 人）
　　備考：（例：理数科の生徒）

6. 講義題目：Is Light a Wave or a Particle?
　　Building Light One Photon at a Time Through Interference

7. 講義概要：
　量子力学における波動粒子二元性について、紹介します。難しそうなタイトルですが、高校生に分かるように丁寧に説明します。光の粒子である photon や、光が持つ粒子と波の性質について、いっしょに考えましょう。

8. 講義形式：
　☑対面 ・ □オンライン （どちらか選択ください。
　1) 講義時間　　45 分　　質疑応答時間　　15 分

　2) 講義方法（例：プロジェクター使用による講義、実験・実習の有無など）
　　プロジェクター使用による講義

　3) 事前学習
　　☑有 ・□ 無 （どちらか選択ください。）
　　使用教材：講師提供の動画 2 本、当日のスライドデータ
　　本校英語教員作成の専門用語語彙リスト

9. その他特筆すべき事項：
講義の内容は非常に高度で専門的な内容を含むものでしたが、生徒たちは、高い専門性の獲得と英語学習への意欲が喚起されたようでした。
インフルエンザによる学級閉鎖のため、当初 20 名以上の参加予定の生徒の人数が 12 名に減ってしまいました。

For Web posting

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Form B-2
(FY2025)
Must be typed

Date（日付） 1/12/2025
（Date/Month/Year：日/月/年）

Activity Report -Science Dialogue Program-
（サイエンス・ダイアログ 実施報告書）

- Fellow's name（講師氏名）: KARMSTRAND Therese Sara （ID No. P24732）

- Name and title of the lecture assistant（講義補助者の職・氏名）

- Participating school（学校名）: Ochanomizu University Senior High School

- Date （実施日時）:20/11/2015. （Date/Month/Year:日/月/年）

- Lecture title（講義題目）:
Is Light a Wave or a Particle? Building Light One Photon at a Time Through Interference

- Lecture format（講義形式）:
◆☒Onsite ・ ☐Online (Please choose one.)（対面 ・ オンライン）（（どちらか選択ください。））
◆Lecture time（講義時間） ~ 40 min（分）, Q&A time（質疑応答時間） ~ 10 min（分）
◆Lecture style（ex.: used projector, conducted experiments）
（講義方法（例:プロジェクター使用による講義、実験・実習の有無など））
Slideshow on a screen

- Lecture summary（講義概要）: Please summarize your lecture within 200-500 words.
I began my lecture with a brief self-introduction, explaining my origins and how I became a scientist in Japan. To help the students relate to me and my cultural background, I first made a few comparisons between my home country (Sweden) and Japan. And then, I presented a few famous books and music artists, a few companies, as well as some food, and cultural celebrations that Sweden is known for, which the students might already be familiar with. To give the lecture a more personal touch, I also shared a brief anecdote about my birth city, which is somewhat famous outside Sweden.

After the self-introduction, I additionally gave a short overview of my career path, from leaving for university studies in a new city far from my family, to a pivotal experience as a master-student intern in a laser lab in California, US, and finally graduating with my PhD and moving to Tokyo with my husband.

All of the above was covered within approximately 10-12 minutes.

The second part of my lecture focused on my science. This scientific part was, in turn, divided

into two subsections. Part one was devoted to answering the question in the title of my talk: “Is Light a Wave or a Particle?”. To do this, I gave a general introduction to wave-particle duality. Wave-particle duality is not only the answer to the question, but it is also a central concept in quantum mechanics, with intriguing implications that I expect to be of interest to the broad public. In particular, I discussed the characteristic properties of waves and particles, such as wave pattern interference and particle scattering, and explained the meaning of the word duality in this context. The former was supported with daily-life examples.

The first half of the scientific part provided the foundational essentials for my science. In particular, it introduced the elementary particle of light, photons. In the second half, I employed this notion of the photon to describe how one can engineer quantum states of light, utilizing its wave and particle-like characteristics. This section of the lecture relates to the second part of the title: “Building Light One Photon at a Time through Interference”, and is directly connected to one of my scientific findings. In the lecture, I called this part the “Quantum Light Lego”, to provide a daily-life analogy that illustrates this otherwise abstract topic. As a part of this section of the lecture, I also discussed how I, as a theoretical physicist, work with models to describe and explore physical phenomena. Hopefully, this gave more insight into my daily work as a theoretical physicist.

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

The English proficiency among the students at Ochanomizu was very high, and the personnel at the school were very accommodating and helpful in the preparations for the lecture.

- Impressions and comments from the lecture assistant（講義補助者の方から、本プログラムに対する意見・感想等がありましたら、お願いいたします。）:

Acknowledging
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