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（学校用）

様式 A-1
(FY2025)

2025 年　11 月　11　日

サイエンス・ダイアログ　実施報告書

1.　学校名:東京都立日比谷高等学校

2.　講師氏名:　Dr.　Zane Marius ROSSI

3.　講義補助者氏名:　有原　愛貴　さん

4.　実施日時:　2025 年　11 月　7日（金）　15:30　～　16:50

5.　参加生徒:　1年生　13 人、　2年生　6人、　3年生　1人（合計　20 人）
　　備考:（例:理数科の生徒）希望者

6.　講義題目:Understanding the language of（quantum）computers

7.　講義概要:自己紹介、コンピュータの歴史から現在の量子コンピュータの概要について

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　50分　質疑応答時間　30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:

9.　その他特筆すべき事項:

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Form B-2
(FY2025)
Must be typed

Date（日付）14/11/2025
（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）：（ID No. P24075） Zane Rossi

- Name and title of the lecture assistant（講義補助者の職・氏名）
Manaki Arihara. University of Tokyo Masters Student

- Participating school（学校名）： Tokyo Metropolitan Hibiya High School

- Date （実施日時）：（Date/Month/Year:日/月/年） 07/11/2025

- Lecture title（講義題目）：
Understanding the Language of Quantum Computers

- Lecture format（講義形式）：
◆XOnsite ・ ☐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） 60 min（分）, Q&A time（質疑応答時間） 30 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））
Projector use with slides, and an open question session.

- Lecture summary（講義概要）： Please summarize your lecture within 200-500 words.

The development of digital computers has impacted nearly all aspects of modern life. One way that we organize and understand computation is through algorithms: finite series of simple mathematical instructions. The history of algorithms is long and fascinating, extending far back before the existence of digital computers. This history suggests an important idea: algorithms are far more useful when they are understandable and communicable by humans.

My current research in Japan, and my past research experience in the US, centers on developing algorithms for quantum computers. These computers operate according to quantum mechanical laws, derived from observations of physical systems, and can perform operations that normal computers cannot. Excitingly, quantum algorithms for these quantum computers appear to be able to solve certain special problems incredibly efficiently. However, our ability to understand, communicate, and design quantum algorithms achieving these speedups is still limited.

In this presentation I introduced my research background, described how my research has allowed me to participate in extended and exciting collaboration with Japan, and provided a brief introduction to crucial problems (and some solutions) in the development of quantum computing algorithms. While these algorithms are sometimes strange at first sight, and understanding the nature of quantum computers takes time, I aimed to provide a brief introduction to the methods by which we understand computers from a theoretical point of view, and how these methods have led to the development of new computing schemes over the past eighty years. I also focused on connecting the study of these computers to the interests of students in other areas of science (e.g., physics, mathematics, biology, and chemistry), demonstrating that cross-disciplinary study related to computing is not only possible, but has historically led to novel breakthroughs and insights.

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

- 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。）: