

Form B-5

Date (日付)

05/04/2012 (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): Daniel Dieter FRIEDRICH (ID No. P11324)
- Participating school (学校名): Tokyo Metropolitan High School of Science and Technology
- Date (実施日時): 19/03/2012 (Date/Month/Year: 日/月/年)
- Lecture title (講演題目): (in English) Gravitational Waves: Listening to the Universe  
(in Japanese) 重力波: 宇宙を聞く
- Lecture summary (講演概要): Please summary your lecture 200-500 words.

1. The lecture started with an introduction of the speaker, including cultural highlights of his home country.
2. A brief introduction to gravity was followed by an explanation of the origin and the effect of gravitational waves (GWs), which are a prediction of Einstein's theory of general relativity. While Hulse and Taylor found indirect evidence for the existence of GWs - a result awarded with the Nobel Prize in Physics in 1993 – the first direct detection is still outstanding. The focus of this part of the lecture was set on laser interferometers, which are the most promising approach to observe GWs directly. These detectors are large-scale experiments based on the principle of a Michelson interferometer. In a Michelson interferometer a laser beam is first split into two beams. The two beams go different ways, are combined afterwards and interfere. A GW would change the length of the two ways differently, which changes the interference. This was demonstrated in the lecture by means of a small Michelson interferometer. In this experiment the change of light power was detected by a photodiode. The latter one was connected to a speaker, which allowed us to listen to changes of the interferometer's arm lengths. Based on the experience with the experiment, namely an interferometer is very sensitive to disturbances (touching, air fluctuations, ...), it was further sketched how the actual detectors look like. The effort that is made to achieve the required sensitivity to detect gravitational waves was exemplarily outlined on the example of the gravitational wave detector KAGRA, which is currently build in Japan.
3. On the example of an actual research project, the way from the first idea to the publication of the experimental results was sketched in order to show the different aspects of working as a researcher. This included e.g. communication and teamwork with colleagues as well as going to conferences to present and to discuss the work carried out.

- Language used (使用言語): English

- Lecture format (講演形式):

◆Lecture time (講演時間) 60 min (分), Q&A time (質疑応答時間) 20 min (分) (+60 min after the actual lecture)

◆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))

Power Point presentation, audio system, experimental demonstration of a Michelson interferometer

◆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 accompanied person

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

Dr. Kazuhiro AGATSUMA

◆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。):

生徒にとっては、英語の重要性を認識しながら最先端の科学に触れられる良い機会であるのと同時に、科学者にとっても、直接的に社会貢献ができる場 であると感じたので、とても有意義なプログラムだと思います。自分が高校生の時に受けてみたかったと感じました。科学者側 (同行者) の積極的な参加を促すためにも、学会シーズンを外す等の時期的な配慮があればなお良いかと思います。