

(For JSPS Fellow)

Form B-5

Date (日付)

10/07/2017 (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): Matthew Murdoch \_\_\_\_\_ (ID No. P16803 )

- Participating school (学校名): Niigata Municipal BANDAI High School \_\_\_\_\_

- Date (実施日時): 24/07/2017 (Date/Month/Year: 日/月/年)

- Lecture title (講演題目): (in English) Supernova neutrinos in Super-Kamiokande

(in Japanese)

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

The first part of the lecture focussed on the UK, its nature and similarities to Japan. I also covered the story of why I became a researcher (past education, etc) and an explanation of why (I think) physics is interesting and should be studied. I then introduced neutrinos as particles, their oddities (flavour oscillations, weak interactions) and the implications of these oddities. Descriptions of Super-Kamiokande, Cherenkov light and PMTs were given along with some basic particle identification methods.

Some highlights of Super-K's many exciting physics results were given including the observation fo supernova 1987a. A description of supernova was given including an emphasis on why they are so important, having created all elements heavier than Oxygen, and why supernova neutrinos are useful.

I talked about supernova burst neutrinos seen when a suspernova happens. Because these neutrinos are created in the core of the supernova, we can learn about the internal processes and, for example, know whether a black hole or neutron start formed. Light is created on the explosions surface and so does not convey the same information. Observation of these neutrinos relies on a nearby supernova occuring (like 1987a) whilst Super-K is operating. I talked about gadolinium and what advantages it brings to Super-K and some of the challenges faced in adding it to Super-K's water system. I introduced and discussed EGADS that was a test bed for gadolinium technology and will now watch for supernova during the Super-K upgrade process. Finally I discussed the diffuse supernova neutrino background, neutrinos created during all the past supernova and how observing them will tell us much about the history of the universe.

- Language used (使用言語): English

- Lecture format (講演形式): PowerPoint

- ◆Lecture time (講演時間) ~60 min (分), Q&A time (質疑応答時間) 15 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
- ◆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))  
None
- ◆Name and title of accompanied person (同行者 職・氏名)  
N/A
- ◆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。):