

## Report on the 8<sup>th</sup> Japanese-French Frontiers of Science (JFFoS) Symposium

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The 8<sup>th</sup> Japanese-French Frontiers of Science (JFFoS) Symposium was held from 24 to 26 January 2014 at Metz in Lorraine, France. It is a tranquil and historic city surrounded by many churches.

Elite young scientists were invited to take part in this FoS symposium. They spent three days together while advancing an interdisciplinary exchange. Attending this year's symposium were 70 scientists (35 from Japan and 35 from France) hailing from seven different fields. A session for each field was organized by two Planning Group Members (PGMs), who selected the topics. The sessions were attended by one chair, 2 speakers, and 5 researchers as discussants. I attended as a chair two years ago, and as a PGM in the previous year and this year.

What I find most exciting about FoS symposiums is to meet and communicate with talented people of widely differing fields. Each session allows an hour for presentations by a chair and speakers, followed by an hour for a question and answer period. Having leading researchers from several fields, the sessions are vibrant with probing questions and insightful comments driving their discussions. In and out of the sessions, the participants spend intensive time interacting from early morning till late in the evening over the three days. Though most of them are meeting each other for the first time, they quickly get to feel like old friends, giving way to an increasingly relaxed atmosphere in the symposium. In watching the Japanese researchers participating in these FoS international exchanges, I always feel a sense of awe at the depth and breadth of knowledge they exude.

Now, I would like to report on the activities of this symposium. The *field of chemistry* was the subject of the first-day's morning session, the topic being "Chemistry of Origins of Life." One lecture was on how the existence of molecules in asteroids and comets offer a hint as to how life originated on the Earth some 3.9 billion years ago. Another introduced research on a bag-shaped membrane, an organic-chemically synthesized artificial cell, that grows through something like cell division. As is characteristic of FoS symposiums, the discussion ranged widely from fundamental science through bioethics.

Soon after enjoying lunch together, the next session in the *field of materials science* started. Its topic was the "miracle material" Graphene. Almost 7,000 research papers are published each year on graphene (more or less one paper an hour). Cutting-edge studies on its manufacturing methods and condensed matter physics were introduced. It was illuminating to hear presentations and discussions on such interesting topics as the usage of spin current, which can replace electrical current. The participants vigorously debated what future materials would be forthcoming after the perfection of spherical fullerenes, cylindrical nanotubes and sheet-

like graphene.

Flash Poster Talks were held immediately after the afternoon session. The session gave the PGMs and participants an opportunity to highlight their research activities. In it, 39 researchers queued up to give their poster presentations. Allotted about one minute, each spoke with pinpoint focus and brevity on advances at the cutting edge of their respective research fields. Each outstanding presentation won a round of applause.

The next session was held at five in the evening on the topic “Earthquakes and Associated Risks” in the *earth science/environment field*. The Japanese researcher talked on such on-the-ground matters as the slow slip phenomenon observed just before the Great East Japan Earth and on disaster risk assessment. In contrast, the French researcher focused his remarks on earthquakes with a seismic center of several hundred kilometers in depth that have virtually no effect on people’s daily lives. The first day of sessions concluded at seven in the evening. Enjoying dinner together, the participants deepened their friendship. After the official program ended, some of us repaired to a local pub, where we went on talking until late in the evening. These evening chats enhanced the feeling of closeness among the participants.

The topic of the next day’s morning session was “Bayesian Statistics” in the *mathematics/ informatics field*. The frequentist approach has been the main thrust of statistical analysis; in recent years, however, Bayesian statistics, named after the 18<sup>th</sup> Century scholar Thomas Bayes, have drawn increasing attention. They are being applied in many fields, including life sciences. Given the FoS policy of avoiding difficult discussion topics like mathematical theorems, selecting a subject for this field can be a difficult task. That said, this time we dared to choose as one of the session topics the relationship between prediction theory and entropy, which spurred an animated discussion.

Following another poster session and lunch, we all walked to the Centre Pompidou in the City of Metz. The museum exhibits a collection of the modern art much like that of the Centre Pompidou in Paris. The building, designed by a Japanese architect, has an impressive large white roof and wooden framework. The participants divided into small groups and strolled around the museum. It was very relaxing.

That evening session’s topic was “Supersolidity and Quantum Plasticity” in the *physics and astrophysics field*. Superfluidity of liquid helium is well known. When a similar phenomenon is seen in solid matter, it is called supersolidity, which has been intensely studied since it was initially reported in 2004. In 2012, however, the discoverer himself came to realize that he had not actually observed supersolidity. It appeared that he had overlooked the influence of helium contained in the axis of the experimental device (torsion pendulum). The choice of such a controversial topic bespeaks the intellectual scope of this FoS symposium. Afterwards, we enjoyed a party hosted by the Department of Moselle.

Embarking upon the third and last day of the symposium, the participants should have been a little worn

down after the two days of late evening discussions. Yet, nobody was absent from the eight o'clock morning session. The topic in the *life/medical science field* was "Psychiatric Disorders: Definitions and Treatments." In the practice of clinical psychology, mental disorders are identified based on clinical interview and behavioral observations in reference with a diagnosis manual. To solve imprecisions in such a diagnostic method, the use of fMRI and PET technologies to observe brain activities was introduced. The participants were also surprised to see the deep brain stimulation for treatment of severe illness.

The final session was held in the *social sciences/humanities field* on the topic of "Happiness." The discussion was advanced from various perspectives, including a philosophical one such as the difference between happiness and welfare, from the Japanese folkcraft notion of *futsu-u*, and from economic aspects. During the discussion, some members noted that in Buddhism, sadness is emphasized over happiness. After all the sessions had ended, the participants enjoyed a farewell lunch together.

I extend my hearty appreciation to all the participants and my PGM colleagues for making this symposium so successful. The FoS Program Committee members also provided instrumental support for the symposium, as did the staffs of JSPS, CNRS and other related organizations who worked so hard to organize it.