

EPSRC International Network for Spintronics Kick-Off Meeting
From Material Development to Novel Energy Efficient Technologies
7-9 June 2021, Online



Background

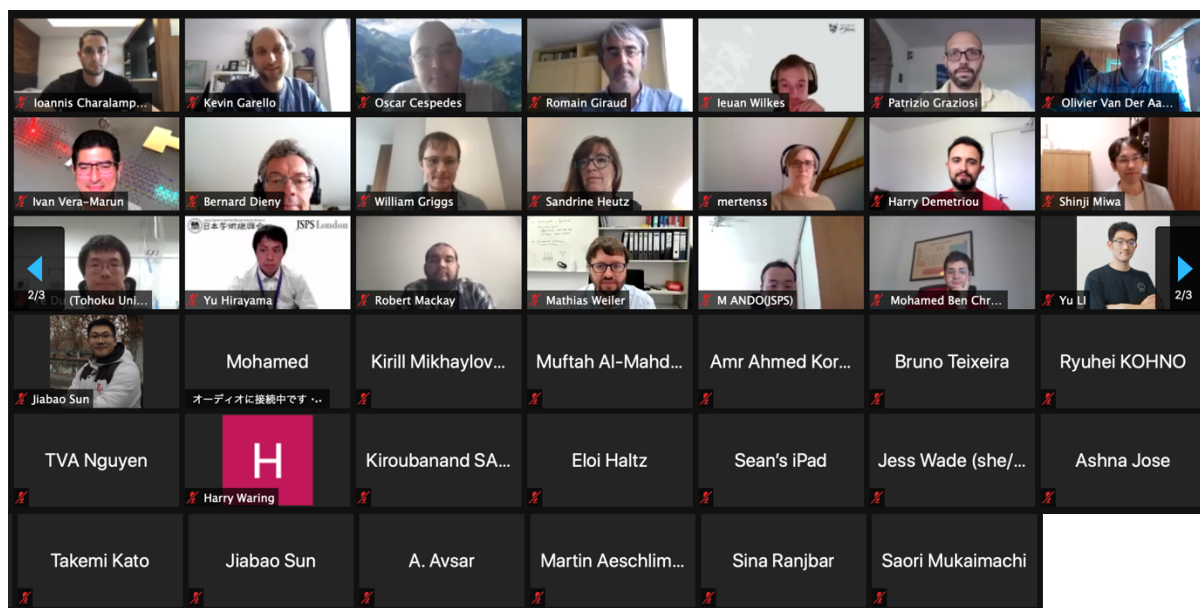
The biannual research symposium series on spintronics was initiated by the mutual visits between the *University of York* and *Tohoku University* in Japan in 2007. The symposium series secured funding under the JSPS Research Symposia scheme to support travel budget for the participants from *Tohoku University* in 2011 and 2013. The symposia were then expanded to include *TU Kaiserslautern* in Germany and research collaborations and exchanges among the consortium by the EPSRC-JSPS Core-to-Core programme and a DFG matching funding in 2015. After successfully completing this five-year programme, an EPSRC International Network programme was awarded to continue the symposia and exchanges together with the above two institutions and the *Universities of Manchester and Leeds* as well as *Spintec* in France. This online symposium was held as a kick-off meeting of this network programme officially started on 1 April 2021.



The symposium

The symposium was held online using Zoom for the first time due to the coronavirus pandemic and travel restriction currently imposed. This has both advantages and disadvantages on the organisation of the symposium. As the advantages, we successfully attracted over 230 participants from 27 countries and encouraged exciting discussion. On the other hand, the online format limited to ask questions directly to presenters unfortunately, which was partially compensated by the networking time allocated at the end of sessions each day.

The symposium opened with a welcome address from Atsufumi Hirohata, who is the Principal Investigator of this International Network project. The following sessions focused on antiferromagnetic spintronics and magnetic memories and sensors. Nine invited speakers from the consortium and beyond, including Dr Robert Carpenter of *Imec (Belgium)* and Professor Sara Majetich of *Carnegie Mellon University (USA)* in these two sessions. These sessions had fruitful discussion on experimental works and modelling, which extended the sessions over 30 min. At the end of the first day, a session on funding opportunities was organised by inviting Dr Sarah Newmann of *EPSRC-UKRI* and Mr Yu Hirayama and Ms Tomoka Miyoshi of *JSPS London*. The presentation slides from JSPS were uploaded on the symposium web page.



The second day consisted of two scientific sessions on spintronic device concepts and low-dimensional spintronics. In the first session, four invited and one contributed talks were given. Namely three external experts presented their recent works: Professor Andrii Chumak (formerly TU Kaiserslautern and now Univ. of Vienna, Austria) on a magnonic logic, Dr Naoyuki Narita of Toshiba (Japan) on their hard disk products less than three months ago based on microwave-assisted magnetic recording, and Dr Yukiko Takahashi of NIMS (Japan) on heat-assisted recording. They provided an industrial viewpoint on the symposium. In the second session, another four invited and three contributed talks were presented, including one by Professor Caroline Ross (MIT, USA). She stayed over the networking time after the session by answering many questions asked by the participants.

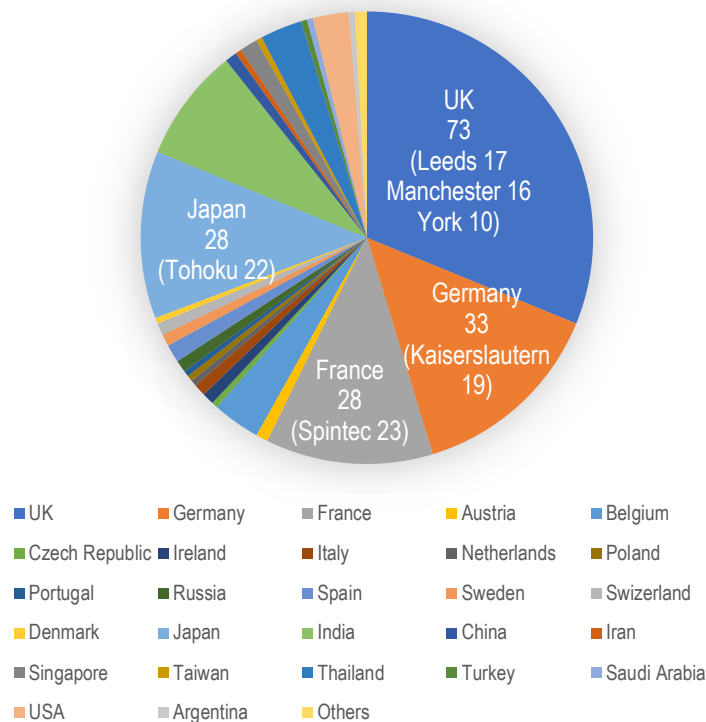
On the last day, two scientific sessions on spintronic materials and dynamics as well as interfaces and topology were presented by six invited and six contributed speakers, including Professor Sandrine Heutz of Imperial College London and PhD students from IFW-Dresden and Walther-Meißner Institute in Germany, who are jointly supervised by the German and French partners. In these sessions, new concept devices to reduce energy consumption were discussed, which was extended almost half an hour. The symposium was concluded with further broad discussion among the participants during the networking time after the sessions.

Symposium statistics

The symposium consisted of 35 oral presentations in three days, covering major topics in spintronics from theoretical to experimental studies and commercial applications. Almost 1/3 of these presentations were specifically allocated to early career researchers to offer an ideal opportunity for them to discuss their results with world-leading researchers. Another 1/3 of the talks were given by external world-leading experts, which was much more than our past meetings by taking the advantages of the online organisation without travel expenses to be covered. In the rest of the talks, representatives of the consortium partners, Professors Thomas Thomson (University of Manchester), Drs Thomas Moore/Joseph Barker (University of Leeds), Drs Benjamin Stadtmüller/Philip Pirro (TU Kaiserslautern), Dr Vincent Baltz (Spintec), Professors Shigemi Mizukami/Satoshi Okamoto (Tohoku University) and Professor Keith McKenna (University of York), gave brief introduction on their activities to encourage planning exchanges/collaborations in this project. These sessions were attended by over 50 participants constantly.

The symposium attracted 234 registrants (including 14 post-deadline registrations) from 27 countries as listed below, some of which cannot be reached in the conventional face-to-face format, such as Turkey, India, Iran and Argentina. Over 30% of the registrants were from outside the consortium, which confirms the importance of this network programme and the impact on the field of spintronics. The broad participation also satisfied the scope of the programme. This leads

to the geographical distribution to be 69% in Europe, 27% in Asia and 3% in Americas.



Overall, the registrants have well-balanced distributions in terms of the other factors. Regarding gender distributions, 22% and 20% of speakers and participants are female, respectively. These participants are in different career stages as distributed as 43% as PhD students, 42% as early career researchers and 15% as established researchers including professors. 67% of them are in academia, 23% in research institutions, 4% in industries and 3% in funding agencies.

Participants' feedback

The feedback from the participants regarding the symposium was very positive. Only negative comment was on the difficulties on asking questions and having intensive discussion, which is due to the online nature of the symposium under the current situation. This can be resolved once the meeting goes back to the face-to-face format as before. The participants all commented on the excellent quality of the speakers in the programme and the general organisation of the event: *e.g.*, “thanks for putting up an excellent program. great conference.” and “Great job” on SNS.

Future meetings

The next symposium will be held at *Tohoku University* later this year, followed by one at *TU Kaiserslautern* in May/June 2022. We intend to organise these symposia in a face-to-face format and also to open it to the wider community as our standard practice.

Last but not least, we are very happy to acknowledge the generous support provided by *EPSRC-UKRI* and trust that future events of this scale and success will be arranged in 2024.



Atsufumi Hirohata
Keith McKenna
Kevin O'Grady

Tom Thomson
Chris Marrows
Mathias Weiler

Burkard Hillebrands
Bernard Diény
Vincent Baltz

Hideo Ohno
Koki Takanashi
Masafumi Shirai