

# Conferences and Workshops

## Research Front of Neutron Scattering

### - Achievements from the User-program Support for Overseas Experiments and Latest Results from JRR-3 -

April 18-20, 2022

O. Yamamuro, T. Masuda, T. Nakajima, and K. Mayumi

After the great east Japan earthquake in 2011, the Japan Research Reactor-3 (JRR-3), which was the largest neutron science facility before J-PARC started, stopped the operation. Since then, the Neutron Science Laboratory of the Institute for Solid State Physics (ISSP-NSL) had supported research groups conducting neutron scattering experiments in overseas facilities. In this workshop, 8 users presented their results obtained in the overseas experiments. In 2021, JRR-3 finally restarted, and ISSP-NSL also restarted the joint-use program on neutron research in JRR-3. In this workshop, the instrument scientists of the neutron scattering instruments in JRR-3 gave talks on the current status of their instruments, and the users of the joint-use program in FY2021 also presented the latest results. The workshop was held only online. There were approximately 50-100 participants on each day. These presentations were accompanied by active discussions, which would contribute to the development of the neutron scattering community in Japan.

## Computational Materials Science —New Perspectives—

May 12-13, 2022

H. Noguchi, T. Ozaki, N. Kawashima, O. Sugino, T. Fukushima, K. Ido, M. Kawamura, J. Haruyama, M. Fukuda, S. Morita, F. Oba, T. Ono, H. Watanabe, and Y. Higuchi

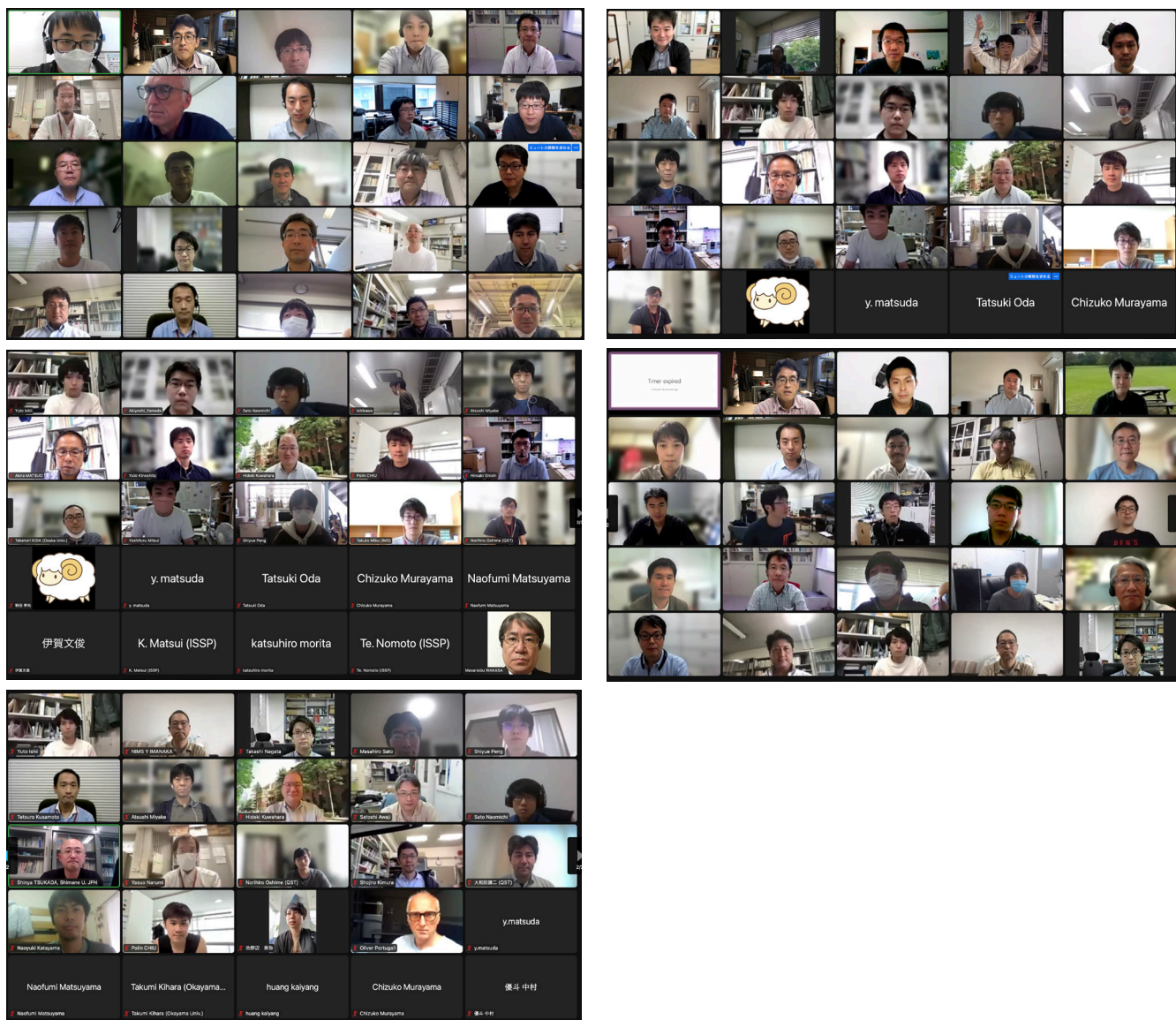
This workshop was organized for the computational condensed matter research community, especially for the users of the ISSP supercomputers, to exchange the most recent information on the computational condensed matter research and on the high-performance computation of related research areas. This was held as a series of annual workshops of ISSP supercomputer that has been held every year. This year, it was held in a hybrid style for the first time. Most of talks were presented on-site and also broadcasted online. The posters were presented online. The selected topics include the progress made in the elements strategy projects, the emergent data-driven material research, and the project for advancement of software usability in materials science (PASUMS) that developed the unified platform of experiment-data analysis for 2D material structure and implemented the ESM RISM method in Quantum ESPRESSO in 2021. In addition to 14 invited talks and 32 poster presentations, two special lectures for material informatics were given by Dr. Yoshihiko Takano and Prof. Haruki Watanabe.



# Development of 1000-Tesla Science

June 10-11, 2022  
Y. Matsuda

This workshop was organized to newly explore ultrahigh magnetic field science in a 1000 T range and have researchers exchange current interests and the latest achievements in the research area. Since the world record of 1200 T in 2018, several scientific results have been obtained such as field-induced insulator-metal phase transition in strongly correlated materials and structural phase transitions in frustrated spin systems. On top of that, several novel measurement techniques such as magnetostriction, electrical impedance in radio-frequency range, and sound velocity have been developed for the destructive ultrahigh magnetic fields, leading to the exploration of a new research area using 1000 T. Researchers from different areas like solid state physics, chemistry, bioscience, particle physics, and plasma science got together. A variety of topics were discussed from the viewpoint of the potential novel effects and phenomena. Among those topics, the magnetic field effect on the ferroelectric phase transition was intensively discussed. Although the phonon has generally been thought to be insensitive to the magnetic field, the strong magnetic field can affect the phonon mode even through direct Lorentz force to the charged ions. The potential magnetic field effect on the ferroelectric material sounded to be one of the most interesting themes in the 1000 T research.



## Frontiers of Protein Sciences: Close Collaboration between Theory and Experiment

July 26-27, 2022  
H. Noguchi, K. Inoue, and Y. Shigeta

Recent developments in supercomputers and experimental methods have combined to make significant progress in the field of analyses on structures and functions of proteins and organelles in living organisms. In order to exchange information on the latest results and discuss future prospects for joint theoretical, computational, and experimental research in protein science, this ISSP regular workshop was organized in the hybrid type (in person and online) format. In this workshop, 20 lectures were given in a wide range of biophysics fields for both theoretical and experimental studies. Active discussions were also held in 16 poster presentations. The workshop attracted a great deal of attention, with 102 participants registered, including online participants, 26 on-site participants on the first day and 29 on the second day (total of 32), and the maximum number of simultaneous online participants was 67.



## Exchange Meeting for Young Women Condensed Matter Physicists 2022

November 15, 2022  
S. Miwa, T. Ideue, K. Inoue, M. Oshikawa, Y. Kohama, T. Nakajima,  
H. Noguchi, T. Fujino, I. Matsuda, and M. Lippmaa.

This workshop was organized to support women researchers in the research field of condensed matter physics. This workshop is part of the events of the ISSP Women's Week 2022. In order to organize this workshop, we set up a working group consisting of ISSP professors selected from each division/group/laboratory. We discussed a lot about the style of the workshop and decided that the main purpose of this workshop is to interact with each other. The workshop consists of oral and poster presentations and panel discussions. We invited 25 young women researchers, including assistant professors, postdocs, and graduate students. The presentations cover a wide range of topics in the research fields of physics, chemistry, and biology. All of the presentations were held on the 6<sup>th</sup> floor of the ISSP main building and were successfully concluded. Especially, in the poster session, not only the female participants but also the members of ISSP joined the discussion and it was very exciting. The number of participants was 63, including 43 on-site and 20 online registrations.

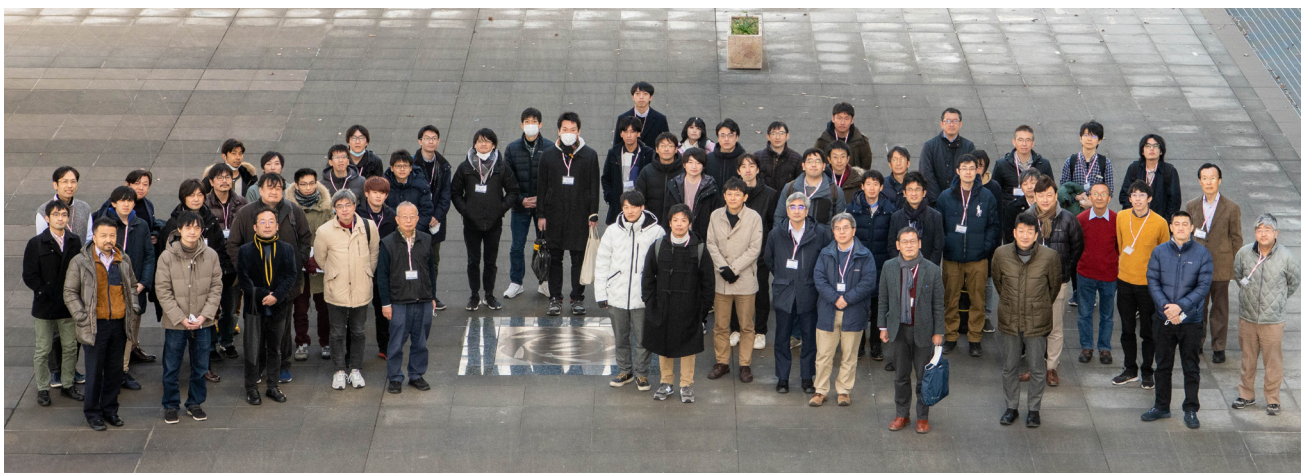


## Recent Developments and Future Prospects of Chiral Materials

December 22–24, 2022

H. Kusunose, H. Tsunetsugu, J. Kishine, Y. Togawa, H. Yamamoto, and T. Satoh

Chirality is a significant concept that bridges across multi-scale research fields such as physics, chemistry, biology, and astronomy. Recently, there has been growing interest in the nontrivial couplings among electromagnetic fields, electronic spins and orbitals, phonons, heat current, etc. in chiral systems. In these circumstances, we organized this workshop aimed at stimulating a renaissance in materials science from the perspective of chirality. The specific focused topics include chiral magnetism, chiral phonon, cross-correlated phenomena inherent from chirality, visualization of chirality, chirality-induced spin selectivity (CISS). The workshop was held for three days in a hybrid style, and featured 17 invited talks, 20 contributed talks, and 23 poster presentations, most of which were given on-site. Pre-registrations reached 200 people from a wide range of research fields and generations, and there were 500 participants throughout the workshop (164 on-site, and 336 on-line). The workshop provided an excellent opportunity for researchers from various backgrounds to share the basic concept of chirality, update their understanding of chirality, and promote a cultural exchange that could lead to new collaborations in the near future.



## Frontiers of Anyons and Fractional Statistical Particle Studies in Solids

February 13–14, 2023

M. Udagawa, Y. Otani, T. Osada, M. Oshikawa, Y. Kasahara, M. Hashisaka, and M. Yamashita

Anyons, following fractional statistics in two-dimensional systems, are not only interesting in their own right, but are also attracting a great deal of attention as emergent particles in solids that enable topological quantum computing. This workshop was organized to gather researchers studying anyons and Majorana fermions in various systems, including 2D quantum Hall systems, 1D quantum nanowires, topological superconductors, and Kitaev spin liquids. In this workshop, various topics are discussed, such as the progress of braiding experiments in fractional quantum Hall systems, Majorana fermions in topological superconducting states and the challenges of detecting Majorana zero modes in 1D quantum wire experiments, the progress of experiments on the Kitaev candidate  $\alpha$ - $\text{RuCl}_3$ , the mathematics of quantum calculations using non-Abelian anyons, and the challenges for preventing errors in the quantum calculations. We invited 4 keynote speakers for the tutorial presentations and 11 invited speakers to cover the research in these areas, in addition to 11 contributed poster presentations. The meeting was held in a hybrid format, combining a face-to-face meeting in the Media Hall in Kashiwa Campus Library and a Zoom meeting. A total of about 120 people attended the on-site meeting, and nearly 160 people participated online.

