

# Conferences and Workshops

## Frontier Research on Glasses and Related Complex Systems

May 10-12, 2021

O. Yamamuro, H. Tanaka, K. Miyazaki, T. Kanaya, T. Hayakawa, K. Fukao, R. Nozaki, N. Shinyashiki, O. Urakawa, H. Shiota, and N. Yamamuro

This workshop was organized for discussing the present frontiers and future directions of the experimental, theoretical and computational studies on glasses and related systems including granular materials, spin/electronic glasses, proteins, foods, medicines, etc. ISSP has held workshops related to the glass every 3-4 years since 2002 and played a leading role of this field. Though a face-to-face meeting was planned at the time of application, it was unfortunately changed to an online meeting due to prolonged COVID-19 effects. The workshop contained 2 plenary lectures, 20 invited talks, and 21 contributed talks. The poster session, which was held in previous workshops, was cancelled. There were 208 participants including some special guests from China. This number was the largest ever, which is the biggest advantage of the online meeting. The discussion was quite active and many questions were asked from the audience though the online meetings are usually quiet. This reflects the activity of the present field. Actually, a related international meeting, International Discussion Meeting on Relaxations in Complex Systems (<https://9idmrcs.jp/>), will be held in Makuhari, Chiba in 2023, based on the domestic members of this workshop.

## 2nd Workshop on the Frontline and Future Trends in Nanoscale Science

June 22, 2021

S. Katsumoto, Y. Otani, T. Osada, Y. Yamashita, S. Miwa, and Y. Hasegawa

Recent rapid progress in nanoscale science, such as elucidation and precise control of novel quantum phenomena by nano-fabricated devices, and emerging topological properties at surfaces, interfaces, and atomic-layer two-dimensional materials, attracts tremendous attentions in the community of condensed matter physics. In order to overview relevant cutting edge researches and explore future directions of the interdisciplinary research field, we organized this workshop following the first one held in July 2020. Looking ahead of the foundation of Laboratory of Nanoscale Quantum Materials (Q-Nano Lab, later founded in March 2022), the present workshop focused on the subjects of low-dimensional and topological materials, spintronics, quantum transport, q-bits, quantum computing etc., and invited 8 young researchers working in universities and research institutes in Japan.

Since the workshop was held online through the network, more than 200 participants, some of which are from abroad, joined the workshop, and actively participated in the discussion after the presentations. Although a half-day short event, the workshop was so exciting because all the presentations provides us new amazing and stimulating results on the frontline nano science. The organizing members are also delighted to find many young promising researchers performing high-quality sciences based on their new ideas and concepts. We expect that the workshop will further encourage the activity of nano science in Japan and promote joint researches with our institute through the newly founded Q-Nano Lab.



# New Trends in Quantum Condensed Matter Theory 2021

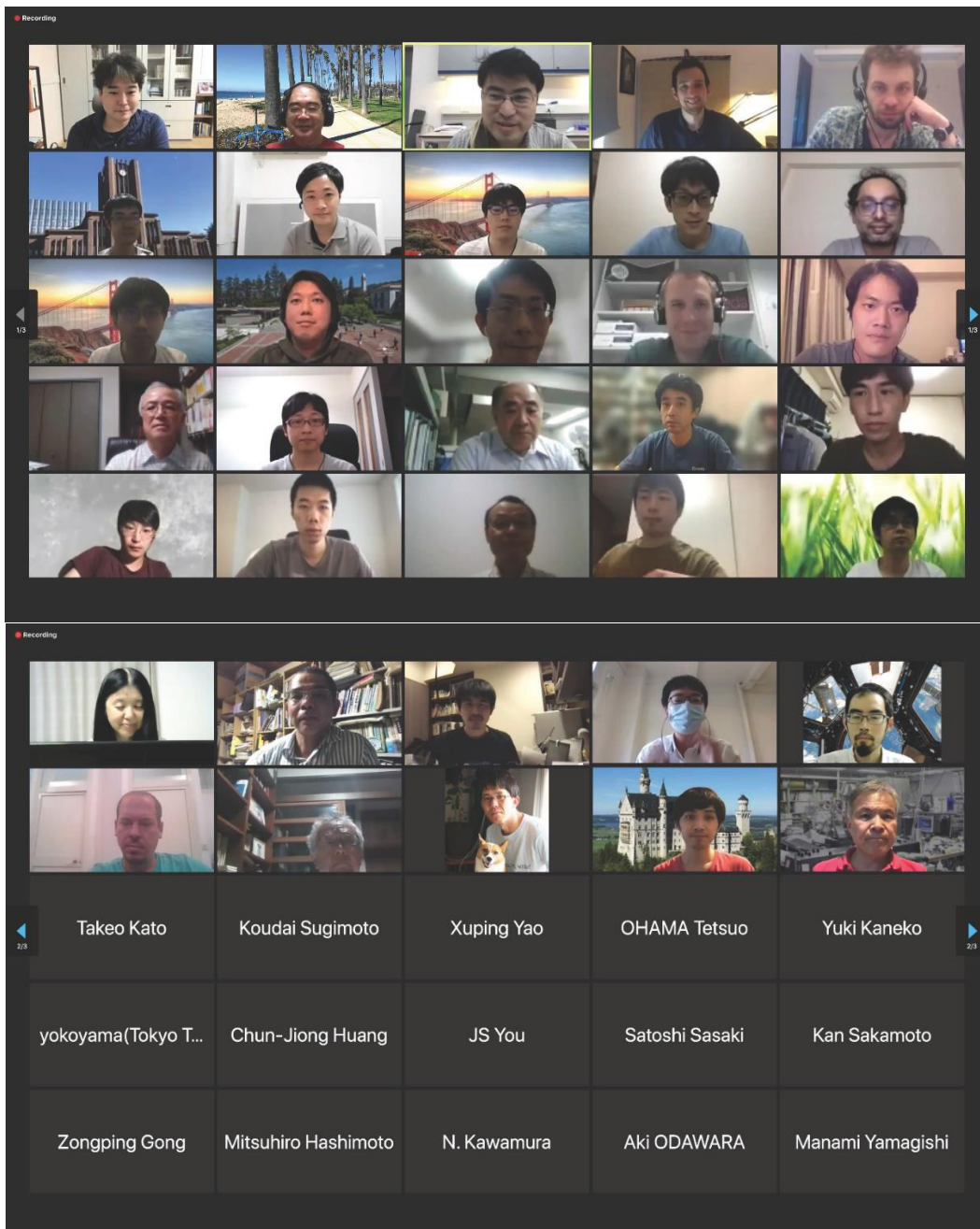
July 26-30, 2021

T. Oka, M. Oshikawa, G. Chen, R. Moessner, and A. Vishwanath

Quantum material is a stage where various exotic quantum phenomena such as phase transitions and non-trivial dynamics are manifested, and active research is being done worldwide. We held an online workshop with a focus on recent developments in the theory of quantum materials, where both Japanese and international young active theorists were invited.

Talks on twisted bilayer graphene, quantum computation, nonequilibrium many-body quantum states, photoinduced superconductivity, quantum chaos, topological states, etc. were given by 11 Japanese, 5 from Asia, 3 from Europe, and 6 from the US, including 3 women.

The invited speakers were young researchers only, and the presentations were full of energy and enthusiasm. Despite the late-night (Japan time), there were always more than 70 participants, and a lively Q&A session was held. One aim of the workshop was to support young researchers in building their career paths by providing a stage for them to stimulate each other actively and by shining a spotlight on their achievements. We think that this workshop was successful in this aim and feel that it should be continued, for example, bi-annually.



## ISSP WOMEN'S WEEK 2021

August 3-5, 2021

H. Akiyama, T. Ozaki, M. Oshikawa, M. Tokunaga, I. Matsuda,  
S. Miwa, H. Mori, M. Yamashita, and J. Yoshinobu

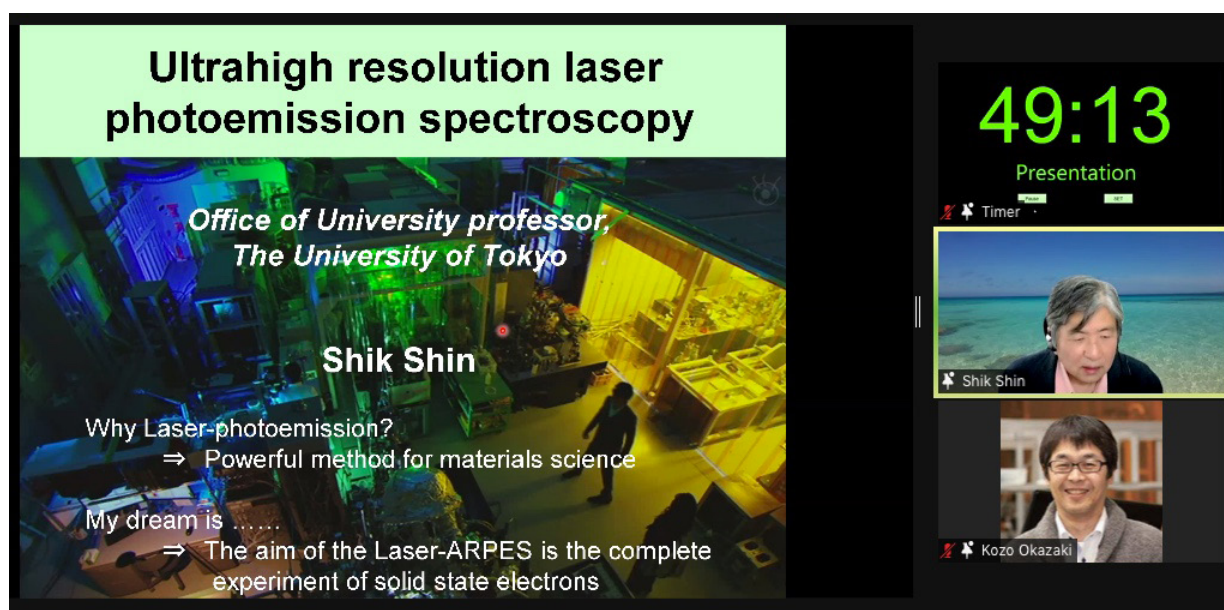
For the development of material science studying the various physical properties of matters, it is essential to further expand the research area and promote the diversity of the researchers. The ISSP Workshop entitled "ISSP WOMEN'S WEEK 2021" was held to further promote the activities of female researchers who still remain a minority in the field of science and engineering research. We invited female researchers who are active on the cutting edge in a wide range of fields of material science, ranging from leading professors representing each research field, who serve as a role model for female students, to up-and-coming young female researchers. In contrast to an ordinary workshop with a focused topic, this workshop covers a wide range of topics – including biophysics, chemistry, surface physical sciences, and strong-correlated electrons – for creating new networks of female researchers. All speakers are thus asked to briefly introduce themselves in addition to the introduction for broad audiences. All speakers are also asked to give comments with respect to current issues to promote diversity. On the second day, Dr. Kaori Hayashi (Vice President of the University of Tokyo) and Dr. Kaoru Tamada (Vice President of Kyushu University) gave special lectures on the efforts of their institutions to promote diversity, which is followed by a panel discussion with invited speakers. There were about 166 pre-registered participants for this workshop, with 60-90 participants / day over the three days.

## 10th International Workshop on Advanced Spectroscopy of Organic Materials for Electronic Applications: ASOMEA-X

October 25-28, 2021

J. Yoshinobu, R. Arafune, K. Akaike, K. Ozawa, Y. Yamada, H. Yoshida,  
Y. Nakayama, Y. Harada, T. Kondo, K. Okazaki, K. Kuroda

ASOMEA has been held every two to three years since 2001 as an international workshop to discuss structures, electronic states, and properties of electronically functionalized organic materials and the related phenomena at surface/interface from the viewpoint of spectroscopy. This ASOMEA-X has expanded its scope to include not only electronically functionalized organic materials, but also low-dimensional and topological materials that have recently been attracting much attention. In order to obtain deeper understanding of the microscopic and dynamic properties of these materials as well as the behavior of electrons, atoms and molecules during device operation and reactions, we have focused not only on studies using conventional spectroscopies but also those by the state-of-the-art spectroscopies including operando spectroscopy, time-resolved spectroscopy and local probe microscopy/spectroscopy. The presentations at ASOMEA-X consisted of 3 invited tutorial talks, 20 invited talks, 22 general oral presentations and 18 poster presentations. For oral presentations, the web conference tool (Zoom) was used together with the breakout rooms for the intimate discussion with speakers after their presentations. For poster presentations, a virtual poster room was prepared using SpatialChat, allowing participants to approach the presenter for discussion, similar to a face-to-face poster presentation. The number of participants is as follows: 103 from Japan and 60 from eight foreign countries (Sweden, Germany, U.S.A., China, Korea, Singapore, India, and New Zealand). The program and abstracts are available from the web site ([https://yoshinobu.issp.u-tokyo.ac.jp/ASOMEAX\\_web/index.html](https://yoshinobu.issp.u-tokyo.ac.jp/ASOMEAX_web/index.html)).



A screen shot of one of the online tutorial lectures, in which Prof. Shin gave his last invited talk among many international conferences. Prof. Shin passed away on June 7, 2022.



## Frontiers in Molecular Crystals Research: New Materials and Novel Phenomena

December 1-2, 2021

H. Ito, T. Kusamoto, M. Naka, T. Osada, H. Seo (chair), M. Suda, N. Tajima, A. Ueda, M. Yamashita, and K. Yoshimi

This workshop was organized to gather researchers working on a rich variety of molecular solids to exchange discussions about recent progresses in different fields. The presentations included a broad range of topics: e.g., development of new metal complexes showing novel cross-correlated functionalities among magnetic, optical, and electric responses, elucidation of novel phenomena by first-principles calculations and strongly-correlated theories, design of pi-electron system in newly synthesized molecular materials, photo-induced nonlinear phenomena explored by state-of-the-art optical sources, and measurements and analyses of nontrivial electronic states in molecular topological materials. We had 12 invited talks, 18 contributed talks, and 41 poster presentations. The workshop was held as a hybrid-type organization with oral talks onsite at ISSP and online otherwise, and successfully had extensive discussions between researchers with different backgrounds.

## High-Pressure Workshop “Recent topics”

March 5, 2022

Y. Uwatoko, Z. Hiroi, H. Takahashi, and M. Hasegawa

Pressure is an important thermodynamic parameter frequently used for understanding and tuning the fundamental physical properties of materials in a controlled manner and also synthesize new materials not existing in ambient pressure and temperature. Apart from these, in recent years, the growing importance of high pressure has been realized in many other research fields. To review and update the status of recent research in various fields using high pressure as a keyword as well as to discuss the future research prospects, the ISSP workshop was held on March 5<sup>th</sup>, 2022. Considering the ongoing COVID-19 situation, the workshop was held online via ZOOM with 183 participants from universities, companies and including research institutes working in various fields. In this workshop, 14 researchers were invited to deliver talk about the latest trends in science and discuss the new direction that is expected to emerge from their current research activity. Each speaker presented various research results ranging from synthesis of new materials, measurement techniques under high pressure, essential pressure technologies to various applied measurements. In addition, each presentation was followed by an active question and answer session. Finally, Prof. Mori, Director of ISSP, gave a presentation on the prospects and direction of ISSP.

## Frontier of Scanning Probe Microscopy and Related Nano Science

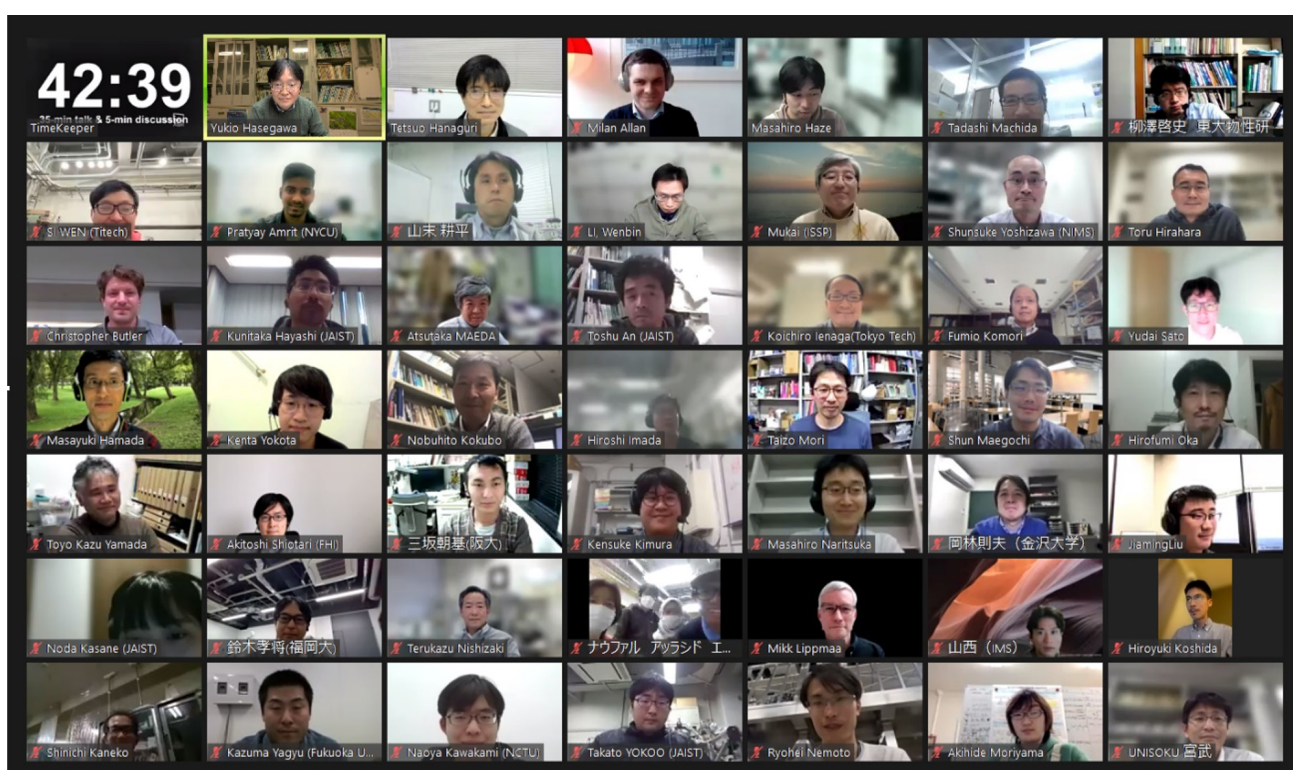
March 30-31, 2022,

M. Haze, T. An, Y. Okada, Y. Kim, Y. Sugimoto, Y. Hasegawa, T. Hanaguri, and Y. Yoshida

Scanning tunneling microscopy (STM) provides us atomically resolved images of materials' surfaces. It has been known that electronic states, magnetic properties, and vibrational spectra can be obtained by tunneling spectroscopy, spin-polarized STM, and inelastic tunneling spectroscopy, respectively. Recently, combined with pico-second pulsed light or THz light, new atomistic information of time-resolved phenomena were revealed. Recent progress of photo STM has made meV-resolution of single-molecule photo luminescence possible. Spin-polarized STM with GHz waves successfully detects spin resonance of single atoms. Dilution refrigerator STM achieves meV energy resolution to reveal fine structures in a superconducting gap. Improvement of atomic force microscopy (AFM) is also amazing; atomic framework of molecules is now imaged by using CO-terminated tip. The orientation of water molecules are successfully visualized.

In order to overview above-mentioned recent advancements of probe microscopy, we organized this workshop. In addition to young domestic invited speakers and poster presenters, we also invited several prominent researchers from abroad, making the most of the online workshop.

Since the schedule was arranged loosely and each speaker has a plenty of time for the presentation (40 min), speakers gave us a very clear and informative talk, which may not be possible in usual tight-scheduled conferences. The discussion after the presentation was also quite active, which obviously helped scientific and technical understandings of the audience. More than 150 researchers joined the workshop including some from abroad. It would be our pleasure if the workshop revise the perspective about the probe microscopes and promote joint researches among the participants.



## Open Topological System in Biology, Quantum Systems, and Statistical Mechanics

March 28-30, 2022

T. Oka and K. Inoue

Transport processes of particles, energy, and information have been widely studied in both condensed matter physics and life sciences. In this workshop, we invited researchers from 3 fields, namely condensed matter physics, life sciences, and statistical mechanics, to discuss the topics of open topological systems.

Talks on non-Hermite quantum systems, correlated electrons, Liouville systems, Floquet systems, and biological systems (experiments) were given. Naomichi Hatano, who pioneered the field, gave the first talk with an excellent overview. Many of the speakers were young, including two Ph.D. students. The format of the workshop was hybrid, with about 50 on-site audiences and 20 online audiences. Extremely lively Q&A sessions were held, and although we had a relaxed schedule (60 mins for each speaker), the discussions continued for a long time. The workshop aimed to bring young researchers from different fields and help them communicate their ideas. We think that this workshop was successful in this aim and feel that it should be continued, for example, bi-annually.

