

Workshop: Emerging Platforms for Quantum Computing

As technology based on classical physics becomes increasingly mature, quantum technology is inevitable, feasible, and desirable. The construction of a useful scalable quantum computer is the holy grail of this second quantum revolution, which will usher in another industrial revolution. There is no doubt about the potential of quantum technology as Feynman once said: there is plenty of room at the bottom. The construction of a scalable useful quantum computer is still a long-term challenge. Since it is not yet clear what would be the successful approach to a useful quantum computer, we should discuss openly wide possible approaches for quantum computing in the interaction of experiment, theory and mathematics.

DATE: Apr.10-11, 2023

PLACE: TOKYO ELECTRON House of Creativity, Tohoku University

PROGRAM:

Apr.10

- 09:00-09:05 Opening Remark
- 09:05-09:45 Mike Freedman (UCSB, Microsoft Q-station) on-line, Anyon-style computation with electrons
- 09:45-10:25 Andrea Young (UCSB) on-line, Fractional quantum Hall effects in van der Waals heterostructures: new results in the bulk and on the edges
- 10:35-11:15 Mike Zaletel (UC Berkeley) on-line, Non-abelian phases in bilayer graphene
- 11:15-12:05 Jun Zhu (Penn State U.) Updates on the fractional quantum Hall effect in bilayer graphene
- 12:05-13:00 Break
- 13:00-13:40 Yong P. Chen (Purdue U.) Emerging platforms for topological superconductor qubits
- 13:40-14:20 Taro Yamashita (Tohoku U.) New-generation superconducting flux quantum bits for scalable quantum computer
- 14:40-15:20 Shin Hayashi (Tohoku U.) An index theoretic approach to topological corner states
- 15:20-16:00 Hiroto Nishihara (Tohoku U.) Challenge of building three-dimensional frameworks using graphene
- 16:10-16:50 Makoto Kohda (Tohoku U.) Spin-orbit interaction and persistent spin helix state in semiconductor heterostructures

Apr.11

- 09:00-09:40 XG Wen (MIT) Non-Abelian statistics in bilayer systems
- 09:40-10:20 Yasu Kawahigashi (U.Tokyo) Tensor networks, two-dimensional topological order and operator algebras
- 11:00-11:40 Tomoki Ozawa (Tohoku U.) Some topics on topology and quantum geometry related to double-layer graphene
- 11:40-15:00 Break
- 15:00-15:40 Motohiko Ezawa (U.Tokyo) on-line, Computing power of topological quantum computation based on the braiding of Majorana fermions
- 15:40-16:20 Takafumi Sato (Tohoku U.) Electronic states of topological superconductor candidates as a Majorana platform
- 16:40-17:20 Tomohiro Otsuka (Tohoku U.) Semiconductor spin qubits and new materials
- 17:20-18:00 Zhenghan Wang (UCSB, Microsoft Q-station) Perspective