Joint workshop of 5th Workshop on Quantum and Classical Cryogenic Devices, Circuits, and Systems (QCCC2023), 16th Superconducting SFQ VLSI Workshop (SSV2023), and 2nd International Workshop of Spin/Quantum Materials and Devices (IWSQMD2023)

Technical Program

Venue: Advanced Institute for Materials Research (AIMR), Tohoku University, Sendai, Japan

Thursday, November 16

13:00–13:10 **Opening remarks** **Taro Yamashita**

13:10–14:10 **SSV session I**

13:10–13:40 [I-1] (Invited) Masahiro Horibe (National Institute of Advanced Industrial Science and Technology)

"Enhancement of Superconducting VLSI Technology for Next Generation Large-scale Quantum Computer in G-QuAT/AIST"

13:40–13:55 [O-1] Toranosuke Nakayama, Shoma Tanemura, Masayuki Higashi, Feng Li, Masamitsu Tanaka, and Akira Fujimaki (Nagoya University),

"Demonstration of essential elements for realizing low-power HFQ circuits"

13:55–14:10 [O-2] Shigeyuki Miyajima[1], Hirotaka Terai[1], Taro Yamashita[2], Duong Pham[2], Masamitsu Tanaka[3], and Shigehito Miki[1, 4] ([1]National Institute of Information and Communications Technology, [2]Tohoku University, [3]Nagoya University, [4]Kobe University),

"Fabrication process for superconducting devices based on nitride superconductors including ferromagnetic Josephson junction"

14:10–14:30 **Coffee break**

14:30–16:15 IWSQMD session

14:30–15:00 [I-2] (Invited) Akira Kamimaki[1], Yuhei Sekiguchi[1], Keidai Wakamatsu[1], Kosuke Mikata[1], Ami Matsuki[1], Kengo Sugihara[1], Shinobu Onoda[1,2], Hiromitsu Kato[1,3], Toshiharu Makino[1,3] and Hideo Kosaka[1] ([1]Yokohama National University, [2]National Institute of Quantum Science and Technology, [3] National Institute of Advanced International Science and Technology)

"Quantum manipulation and creation of a single nitrogen-vacancy center for high-fidelity quantum repeaters"

15:00–15:30 [I-3] (Invited) Donghun Lee (Korea University),
"Qubits, new experimental tools for science: Diamond magnetometry"

15:30–15:45 [O-3] Shunki Nakamura[1], Naoya Morioka[2], Norikazu Mizuochi[2], Shigemi Mizukami[1], and Hiroki Morishita[1] ([1]Tohoku University, [2]Kyoto University),

"Photoelectrically detected single nitrogen-vacancy centers in diamond"

15:45–16:00 [O-4] Fumihiro Kaneda (Tohoku University, Japan Science and Technology Agency)
"Time multiplexing for high-efficiency generation of single and entangled photons"

16:00–16:15 [O-5] Michihiro Yamada[1,2], T. Naito[1], R. Nishimura[1], A. Masago[1], Y. Shiratsuchi[1], Y. Wagatsuma[3], K. Sawano[3], R. Nakatani[1], T. Oguchi[1], and K. Hamaya[1] ([1]Osaka University, [2]Japan Science and Technology Agency, [3]Tokyo City University),

"Effect of interfacial spin moments at ferromagnet/semiconductor heterojunctions on interface spin polarization"

16:15–16:30 Coffee Break

16:30–18:00 Poster session (1st floor at AIMR)

18:00–19:30 Banquet

Friday, November 17

9:00–10:15 SSV session II

9:00–9:30 [I-4] (Invited) Peter Beerel (University of Southern California),
"Clocking large-scale SFQ circuits: Hidden challenges and new opportunities"

9:30-9:45 [O-6] Nobuyuki Yoshikawa, Wataru Komiya, Naoki Takeuchi, Ayala Christopher, and Yuki Yamanashi (Yokohama National University),

"Dual-rail direct-coupled AQFP logic"

9:45-10:00 [O-7] Hiroaki Myoren, Takuro Funazawa, Kiraru Oba, Yuki Shimizu, and Masato Naruse (Saitama University),
"SFQ logic circuits for Braiding Operations in a Topological Josephson Junction Array"

10:00-10:15 [O-8] Mutsuo Hidaka[1], Shuichi Nagasawa[1], Kazumasa Makise[1,2], Hirotake Yamamori[1], Taichi Sato[3], and Masamitsu Tanaka[3] ([1]National Institute of Advanced Industrial Science and Technology, [2]National Astronomical Observatory of Japan, [3]Nagoya University),

"Integration process for 0 and π Josephson junctions into Nb four-layer devices"

10:15–10:30 Coffee break

10:30–12:15 CIRQuM session

10:30–11:00 [I-5] (Invited) Hideaki Takayanagi (National Institutes of Natural Sciences),
"Andreev reflection and superconducting proximity effect"

11:00-11:30 [I-6] (Invited) Yuichi Yamazaki[1], Tomoaki Tanaka[1], Makoto Kohda[1,2], and Takeshi Ohshima[1,2] ([1]National Institutes for Quantum Science and Technology, [2]Tohoku University),
"Development of silicon vacancy based quantum sensor for direct measurement inside silicon carbide devices"

11:30-11:45 [O-9] Shun Kanai (Tohoku University, National Institutes for Quantum Science and Technology, Japan Science and Technology Agency),
"Solid state spin center in oxide"

11:45-12:00 [O-10] Xuejun Xu[1], Tomohiro Inaba[1], Takuma Aihara[1], Kenichi Hitachi[1], Atsushi Ishizawa[2], Takehiko Tawara[2], and Haruki Sanada[1] ([1]NTT, [2]Nihon University),

"Epitaxial Rare-Earth Oxide Thin Films and Waveguide Devices for Quantum Information Applications"

12:00-12:15 [O-11] Katsushi Hashimoto[1], Kairi Kaneta[1], Yuma Hiraga[1], Songtian Li[2], Seiji Sakai[2], Ryo Kawaguchi[1], and Tadahiro Komeda[1] ([1]Tohoku University, [2]National Institutes for Quantum Science and Technology),

"Electrically detected electron spin resonance applied to atomic-layer and single-molecule systems"

12:15–13:45 Lunch

13:45–15:00 QCCC session I

13:45–14:15 [I-7] (Invited) Shuhei Tamate (RIKEN),
"Scalable integration of superconducting quantum circuits with three-dimensional wiring"

14:15-14:30 [O-12] Takahiro Yamada, Y. Urade, T. Ishikawa, M. Tsujimoto, G. Fujii, S. Nagasawa, Y. Nakashima, W. Mizubayashi, and K. Inomata (National Institute of Advanced Industrial Science and Technology),

"Characterization of a Josephson traveling-wave parametric amplifier with an AlO_x dielectric for capacitors"

14:30-14:45 [O-13] C. W. Sandbo Chang[1], Arjan F. van Loo[1,2], Hiroki Kutsuma[3], Shuhei Tamate[1], Yasunobu Nakamura[1,2] ([1]RIKEN, [2]The University of Tokyo, [3]Tohoku University),

"Low-insertion-loss Josephson traveling-wave parametric amplifiers based on coplanar architectures"

14:45-15:00 [O-14] Hiroki Kutsuma[1,2,3], C.W. Sandbo Chang[2], Masanori Takeda[4], Hirotaka Terai[5], Yoshiro Urade[6], Shuhei Tamate[2], Yutaka Takeda[7], and Yasunobu Nakamura[2,7] ([1]Tohoku University, [2]RIKEN, [3]Japan Science and Technology Agency, [4]Sizuoka University, [5]National Institute of Information and Communications Technology, [6]National Institute of Advanced Industrial Science and Technology, [7]The University of Tokyo),

"Design of kinetic-inductance traveling-wave parametric amplifiers for readout of superconducting quantum circuits"

15:00–15:15 Coffee break

15:15–16:30 QCCC session II

15:15–15:45 [I-8] (Invited) Masayuki Ohzeki (Tohoku University),
"Quantum solution hub -Tohoku University- quantum annealing and its solution in society"

15:45-16:00 [O-15] Yosuke Ueno[1], Yuna Tomida[2], Teruo Tanimoto[3], Masamitsu Tanaka[4], Yutaka Tabuchi[1], Koji Inoue[3], Hiroshi Nakamura[2] ([1]RIKEN, [2]The University of Tokyo, [3]Kyushu University, [4]Nagoya University),

"Toward system-level optimization of superconducting quantum computers: The case of QAOA"

16:00-16:15 [O-16] Duong Pham[1], Tomoharu Ueda[2], Shigeyuki Miyajima[3], Hirotaka Terai[3], Kunihiro Inomata[4], Masamitsu Tanaka[2], Akira Fujimaki[2] and Taro Yamashita[1] ([1]Tohoku University, [2]Nagoya University, [3]National Institute of Information and Communications Technology, [4]National Institute of Advanced Industrial Science and Technology),

"Design, fabrication, and measurement of capacitively-shunted π-flux qubit controlled by monolithically-integrated SFQ circuit"

16:15-16:30 [O-17] Tomoya Johmen[1], Motoya Shinozaki[1], Yoshihiro Fujiwara[1], Takumi Aizawa[1], and Tomohiro Otsuka[1,2] ([1]Tohoku University, [2]RIKEN),

"High-frequency measurement in graphene nanostructures for quantum devices"

16:30–16:45 Closing remarks Shigemi Mizukami

Poster presentation list

[P-1] Pratiksha Mundhe[1], Kosuke Hiwaki[2], Masamitsu Tanaka[2], Koji Inoue[1] ([1]Kyushu University, [2]Nagoya University),
"Detection of Timing Errors in SFQ Circuits"

[P-2] Taichi Sato, Masayuki Higashi, Feng Li, Masamitsu Tanaka, and Akira Fujimaki (Nagoya University),
"Impulse-driven memory cell with a directly coupled word line for reduction in footprint"

[P-3] Luding Wang (Tohoku University, Eindhoven University of Technology),
"Integrating spintronics with Photonics -- towards quantum sensing applications"

[P-4] Jana Lustikova[1], Akichika Kumatani[2,3,1], Kosuke Nakayama[1], Takafumi Sato[1], and Yong P. Chen[1, 4,5] ([1]Tohoku University, [2]The University of Tokyo, [3]Japan Science and Technology Agency, [4]Purdue University, [5]Aarhus University),
"Spin pumping into a d-wave superconductor"

[P-5] Sanshiro Hatakeyama, Yusuke Masaki, and Hiroaki Matsueda (Tohoku University),
"Theoretical analysis of photon detection mechanism in superconducting single-photon detector"

[P-6] Seigo Ito, Yuki Yamanashi, and Nobuyuki Yoshikawa (Yokohama National University),
"Design of Restricted Boltzmann Machines Using Quantum Flux Parametron"

[P-7] Kengo Sawai, Yuki Yamanashi, and Nobuyuki Yoshikawa (Yokohama National University),
"Simulation of Interaction between Probabilistic Bits composed of Superconductive Random Number Generators"

[P-8] Kosuke Hiwaki, Masamitsu Tanaka, Feng Li, and Akira Fujimaki (Nagoya University),
"SFQ interface circuit for high-speed clock domain crossing"

[P-9] Kouki Nukui, Satoshi Iihama, Kazuaki Ishibashi, Shigemi Mizukami (Tohoku University),
"Circularly polarized laser induced magnetization dynamics in $Co_{1-x}Pt_x$ alloy thin films"

[P-10] Takuya Suzuki, Yuki Yamanashi, and Nobuyuki Yoshikawa (Yokohama National University),
"Research on Network-based Intrusion Detection System Utilizing SFQ Hardware Acceleration"

[P-11] Shu Sasaki, Naoki Takeuchi, Yuki Yamanashi, and Nobuyuki Yoshikawa (Yokohama National University),
"Amplitude-controllable microwave pulse generator for qubit control using ERSFQ circuits"

[P-12] Tokunoshin Uchida, Hiroki Kutsuma, and Taro Yamashita (Tohoku University),
"Design of scalable self-shunted flux qubits with large-area Josephson junctions"